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IMPROVING RURAL CITIZEN SATISFACTION WITH WATER SERVICES: A CASE OF THE UMZUMBE LOCAL MUNICIPALITY

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Supervisor: Dr Genius Murwirapachena Signature: _ Date: 09/08/2024

Abstract

South African rural households generally experience water supply challenges. Some rural households do not have access to potable water services at all and rely on natural sources. The consequences of water from such sources are far-reaching. Where households have access to potable water, they mostly use community taps which in many cases are further from their dwellings. Equally, evidence exists that water supply reliability and quality are major concerns in many rural areas. This study aims to establish possible ways through which water service delivery can be improved to meet the needs of rural citizens in South Africa. To do this, a mixed-methods approach was adopted where quantitative data was collected from 360 household heads across four villages selected in the Umzumbe Local Municipality. Additionally, qualitative data was collected from 7 employees sampled from the Water Service Department of the UGu District Municipality which is the Water Service Authority for the Umzumbe Local Municipality. Probit regression models were then used to analyse the quantitative data, while a manual thematic approach was used to analyse the qualitative data.

Results from the household survey revealed that households are not satisfied with how they currently access drinking water, they are also not satisfied with the quality of their drinking water and are not satisfied with water supply reliability. On the contrary, municipal employees revealed that rural households are currently satisfied with the quality of their drinking water supply. However, they identified load shedding, illegal connections, budget constraints, ageing infrastructure, and climate change among the key factors affecting effective water service delivery in the municipality. The study then triangulates the quantitative and qualitative findings and made five recommendations that can improve rural citizen satisfaction with water services.

Keywords: Household satisfaction; public service delivery; water service delivery

Declaration by student

Following the University's rules, I declare that this dissertation is my work. I further declare that it has never been submitted for assessment of a degree to another university or qualification.

Student's signatur

Dedication

This dissertation is dedicated to my parents, Mr ZP Mpisane and Mrs NG Mpisane, and to my twin daughters Zelwande and Zesande Mpisane.

Acknowledgements

"*Trust in the Lord with all your heart and lean not on your own understanding; in all your ways submit to him, and he will make your paths straight"* Proverbs 3: 5-6.

Almighty, I am grateful that you have led me on this academic journey and given me the fortitude to keep going.

My parents, Mr. ZP Mpisane and Mrs. NG Mpisane, have been my pillars of strength; thank you for your unwavering belief, prayers, and support. I will always be incredibly appreciative of your love and support. My dear siblings, Thembelihle Mapumulo, Anele Mpisane, and Sifundo Mpisane, thank you immensely for your support and compassion. I appreciate you being there for me. I want to express my sincere gratitude to my extended family for your unwavering support, prayers, and belief in me.

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enthusiastic participation in the surveys and interviews. Your assistance has been greatly appreciated, and your insights have enhanced my research.

List of acronyms

DWS	Department of Water and Sanitation
IREC	Institutional Research Ethics Committee
KZN	KwaZulu-Natal
MFMA	Finance Management Act
NPM	New public management
PPPs	Public-private partnerships
RDP	Reconstruction and Development Program
SDG 6	Sustainable Development Goal 6
Stats SA	Statistics South Africa
UNICEF	United Nations Children Emergence Fund
VIF	Variance Inflation Factor
WBs	Water Boards
WHO	World Health Organisation
WSAs	Water Services Authorities
WSPs	Water Services Providers

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Chapter 1

Introduction

1.1 Introduction and background

In developing and emerging economies like South Africa, India and Brazil, municipalities are an essential vehicle for local economic development. They provide public services as a measure to address poverty, improve livelihoods and develop local economies. The most common services provided by municipalities to communities include water, sewage and sanitation, electricity and solid waste collection, among others. To provide these services, municipalities may use internal and/or external mechanisms. The former entails the use of a department or administrative unit within the municipality to provide public services on behalf of the municipality. On the other hand, the latter refers to a situation when a municipality outsources a third party to provide public services on its behalf. In some cases, municipalities enter into public-private partnerships (PPPs) to improve the quality of public service delivery (Mandiriza and Fourie 2023; Qian et al. 2020). Each of these mechanisms has its own advantages and disadvantages, which are sufficiently discussed in the literature (Nwokorie 2018).

While both rural and urban communities receive public services, urban communities usually receive better services than rural communities in most developing countries (Cattaneo et al. 2022). The discrepancy in public service delivery between these communities is driven by a plethora of factors, which include the ability to raise revenue from public services, the ability to attract skilled personnel, and the availability of economic activities. In most cases, economic activities are concentrated around urban areas; thus, urban municipalities can raise more revenue and attract more skilled personnel than rural municipalities. Such dynamics would result in urban communities receiving better services than communities served by rural municipalities. To promote local economic development in rural areas, national governments across the world do

provide incentives for private businesses to invest in rural and remote communities (Apeh et al. 2020; Narzetti and Marques 2022). Such private investments have an impact on the livelihoods of rural citizens and can eventually boost the revenue base of municipalities operating in such environments (Musara, Niyimbanira and Madzivhandila 2022; Sycheva et al. 2018).

Access to public services in rural communities in South Africa is marked by several milestones. For example, access to potable water services has significantly increased across the country, even in rural and remote areas, since the end of apartheid. Approximately 88.2% of South African households had access to tap water in their dwellings, off-site or on-site, in 2019, while about 82.1% accessed improved sanitation (Statistics South Africa 2020). Although the statistics on access to potable water services are quite commendable at the aggregate level, access to potable water services is still a challenge in some rural areas. In these areas, communities still fetch water from rivers and streams. Therefore, efforts are still being made to improve potable water services for all South Africans, especially those in rural areas and other previously disadvantaged areas.

According to Mwelase (2021), all citizens in the UGu District, which is responsible for the water supply, have been exposed to the distressing situation of being unable to engage in essential activities such as cooking, bathing, flushing toilets, and caring for their families. This predicament has significantly hindered their ability to lead a satisfactory quality of life. Water shortages continued for more than four weeks over the 2016 Christmas season. Residents of Umzumbe Ward 13 and Oshabeni Wards 4 and 14 barricaded the road in protest of their living conditions with regards to water supply, to convey the anger and frustration felt by thousands of people in the UGu area. Pressure is escalating on UGu District Municipality to fix, or at least play a part in fixing, the current water crisis (Aylward 2021).

1.2 Problem statement

There is a large gap in service delivery between rural and urban communities in South Africa. This gap has led to a lack of public confidence in the local government systems (Rulashe and Ijeoma 2022; Thusi, Matyana and Jili 2023). Most municipalities in South

Africa fail to optimally deliver public services, and this situation is worse in rural and other less developed areas. While insufficient finance and backlogs are usually cited as key determinants, evidence also suggests that inefficiency, inaptitude, complacence, negligence and corruption critically affect the provision of public services across municipalities. Consequently, service delivery protests are common to the extent that the country has frequently been identified as the “protest capital of the world” (Check 2023; De Juan and Wegner 2019). In most cases, such protests end up violent, leading to vandalism and the destruction of property and infrastructure (Mahaye, Dlomo and Ajani 2023; Mokhomole, Khosa and Olutola 2023; Rakubu, Masuku and Madima 2023).

The lack of proper and/or adequate public services is mostly observed in remote and rural areas, which are, in most cases, marginalised. In these areas, there is inadequate access to potable water services (Mabizela and Matsiliza 2020). Literature suggests that inaccessibility to potable water services in rural areas is mainly due to financial difficulties as municipalities do not raise sufficient revenue; thus, a majority of them rely on the equitable share grant to fund water services (Enaifoghe 2022; Selaelo and Khutso 2022; Mazele and Amoah 2022). While resources are scarce, municipalities serving rural communities should devise innovative ways to improve citizen satisfaction with potable water services. This is more important because access to basic water services is constitutionally considered a basic human right in South Africa.

Most residents in rural areas are poor and rely on the government for social welfare. According to Jamieson and Van Blerk (2022), most people in rural South Africa receive at least a social grant, which means they also rely on local municipalities to provide basic needs. Across the world, more than 785 million people do not have access to basic drinking water facilities, and this is more prevalent in rural areas where four out of every five people do not have access to potable water (United Nations Children’s Emergency Fund, UNICEF 2019; World Health Organisation, WHO 2019). In South Africa, a large number of rural residents do not have access to potable water services, with many relying on water from rivers, streams and wells. During dry seasons, communities that depend on wells for water usually run out of water (Arimoro and Musa 2020). Individuals with access to potable water services predominantly obtain water from shared taps, and sometimes from outdoor sources like yards rather than

within their homes. Nevertheless, water supply reliability is still a concern even among those with access to potable water services. In some cases, residents can go for days without water due to one problem or another. Many other water service challenges for rural households are documented in the literature (Enqvist, Matikinca and Ziervogel 2020; Geere et al. 2020; Makaya et al. 2020).

1.3 Research aim and objectives

The aim of this study is to establish possible ways through which the delivery of potable water services can be improved to meet the needs of rural citizens in South Africa. To achieve this, the study uses a case study of selected rural areas in the Umzumbe Local Municipality, in the KwaZulu-Natal province. The aim of the study is achieved through the fulfilment of five main objectives, namely:

i. To ascertain the extent of rural citizen satisfaction with water services in the municipality,

ii. To establish the key determinants of the current water service delivery levels in the municipality,

iii. To determine the effects of the current water service delivery levels in the municipality,

iv. To establish household preferences for water service delivery in the rural areas of the municipality, and

v. To recommend possible strategies that can be used to improve water services for rural consumers in the Umzumbe Local Municipality.

1.4 Significance of the study

Although the South African government has made significant strides with regard to creating an equal society, challenges are nonetheless still dominant. These challenges contribute to the prevalence of violent service delivery protests (Xolani, Mkhize

Mlambo 2022). Currently, there are very few studies in the literature that reflect on the effectiveness of public service delivery in rural municipalities. Therefore, the contribution of this study is threefold. First, the study contributes to the academic literature by recommending possible attributes of water service packages that may satisfy rural citizens. The few available studies in the literature focus mainly on service delivery challenges, determinants and consequences and do not focus much on providing ways through which water services can be tailored to meet the expectations of rural citizens (Mamokhere 2019; Salehi 2022; Zhang et al. 2023). Thus, this study is a notch up on these studies as it seeks to provide evidence on water service delivery packages and attributes that would improve rural citizen satisfaction.

Second, this study is important to managers and policymakers in municipalities that serve rural communities. It provides new knowledge generated directly from citizens to suggest possible ways to sustain water services. Such evidence is essential in water service delivery and complements efforts from the national government for municipalities to promote public participation in municipal decision-making. This study provides a platform for rural citizens to reflect on the water service packages that they currently receive and subsequently suggest possible ways through which water services may be delivered. Such an exercise promotes consumer-oriented water service decision making and is essential for efficiency as needs and services match each other (Almeida 2023; Blair 2018). Public participation mechanisms essentially develop a sense of ownership. As citizens get an opportunity to express their views and believe that their views are valued, they are likely to refrain from unnecessary service delivery protests as recourse (Glimmerveen, Ybema and Nies 2022).

1.5 Organisation of the study

This study is divided into seven chapters. The first chapter introduced the study. An overview of the water distribution sector in South Africa is presented in the second chapter. The theoretical and empirical literature that serves as the study's foundation is examined in depth in the third chapter. In the fourth chapter, the study discusses the methodology. The findings from the household survey are presented in chapter five,

while the findings from employee interviews are presented in chapter six. Chapter seven provides possible recommendations and summarises the study's findings.

Chapter 2

The South African water distribution sector

2.1 Introduction

The commitment to the right to water has led to a significant increase in the number of South Africans who have access to clean and sufficient water sources (Angel and Loftus 2019). On the other hand, poor municipal administration and deteriorating infrastructure continue to increase the likelihood of poor and irregular water service delivery (Askham and Van der Poll 2017). This chapter provides an overview of the South African water distribution sector. The chapter is organised into three main sections. The first section introduces the important players in the South African water distribution sector and their responsibilities. The second section provides an overview of trends in access to water services in South Africa. The final section discusses the key legislation governing the South African water distribution sector.

2.2 Key players in the South African water distribution sector

The provision of water services in South Africa has a value chain that involves many players. Key players in this value chain are the Department of Water and Sanitation (DWS), Water Boards (WBs), Water Services Authorities (WSAs), Water Services Providers (WSPs) and consumers. The legislative mandate of the DWS is to ensure that the country's water resources are protected, managed, used, developed, conserved and controlled in a manner that benefits both the citizens and the environment. The DWS acts as the regulator in the water sector, setting national norms and standards for water services as well as monitoring and supporting players in the sector. The WBs, on the other hand, are responsible for the provision of bulk potable water and wastewater services to municipalities, which are retailers in the water distribution sector. There are nine WBs that vary in size and perform bulk water

purification and distribution as well as managing water resource facilities and infrastructure within specified jurisdictions across South Africa (Ngobeni and Breitenbach 2021).

In South Africa, municipalities are the only institutions legally allowed to provide water services to final consumers. Thus, they operate as natural monopolies in the provision of water services. The country has 257 municipalities, which are grouped into eight (8) metropolitan areas (A), 44 districts (C) and 205 local (B) municipalities. Nevertheless, not all 257 municipalities are legally authorised to provide water services. A municipality that is authorised to provide water services is called a Water Services Authority (WSA). Murwirapachena et al. (2024) explain that there are only 152 WSAs, which are generally district municipalities that deliver water services within the jurisdiction of their local municipalities and local municipalities that deliver water within their own jurisdictions.

Usually, when the district municipality is a WSA, the local municipalities in that district are not authorised to provide water services. However, where the local municipalities within a district are authorised, the related district municipality is not authorised. Cases where a local municipality is authorised ahead of the district occur when the local municipality is deemed to have a bigger budget. This is usually the case with category B1 local municipalities, which are also called secondary cities in South Africa[1] (Murwirapachena et al. 2024). In some instances, a municipality may be an authorised WSA but appoint another municipality to act as a water service provider (WSP) and provide water services to customers on its behalf (Enqvist and Ziervogel 2019; Murwirapachena et al. 2024). While only municipalities can be WSAs, a WSP can be a municipality, a WB, or an individual given the responsibility to supply water services to final consumers on behalf of a WSA. Figure 2.1 shows the location of the big South African municipalities across the nine (9) provinces of the country.

[1] Local municipalities are further grouped into four categories. Any local municipality with a large town or city as its urban core is category B1, while a local municipality with a medium town as its urban core is category B2, and a local municipality with a small town as its urban core is category B3, whereas a local municipality without an urban core is category B4.

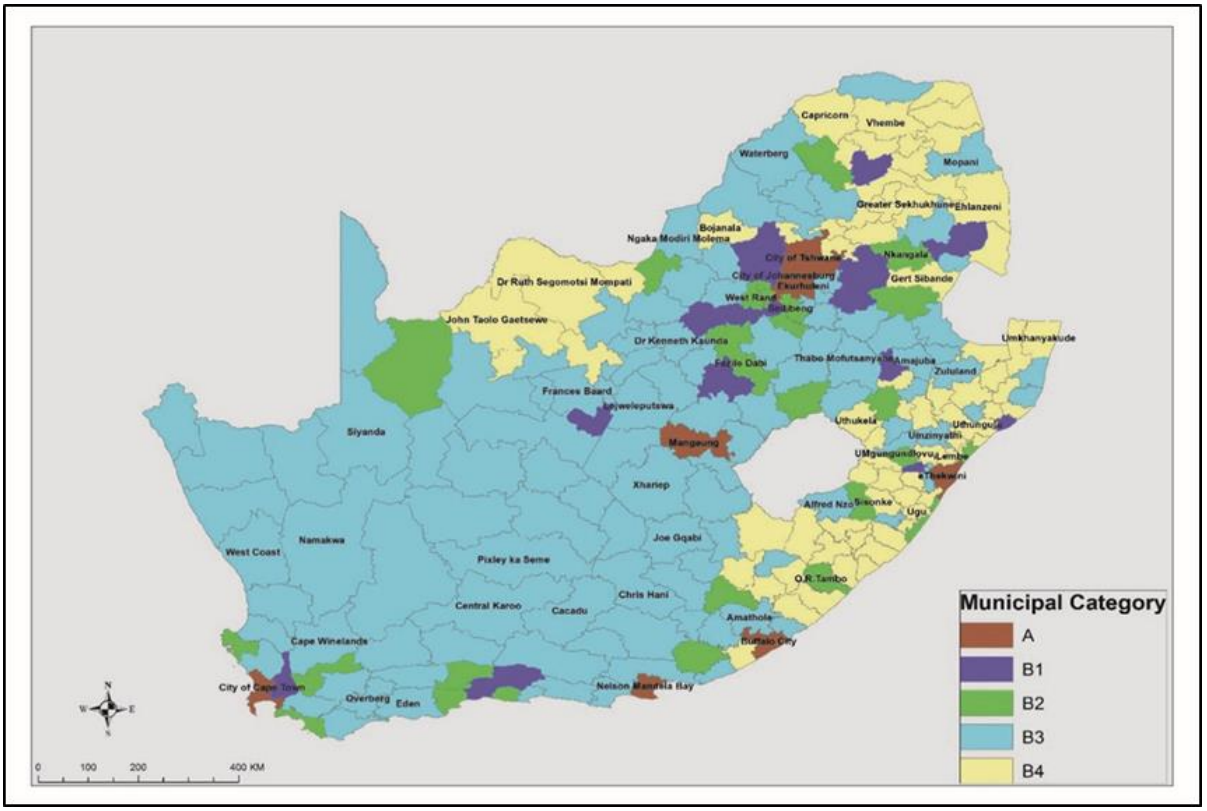


Figure 2.1: South African map showing municipal categories

Source: Statistics South Africa (2016)

The map shows the distribution of municipalities according to their categories around the country. It is clear from the map that most municipalities in the country are category B3 local municipalities. As mentioned earlier, these are local municipalities with small towns as their urban cores. Interestingly, category B4 local municipalities exist only in some parts of the country, predominantly in KwaZulu-Natal, the Eastern Cape, Mpumalanga, Limpopo, and the North-West provinces. This category does not exist in more urbanised provinces like Gauteng and the Western Cape, as well as other provinces like the Northern Cape and the Free State. On the other hand, very few B1 municipalities are noted, scattered across the country. Together with metropolitan (category A), B1 municipalities have higher populations and are anchored by major cities across the country.

On the other hand, water consumers are also an important stakeholder in the water distribution sector. Water consumption in South Africa is categorised into household consumption, irrigation, urban usage, rural use, mining and bulk industries, power

generation, and afforestation (Cole et al. 2018). Only 3% of the country's total water resources are utilised for municipal and domestic uses in rural regions, whereas 66% is used for agriculture, irrigation, afforestation, animal watering and environmental conservation (Department of Water and Sanitation 2019). Water is often used by mining companies in the manufacturing of raw materials and other direct operations. It is also extracted for dust control, drilling and product transportation as slurry, as well as during direct operations when freshwater is consumed for cooling, heating and washing (Askham and Van der Poll 2017). The demand for water among businesses and agriculture continues to drastically increase due to population growth and economic development. Figure 2.2 depicts the various water uses in South Africa.

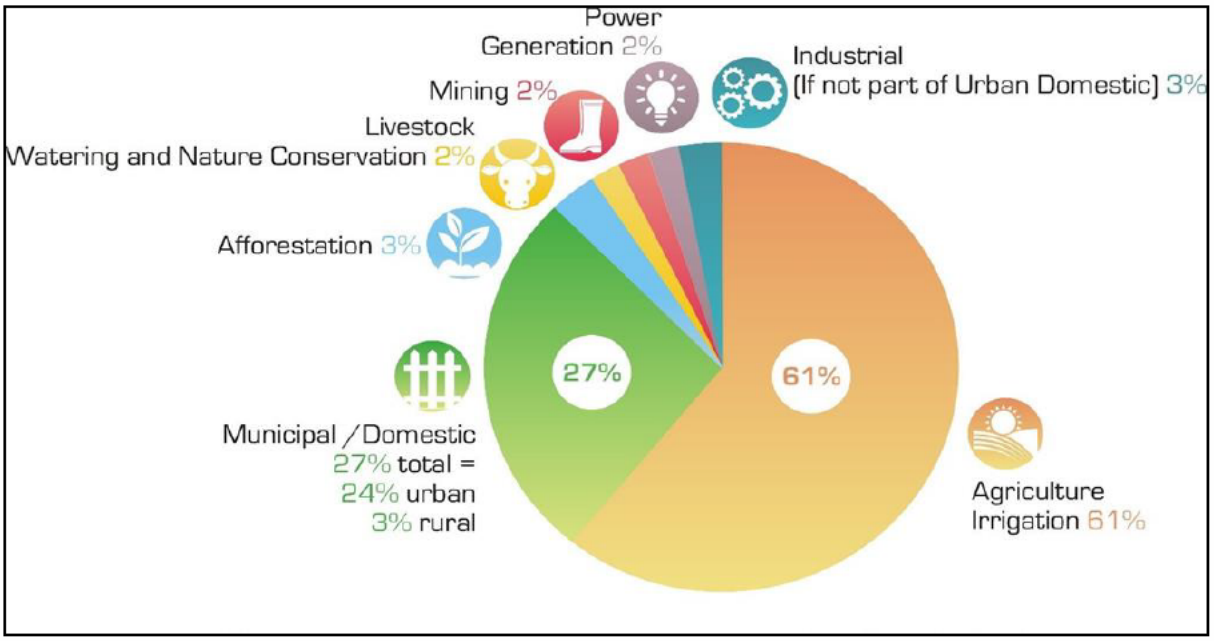


Figure 2.2: Water use by sector in South Africa

Source: Viljoen and van der Walt (2018)

The agriculture and irrigation industries consume the greatest share of water resources, accounting for 61%. This is mostly unmetered consumption, prompting concerns about unlicensed abstraction and water waste in the industry (Viljoen and van der Walt 2018). Evidence exists that agricultural water users pay a far lower rate than other untreated water users, and the comparatively inexpensive water has not encouraged the development of water-saving irrigation methods (Viljoen and van der Walt 2018). Municipal water use is the second-largest water consumption category.

This includes water that is distributed by the various municipalities to their domestic and non-domestic consumers. While the share of municipal water consumption is 27% in total, most of this water is distributed to urban consumers, who account for 24%, while only 3% goes to rural consumers. Other industries consume within the range of 2-3% of South African water resources.

It is very important to note that in terms of household water consumption, South Africa's daily water consumption averages are above the global averages. More precisely, the average household water consumption in South Africa is around 237 litres per day, which is greater than the global average of 173 litres per household per day (Murwirapachena 2021). Within a typical household, water is mainly used for drinking, cooking, hygiene, laundry, cleaning cooking utensils, cleaning the house, watering animals and irrigating the garden. A variety of factors influence domestic water consumption, including the age, employment, cultural preferences, and family income of those who use it (Crouch, Jacobs and Speight 2021; Murwirapachena 2021).

2.3 Access to water services in South Africa

Since attaining democracy, the South African government has continuously implemented pro-poor policies with the view of uplifting poor communities by improving their quality of life. Such policies aim to improve the levels at which basic services like water are delivered across the country. At the onset of democracy, policies such as the Reconstruction and Development Programme (RDP) specifically quantified what was considered acceptable and adequate basic services. In terms of water services, the RDP stated that water should be accessible within 200 metres of the home and must be reliable (with no interruptions that are longer than 7 days) and safe to drink, where each person should receive at least 25 litres of water per day (Farrar and Rivett 2012). Thus, the policy implied that a household of eight (8) people was entitled to at least 6 000 litres of uninterrupted water within 200 metres of the house per month.

Access to safe drinking water has improved in South Africa. Currently, there are many ways through which South Africans access water. Commonly, households access water inside the house, while others access it in the yard and through community taps

within 200 metres of the yard. However, some households' still access water from facilities located more than 200 metres away (Cole et al. 2018). This is usually common in areas where poorer citizens live, for example, in informal settlements and some rural areas. In such areas, people usually rely on boreholes and/or surface water (i.e., rivers, dams, springs, and wells). The quality of water from surface sources is usually not guaranteed due to pollution and other human activities. Trends in access to water and the various types of access in South Africa over the period 2002 – 2020 is given in Table 2.1.

Table 2.1: Household access to drinking water in South Africa (2002 – 2020)

Year										
Water source	**2002**	**2004**	**2006**	**2008**	**2010**	**2012**	**2014**	**2016**	**2018**	**2020**
Percentage										
Piped(tap) water in dwelling	40.4	40.1	41.2	43.7	42.8	44.6	46.4	46.6	44.9	46.6
Piped (tap) water on site/yard	27.7	29.3	30.2	27.1	29.1	27.1	27.0	26.8	28.8	28.3
Borehole on site	2.7	1.6	1.2	1.2	1.1	1.4	1.9	1.8	2.2	1.9
Rain-water tank on site	1.3	0.3	0.4	0.5	0.3	0.6	0.4	0.8	1.4	1.2
Neighbour's tap	0.6	2.3	2.1	2.6	2.5	2.9	2.7	2.4	2.5	1.7
Public/ communal tap	13.6	14.8	15.4	15.6	15.5	15.9	14.0	13.2	12.2	12.5
Water-carrier/tanker	0.6	0.6	1.1	1.1	1.4	1.4	1.2	2.4	1.7	1.8
Water vendor	-	-	-	-	-	-	-	-	1.7	1.8
Borehole outside yard	2.8	2.7	2.3	1.9	1.3	1.1	1.2	1.6	1.4	1.1
Flowing water/stream/river	5.9	4.7	3.3	3.5	3.2	2.3	2.7	2.1	1.6	1.9
Stagnant water/dam/pool	0.7	0.6	0.3	0.3	0.3	0.2	0.4	0.2	0.1	0.2
Well	1.4	1.0	1.0	0.6	0.3	0.4	0.5	0.3	0.5	0.3
Spring	2.0	1.8	1.3	1.5	1.5	1.3	0.9	1.0	0.9	0.6
Other	0.3	0.2	0.2	0.3	0.6	0.5	0.7	0.9	0.5	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Statistics South Africa (2020)

The table shows trends in access to water through both improved and unimproved water sources over the period 2002 – 2020. Access to water through improved sources (i.e., in dwellings, on site, boreholes, neighbour's tap's, community taps, etc.) has improved from about 86.9% in 2002 to about 96.9% in 2020. This implies that the percentage of improved sources has increased by 10% since 2002. On the other hand, the table also shows that access to water through unimproved sources (i.e., rivers, pools, wells, springs, and others) changed from 10.0% to 3.0% during the same period. This results in a 7% decline in unimproved sources in 2020. The use of water from unimproved sources endangers human health (Herbig 2019). Nevertheless, these sources are common in the most impoverished communities, especially in rural areas.

While access to potable water has improved in the country, water supply reliability is a major challenge across South Africa. An increase in the population, pollution, and inadequate allocation and distribution systems all placed significant strain on a sufficient and equitable water supply (Ndimande 2022). As a result, water access varies significantly between provinces, with rural areas falling behind (Statistics South Africa 2016; Statistics South Africa 2019). From 2002 to 2019, the availability of water decreased in five provinces, with Mpumalanga experiencing the greatest decrease (Statistics South Africa 2019). Additionally, the inadequate budget provided by certain municipalities for operations and maintenance in comparison to that allocated for new capital works, poor revenue management, and municipalities inability to engage suitably skilled technical personnel are all contributing factors to poor water dependability (Department of Water and Sanitation 2018).

Due to the legacy of apartheid, weak public sector accountability, and low-average annual rainfall, around 5 million South Africans do not have reliable access to safe drinking water (Botai, Botai, and Adeola 2018; Statistics South Africa 2016). Since then, South Africa has been experiencing extreme weather conditions as a result of climate change, with droughts, heat waves, and floods becoming more common (Chersich et al. 2018). Consequently, droughts have a significant direct influence on the lives of rural populations (Makaya et al. 2020). The consequences of persistent droughts in South Africa have been particularly visible in the strains on water resources in a number of large cities, such as Cape Town and Port Elizabeth (officially renamed Gqeberha), as well as medium-sized towns, such as Makhanda (Dos Santos et al.

2017; Weaver et al. 2017), where severe water cuts and rationing measures have been implemented to avoid the so-called 'day zero' (i.e., the day when most taps in households will be switched off literally). Figure 2.3 shows the percentage of water disruptions in each of South Africa's nine provinces in 2020.

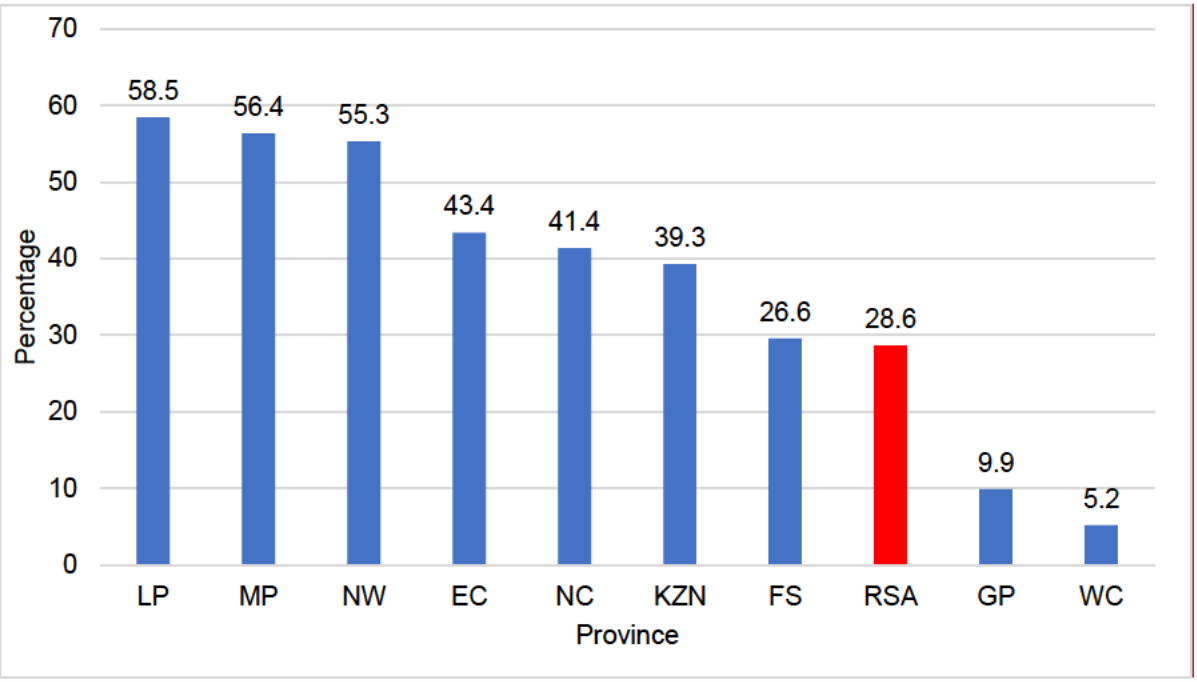


Figure 2.3: Percentage of households that reported water interruptions in 2020

Source: Statistics South Africa (2020)

Figure 2.3 reveals that the greatest disruptions were reported by families in Limpopo, with 58.5% and Mpumalanga with 56.4%. These interruptions lasted for more than two (2) days, or more than 15 days in total, during the whole period. On the other hand, households in the Western Cape with 5.2% and Gauteng with 9.9% had the fewest disruptions. Nationally, 28.6% of households experienced water interruptions in 2020. This implies that the water supply is not always consistent. While many households do not have alternatives when faced with water interruptions, those that do rely on boreholes, rainfall and water tankers (Statistics South Africa 2017). However, many of these sources provide consumers with polluted water that is unsafe for immediate consumption (Umra 2020).

2.4 Key laws governing water services provision in South Africa

Since attaining democracy, various pieces of legislation have been introduced to govern the provision of water services in South Africa. These pieces of legislation include the Water Services Act (108 of 1997), the National Water Act (36 of 1998), the Municipal Systems Act (32 of 2000), and the Municipal Finance Management Act (56 of 2003). These Acts complement each other and provide guidance for municipalities to effectively operate and deliver services to all South Africans.

The Water Services Act (108 of 1997) makes provision for an institutional framework for the delivery of water services by recognising the right of access to basic water supply that is necessary to secure sufficient water and an environment that is not harmful to health and the well-being of communities. Section 3 of the Act interprets Section 27 of the Constitution of the Republic of South Africa by stating that everyone has the right of access to water and that the government must take steps to ensure that this right is realised. Thus, the government must guarantee that water services are provided in an efficient, equitable and sustainable manner. Such a provision should not be less than 25 litres per person per day at a minimum flow rate of not less than 10 litres per minute and within 200 metres of a household. Further, it provides that no consumer should be without water supply for more than seven full days in any year. Every municipality is expected to include these rights in its water services development plan.

The National Water Act (36 of 1998) ensures that the country's water resources are protected, used, developed, conserved, managed and controlled in ways that are consistent with international standards and best practices. According to the Act, rivers, dams, wetlands, surrounding land, groundwater and human activities that affect them should be managed as part of a single cycle. As a result, all water will be viewed as a shared resource. Additionally, it repealed the Water Act (54 of 1956), which essentially consolidated water law as it had developed during the historical context of colonial expansion and sets the scene for a new water dispensation in democratic South Africa.

While these two pieces of legislation speak directly to water as both a resource and a service, legislation such as the Municipal Systems Act (32 of 2000) and the Municipal Finance Management Act (MFMA 56 of 2003) regulate how municipalities conduct

themselves in providing services such as potable water services. The former sets out guidelines that enable municipalities to uplift communities by ensuring access to essential services. The Municipal Systems Act is one of several pieces of legislation aimed at empowering local governments to carry out their constitutional obligations. Municipal councils are required by the Municipal Systems Act to consult communities on matters relating to municipal services. Thus, communities should contribute towards the delivery of services.

On the other hand, the MFMA modernises budgets and financial management practices by making municipal finances more sustainable, giving municipalities the capacity to maximise revenue and efficiently deliver public services. It provides the key concepts, systems and processes that municipalities should follow to promote community, social and economic upliftment. Its goals are to ensure the sound and sustainable financial management of municipalities and other institutions in local government. Further, it defines Treasury rules and standards for the local government. According to the Act, municipalities should build and manage their administration, budgets and plan procedures that prioritise both the community's fundamental requirements and promote its social and economic growth. It recognises that municipalities cannot provide services to the public without sufficient funds. Thus, they should raise revenue from ratepayers within their jurisdictions through levying taxes, rates and service charges. The Act builds on the premise that if a municipality does not have sustainable revenue, it will be unable to meet its obligations.

2.5 Conclusion

This chapter presented an overview of the South African water distribution sector. A discussion of key players in the South African water distribution sector was provided. It was mentioned that the most important players in this sector include the DWS, which assumes the role of policymaker and regulator, as well as Water Boards and municipalities, which can be WSAs and/or WSPs. The consumers of water services were also mentioned among the key players. Further, the chapter presented trends in access to water in the country, noting that while some inroads have been made, more still needs to be done to increase the number of households that access water from

improved sources. Finally, the chapter provided a brief discussion of the key legislation that governs the South African water distribution sector. Generally, the chapter gave a clear overview of the South African water distribution sector. Such an overview is an important precursor to achieving the aim of this study. The next chapter will provide the theoretical framework of the study and review some empirical literature important to the study.

Chapter 3

Literature review

3.1 Introduction

Access to improved water supply is an important aspect of socio-economic development. Literature documents the importance of accessing improved water supplies for people's livelihoods. Access to water supply differs in terms of extent and magnitude across different areas in the same country, countries and global regions. Many people in developing countries do not have access to improved and sustainable water supplies. As a result, access to improved water supply is a topical socio-economic goal in these countries. This is consistent with the sixth sustainable development goal 6 (SDG 6) of equitable access to safe and affordable drinking water for all by 2030. Hence, studies on access to improved water supply have increased in the academic literature. This chapter provides a discussion of some of these and other related studies in the literature. The chapter is divided into two sections. The first section discusses the theoretical literature that underpins the study. The second section of the chapter discusses some of the empirical literature linked to the study. These two sections generally position the study within the existing body of public administration literature.

3.2 Theoretical literature

Many theories can be used to separately explain the provision of public services and citizen satisfaction with public services. Such theories include the new public management theory (Hood 1991) and consumer satisfaction theories such as the dissonance theory (Festinger 1957), the contrast theory (Sherif 1961), the expectancy disconfirmation paradigm (Oliver 1980) and the value percept theory (Westbrook and Reilly 1983). The study adopts the new public management theory as the main theory

underpinning it. However, since the focus of the study was on improving citizen satisfaction with water service delivery, the study further adopted two consumer satisfaction theories, namely, the dissonance theory and the equity theory, as key theories relevant to the study. Although these two consumer satisfaction theories do not belong to the public management domain, their assumptions may be adopted by municipalities to improve water service delivery. This subsection provides summarised discussions of the three theories that form the theoretical framework of the study.

3.2.1 The new public management (NPM) theory

Developed by Hood (1991), NPM applies private sector concepts and strategies to the public sector. The theory is premised on the key assumption that increased market adaptation in the public sector would lead to more effective and efficient governance. The theory opposes focusing too much on formal organisational structures, bureaucracy, rational actor behaviour and policy implementation, and advocates for critical thinking at the management level (Hyndman and Liguori 2016). It argues that previous public administration was neither democratic nor free-market-oriented; hence, it failed to enhance institutional, administrative, organisational, and structural environments, especially in less developed regions (Vyas-Doorgapersad 2011). The theory is viewed as the tacit premise of a coherent and integrated body of management theory that originated from private sector experiences but is used to ground contemporary public management (Osborne, Radnor and Nasi 2013). Individualism, instrumentality, and individual rationality are central to the NPM paradigm. According to Kelly (1998) and Lynn (1998), these values developed new performance-driven public administration and institutional arrangements, new structural forms, and new management approaches.

In recent years, the theory has dominated the way practitioners and academics think about public sector reform. The fundamental concerns that NPM addresses require full attention in the academic and public administration literature. Hence, its virtues and demerits continue to receive considerable attention within both the public administration and political dimensions. Earlier discussions around the theory were usually on whether its reforms were desirable in principle (Polidano 1999). Therefore,

early critics of the theory claimed that it was only a passing fad, which would erode public service accountability to communities and fail to achieve the promised quality and efficacy of public service delivery (Lynn 1998; Pollit 2000). However, the theory uses economic and management theories to provide perspectives on how an efficiency focus should modify the formal organisation of the public sector, the methods employed, and the competence required (Christensen and Lægreid 2017).

Regardless of the criticisms, the theory is relevant in modern public management practice. It is more applicable to this study as it identifies ways through which the public sector can increase productivity, efficiency and effectiveness in public service delivery. Quality service delivery must meet the demands of the community. NPM emphasises the importance of collaboration between private and public entities in order to achieve this goal. This is more important in the South African context, where citizen-centred services, value for taxpayers' money, and responsive public service personnel are among the most critical challenges. Additionally, the NPM advocates for the vision of public managers as entrepreneurs leading a new, leaner and increasingly privatised government, copying not just commercial tactics but also corporate principles (Denhardt and Denhardt 2000). These tenets are the pillars of this study, which seeks to promote efficiency and optima in the delivery of water services to rural South Africans.

The NPM's guiding principles are pertinent since they seek to improve the efficacy and efficiency of the provision of water services. This goal is supported by NPM's emphasis on outcome-based management and performance measurement, which ensures that water services are provided more effectively in response to community demands. The water services in South Africa benefit from decentralisation and flexibility as well, especially in rural areas. The study's emphasis on public participation and NPM's approach of considering citizens as customers complement each other. By taking into account citizens' needs and preferences, NPM ensures that citizens are satisfied with the services they receive. In order to improve service delivery, collaboration between the public and private sectors is encouraged, particularly in South Africa where resources are scarce. Encouraging a culture of responsibility and proactive management within the water services industry, pushing innovation and continuous

improvement, and holding managers accountable for their actions are all ways to advance managerialism and accountability.

3.2.2 The dissonance theory

Developed by Festinger (1957), this is a psychological theory that assumes that a person who expects a high-value product but receives a lower-value one will note the difference and experience cognitive dissonance. Mostly applied in the private sector, the theory focuses on how motivation and emotion can be influenced by perception and cognition. When there is a contradiction (dissonance) in attitudes or behaviours, something must be done to alleviate the dissonance. In terms of the disparity between attitudes and conduct, the attitude will most likely alter to accommodate the behaviour (Festinger 2002). Accordingly, Hogg and Vaughan (2005) stated that individuals desire consistency as they always want to act in ways consistent with their ideas. Thus, they want to guarantee that their beliefs and values are always correct. In other words, when people's views are questioned or their conduct is inconsistent with their beliefs, dissonance is created and individuals need to lessen the dissonance to feel safer and more comfortable. In general, the theory suggests that satisfaction is the outcome of a comparison between a consumer’s expectations and the actual product that they receive. Therefore, the consumer’s post-decision effect is influenced by the degree and direction of the discrepancy between their expectation and what they received.

According to the theory, people will perceive a dilemma (or cognitive conflict) only when an essential idea or attitude towards them contradicts reality (Owuamalam, Rubin and Spears 2016). The theory hypothesises that increases in the number of cognitions that are inconsistent increase the level of dissonance. It claims that dissonance can be caused by conceptual contradictions, cultural norms, inconsistencies between a cognition and a larger cognition, as well as past experiences. In addition, Miller, Clark and Jehle (2015) identified three basic assumptions. First, humans are sensitive to the inconsistencies between beliefs and actions. Second, recognising inconsistencies will lead to dissonance (Hinojosa et al. 2016). Third, resolutions to dissonance can be made in three fundamental ways,

namely, a change of belief, a change in action, and a change in action perception (Draycott 2012).

In the original publication, Festinger (1957) used the term dissonance to refer to three distinct elements. Thus, the theory itself, the triggering situation and the produced condition. One of the first revisions of the theory by Aronson (1992) emphasised the self-consistency interpretation of dissonance, which improved its predictive potential by retaining the core premise of contradictions but focusing more on the self-concept stage. Harmon-Jones (1999) later proposed the action-based model of dissonance, which aimed to explain the adaptive value of cognitive dissonance.

While the dissonance theory is both praised and criticised in the literature, it is applicable to this study for several reasons. These reasons include the impact and extensiveness of human behaviour in social psychology. As a result, it is relevant to the study because residents in rural municipalities experience physiological pain when they go days without water or endure poor water quality. Further, the mobility of people from one place to another exposes even rural residents to better water supply facilities that residents receive at other places. Such experiences create some psychological expectations in terms of the water services they should receive. If such expectations are not met by the water service provider, then rural residents may become frustrated, leading to service delivery protests.

3.2.3 The equity theory

Developed by Adams (1963), the equity theory stems from the social exchange theory by Homans (1958) and focuses on whether resources are distributed fairly across relational partners. In that context, equity is measured by comparing the ratio of contributions (costs or inputs) to benefits (rewards or outputs) for each person. The theory suggests that during an exchange, parties will feel equitably treated and satisfied if the ratio of their output to inputs is fair in their minds. When the perceived inequity causes tension in an individual, the amount of which is proportional to the magnitude of the inequity, that inequity motivates the individual to reduce it, and the strength of the motivation to reduce the inequity is proportional to the perceived inequity (Adams 1965).

When the ratio is unequal, individuals are prompted to take action that restores justice. Generally, the feeling of equity in a person depends on factors like the price paid, the benefits received, the time and effort spent during the transaction, and the experiences from previous transactions. In context, the equity theory is underpinned by the "norm of equity", which argues that everyone is equally sensitive to equality and inequity. Thus, everyone feels the same amount of tension when faced with the same level of unfairness. Even if an individual's inputs and outputs do not balance, individuals only feel equitable when the other is believed to not have an individual's inputs and outcomes in balance (Pritchard 1969). The theory assumes that people may be classified along a spectrum of equity sensitivity, ranging from "entitled" to "benevolents". Individuals who are entitled aim to maximise their benefits and prefer extrinsic to intrinsic rewards (Miles, Huseman and Hatfield 1994). In turn, equity-sensitive people desire that their outcome and input ratios be equivalent to those of their referent group, thus typically adhering to the principle of reciprocity (Hofmans 2012). On the other hand, benevolent individuals have faith that another person is looking out for their best interests and will safeguard them by exhibiting compassion, honesty, discretion, fairness, generosity, empathy, a lack of opportunism, equitability and altruism (Shaw and Liao 2021).

The equity theory has received both praise and criticism in the literature. Yüksel and Yüksel (2008) argue that the theory is different from other conventional satisfaction theories because consumer satisfaction is evaluated relative to other parties in an exchange and the outcomes of all parties sharing the same experience are taken into consideration. However, the theory has been unable to predict which behaviour, such as decreasing inputs, increasing results, or abandoning the field, would have been seen (Al-Zawahreh and Al-Madi 2012). When someone feels undercompensated, the theory suggests that the person could either work less to lessen unfairness or even work more if they choose to cognitively misrepresent the quantity of current inputs (Al-Zawahreh and Al-Madi 2012).

This theory is relevant to the study for many reasons. It provides a much richer picture of consumer satisfaction in situations that may not be captured using conventional satisfaction theories (Erevelles and Leavitt 1992). All groups, organisations and societies should cope with the issue of assigning rewards, penalties and resources.

The way a social system addresses these concerns has a significant impact on its efficacy and the satisfaction of the parties involved (Leventhal 1980). Therefore, the theory can be useful in modelling situations where consumer satisfaction is considered an important element of the transaction. This is in line with the aim of this study, which seeks to model consumer satisfaction with the delivery of water services in a rural municipality. Although the equity theory is a social science theory, it has been applied in various other domains, which include tourism, social work, consumer studies and other areas where social interactions exist (Oliver and Swan 1989; Reisinger and Turner 1997). Thus, it can be a perfect fit in the public administration domain, where consumer satisfaction with water service delivery is a topical issue.

3.3 Empirical literature

A plethora of studies on water service delivery exist both in the South African literature and in the literature of other developing countries. Such studies are currently topical as most developing and emerging economies have intensified the goal of providing improved and sustainable water supply for all in line with SDG 6. This section discusses some of the empirical studies on water service delivery that currently exist in the literature. The section is organised into four subsections. Initially, the common water supply challenges in developing and emerging economies are discussed. Secondly, the common water supply challenges experienced in rural areas are discussed. Following that, a discussion of the key determinants of water supply challenges in rural areas is provided. Finally, the impact of water supply challenges in rural areas is discussed.

3.3.1 Water supply challenges in developing and emerging economies

Many developing and emerging economies across the globe experience acute water supply challenges. In most cases, these challenges are a result of natural water scarcity, especially in arid and semi-arid regions of the world. Apart from this, various other factors are also key determinants of water supply challenges in most developing and emerging economies. The common drivers noted in the literature include

industrialisation, rapid population growth, urbanisation, and climate change (Zhang et al. 2021). Generally, both natural and human activities continue to create water supply problems across the developing and emerging economies of the world (Mateo-Sagasta et al. 2017; Motho et al. 2022).

In Africa, droughts and other extreme weather occurrences are becoming more common (Ahmed et al. 2018). The occurrence of prolonged droughts disrupts the equilibrium between water supply and demand, making regions more vulnerable to negative consequences (Payus et al. 2020). Furthermore, warmer weather encourages increased water use and exacerbates the exploitation of water resources, altering water consumption patterns and raising demand, resulting in a water shortage (Payus et al. 2020). The rapidly increasing population is another challenge African water utility commonly experience (Adeoti and Fati 2022). The major consequence of rapid population growth is that most water utilities struggle to meet consumer demand. This leads to unreliable water supply and poor water quality, among other problems. In many African countries, water supply reliability is also attributed to aging infrastructure and machine breakdowns as the current water infrastructure struggles to meet high water demand (Adeoti and Fati 2022; Kumwenda 2019). Furthermore, the problem of water contamination is posing a growing threat to the availability of clean drinking water (Afroza and Rahman 2017). Evidence shows that human activities continue to increase the levels of water pollution and the consequence is that communities then lack access to safe drinking water in many developing countries, especially in Africa and Asia (Afroza and Rahman 2017; Alayande et al. 2019).

South Asian countries battle water supply challenges, although the region is not completely water-constrained. Countries in that part of the world face challenges of water security, agricultural reliance on fresh water supplies, and an increase in irregular rainfall and climatic patterns that result in floods, droughts and natural catastrophes. Chakrabarti (2020) reiterates that unplanned water resource management and uneven access to water exacerbate these problems. In Pakistan, for example, floods that usually damage water infrastructure and the ecosystem are common (Daud et al. 2017). Generally, some parts of Asia experience intermitted water supply, where consumers within the distribution network have access to drinking water for less than 24 hours each day (Farmani et al. 2021; Li et al. 2020; Loubser et

al. 2021). Water rationing can lead to further problems as the practice of cutting and resuming the water supply creates pressure transient events, which can damage the water mains and degrade the water's chemical, microbiological, and aesthetic quality (Salehi 2022). As a result, sewage, groundwater, surface water and other sources of pollution enter the system as the pressure in the piped network declines (Bivins et al. 2017; Mitlin et al. 2019). The major consequence of inconsistent water supply is that it is linked to increased microbial contamination and a potential rise in the risk of contracting a waterborne illness.

In South America, millions of people, mostly children, die every year due to a lack of clean water (Prashad 2020). Many water customers utilise in-house storage tanks to have some backup water during periods of low water pressure or interruption of water supply, particularly in the summer, due to the unpredictability of water sources (Negharchi and Shafaghat 2020). These storage tanks are often excessive in comparison to home demand, resulting in a protracted water turnover and, as a result, a longer stagnation of water in tanks. This stagnation may lead to decreased disinfection residuals, increased water temperature, the presence of corrosion products, dangerous microbial development, and subsequently, health risks to consumers (Proctor et al. 2020; Slavik et al. 2020). Evidence exists that the water consumed by people in some parts of South America contains various forms of bacteria, viruses, protozoa and helminths, all of which cause waterborne diseases (Alvez et al. 2020; Rosado-Garca et al. 2017).

Water supply challenges are also reported in Eastern Europe, where water supply shortages are projected to affect approximately 11% of Europe's population, with an inadequate water supply now leading to the deaths of about 14 people per day (United Nations Water 2020). Due to a lack of financial resources, water infrastructure is often neglected, contributing to poor water quality and consequently customers are unwilling to pay for a low-quality water supply (Klien and Salvetti 2018). In Ukraine, for example, cases of low water efficiency, poor drinking water quality, nitrate contamination of water resources, and the deterioration of water bodies have been reported (Ladychenko et al. 2019). This causes a decrease in general organism resistance and increases the rate of general diseases, particularly infectious and oncological diseases.

Considering the above, it is evident that developing and emerging countries have similar water supply challenges that continue to negatively affect the social wellbeing of people in many communities. Population expansion, urbanisation, climate change and industrialisation are among the major drivers of water supply challenges in many developing countries. As a result, water supply becomes highly unpredictable, and the quality of water consumed is generally low. In general, customers who do not have access to clean, potable water are often forced to source water from unsafe sources, which has a severe influence on their health. The implication is that policymakers in developing and emerging economies need to develop realistic and achievable strategies that focus on enhancing the level of water supply and ensuring a consistent supply of clean water.

3.3.2 Water supply challenges and their drivers in rural areas

Water shortages affect an estimated 2 billion people worldwide, and over 4 billion people encounter service scarcity for at least one month each year (World Water Assessment Programme 2019). Most of the people exposed to the lack of or limited access to water supply are usually those residing in rural and other less developed areas. The common challenges experienced by rural communities include, but are not limited to, unreliable potable water supply, poor water quality and no access to potable, safe water services (Edokpayi et al. 2018). These constraints have a negative impact on human rights and the wellbeing of rural citizens.

Water supply reliability is a major issue in most rural communities across the globe. In South Africa, about 3% of rural communities use surface water (i.e., water from rivers, streams, stagnant water pools, dams, wells, and springs) (Statistics South Africa 2018). This has a huge impact during summer, hot periods, or when there is a drought (Iyer and Tewari 2017; Makaya et al. 2020). Even during times when there are no droughts, surface water may not always be sufficient to meet the growing demand for water in many rural areas (Fanadzo and Ncube 2018; Nephawe et al. 2021). Supply dependability is a major concern, even in rural areas where residents have access to potable water. Evidence exists that many rural households connected to public-supplied potable water sometimes spend weeks or even months without receiving

water (Edokpayi et al. 2018). In communities where, potable water is not supplied to each home, households usually collect water from rivers, springs, communal standpipes, and boreholes. Evidence shows that there is a high possibility of contamination during transporting, processing and storing water collected from these sources. This contamination is usually attributed to inadequate hygienic procedures, which eventually contaminate the water prior to consumption (Too et al. 2016). Generally, the water consumed in many rural areas is frequently considered to be of poor quality because, in most cases, it comes from unsecured sources (Daud et al. 2017; Nthunya et al. 2018; Olufunke 2022; Silva et al. 2020).

In most developing countries, water service delivery challenges are commonly due to technical restrictions, budget constraints, climate change, institutional arrangements and poor governance, social factors and environmental restrictions (Mabeba 2021). Other studies in the literature also cite unclear policy direction, poor water infrastructural maintenance, poor community participation, a lack of coordination and cooperation among stakeholders and a weak institutional framework as key drivers (Abui et al. 2016; Ahmed, Zounemat-Kermani and Scholz 2020; Chukwuma 2017). Providing equitable access to a sustainable water supply requires inclusive institutional mechanisms for multi-stakeholder engagement and collaboration. In South Africa, many municipalities are often criticised for their poor administration, which results in poor public service delivery (Mamokhere 2019). Waterpoints are usually not connected in a unified planning, management and monitoring framework. Institutional accountability is frequently lacking, service performance is unquantified and generally unknown, and infrastructure breaks down on a regular basis and is repaired slowly (Foster and Hope 2017; Omarova et al. 2019).

Proper finance and maintenance strategies that focus on maintaining and repairing water infrastructure throughout its life are essential for sustaining and improving water service delivery in rural areas (Etongo et al. 2018; Humphreys et al. 2018; Kalin et al. 2019). Large sums of state funds usually go missing without being accounted for, and state resources are often used for personal gain in many South African municipalities. Thus, fraud and corruption in the local government domain pose a huge challenge to good governance in the public sector (Mamokhere 2019). This implies that funds are mismanaged and unaccounted for due to a lack of adequate financial tools, straining

service delivery. Inadequate financial resources and ineffective pricing structures have also been identified as major factors in rural water service failure (Kativhu et al. 2018).

The state of infrastructure is closely related to the efficiency with which it offers services to all residents (Bekturganov et al. 2016; Govender 2019). Edokpayi et al. (2018) reiterate that approximately 2.11 million people in South Africa do not have access to any clean water because of poor infrastructure maintenance. According to Ntjatsane (2017), the bulk of water supply infrastructure in South Africa has deteriorated from bad to extremely poor owing to maintenance negligence. Water supply infrastructure in most areas does not provide long-term access since water may be available on certain days and unavailable on other days. As a result, individuals with sufficient financial resources have begun to drill boreholes (Edokpayi et al. 2020). However, this implies that poor rural households will not be able to install a borehole in order to have access to water. Stolen pipes and outdated equipment are commonly highlighted among the causes of intermittent potable water delivery in rural regions (Makalela and Asha 2019). Effective governance may help to resolve water supply constraints in many rural areas (Ya Metsi 2019).

3.3.3 The impact of poor water supply in rural areas

Many people in developing countries continue to suffer the adverse effects of poor water supply generally due to huge gaps in socio-economic development. Rural communities continue to bear the huge burden of water supply challenges. The effects of poor water supply that are commonly identified in the literature can be broadly categorised into health, security, social and economic challenges (Adelodun et al. 2021; Gomez, Perdiguero and Sanz 2019; Masuku and Jili 2019).

The quality of drinking water in many developing countries is poor, leading to many cases of waterborne illnesses being reported (Li and Wu 2019). Poor water quality, which makes water unsafe for consumption has several negative health consequences, including outbreaks of diseases like diarrhoea, cholera, dysentery, and typhoid (Mishra et al. 2021). About 829 000 diarrheal fatalities caused by drinking contaminated water are reported each year (World Health Organisation 2022). Generally, other health concerns connected to drinking contaminated water include

fluoride, arsenic, lead, cadmium, nitrates, and mercury, as well as other environmental contaminants including fluoride, arsenic, lead, cadmium, nitrates, and mercury (Edokpayi et al. 2018).

In most cases, women and girls around the world are responsible for gathering water. The United Nations Children's Fund (2017) estimates that women and girls spend a total of about 200 million hours every day fetching water. This role puts them at risk for musculoskeletal injuries (Geere et al. 2018). Additionally, women also have to wait in long lines, draw water and carry it back home. On their walk to and from water sources, they risk being sexually attacked. The distance a woman must go to obtain water and the regularity with which she visits water sources enhance her risk of being assaulted (Sommer et al. 2015).

In democratic countries like South Africa, the supply of inadequately treated water has been a major cause of service delivery protests. The first reason for service delivery demonstrations is dissatisfaction with the supply of essential municipal services such as safe drinking water, particularly in rural areas (Mamokhere 2019). Frustration is exacerbated by officials' and councillors' lack of response, as well as restricted or confusing lines of communication, poor service provision and high poverty levels (Masiya, Davids and Mangai 2019). Frequently, dissatisfaction leads to a wide variety of protest activities, which vary in intensity and impact (Breakfast, Bradshaw and Nomarwayi 2019). In most cases, these protests become violent, eventually causing loss of life and damage to both private property and public infrastructure.

Equally, the effects of accessing drinking water from natural sources are far-reaching. These include the economic implications of the time spent travelling to fetch water, and the potential concern that the water itself may not be fit for human consumption (Potgieter et al. 2020). Water fetching usually entails going to a water access point, waiting in line for a while, filling large containers, then lifting and bringing heavy containers home on foot, by bicycle, by pack animal, or by motor vehicle (Venkataramanan et al. 2020). People spend less time and effort physically gathering water when it comes from improved and more accessible sources, allowing them to be more productive in other ways (Hutton and Chase 2018). People are less likely to become ill and incur medical bills when they have access to a better water supply, and they are better able to remain economically active. Bhorat and Kimani (2018) state

that establishing the significance of water in South Africa's economic growth requires an economic valuation of water. This means that inadequate water service delivery is impeding economic growth and posing a threat to people's livelihoods.

3.4 Conclusion

This chapter reviewed the literature related to the phenomena examined in this study and provided a discussion of some of the theories and empirical studies underpinning the study. First, the chapter discussed the theoretical framework, where three theories linked to the study were reviewed. Second, the chapter reviewed some of the empirical literature related to the study. The empirical literature discussed in the second section of the chapter focused on the common water supply challenges experienced in rural areas of developing countries as well as the impact of these challenges. In summary, this chapter positions the study within the existing body of public administration literature. The next chapter presents the methodology used in the study.

Chapter 4

Methodology

4.1 Introduction

A methodology is the path followed to conduct research, which depicts the process by which the problem and objectives of a study are formulated as well as the presentation of findings based on the data collected (Sileyew 2019). It enriches the research process by providing scientific value and outlining the tools used to carry out the research (Igwenagu 2016). This chapter provides the methodology of this study and is organised into 16 sections. These sections include the research philosophy, research approach, methodological choice, research strategy, time horizon, the study population, target sample, sampling method, data collection instruments, data collection process, data analysis, and ethical considerations, among other sections.

4.2 Research philosophy

A research philosophy is a way of thinking that leads to the development of new and trustworthy information about the subject of the study. More precisely, it serves as the foundation for the study, which includes the formulation of the topic, the selection of the research approach, and the collection, processing and analysis of the data. Literature identifies ontology and epistemology as the two broad categories of research philosophy (Alharahsheh and Pius 2020; Ukauskas, Veinhardt and Andriukaitien 2018). In this regard, ontology focuses primarily on the phenomenon in terms of how it exists, while epistemology focuses on discovering information to arrive at reality. Thus, when referring to the types of knowledge that already exist, ontology attempts to elicit facts about a phenomenon, while epistemology is an internal aspect of the researcher, who may discriminate between good and wrong and how they visualise the world around them.

Literature further divides the two broad research philosophies into three main paradigms, namely, positivism, constructivism and critical theory (Kumatongo and Muzata 2021; Ryan 2018). Positivism asserts that reality exists independently of the researcher and must be explored through a rigorous scientific procedure (Rahi 2017; Selvan 2017). On the other hand, constructivism emphasises subjectivity and is the exact opposite of positivism. It is founded on the idea that humans attempt to comprehend the world by creating subjective interpretations of their experiences (Creswell and Creswell 2018). Meanwhile, the critical theory paradigm considers the broader repressive character of politics or cultural effects and frequently incorporates feminist studies (Ryan 2018). It comprehends society's behaviour and identifies the many types of prejudice by admitting that bias exists in all human acts. Generally, the critical theory paradigm is interested in how injustices and oppression affect how individuals experience and see the world (Haydam and Steenkamp 2020). Ryan (2018) summarises the research philosophies and the paradigms in Figure 4.1.

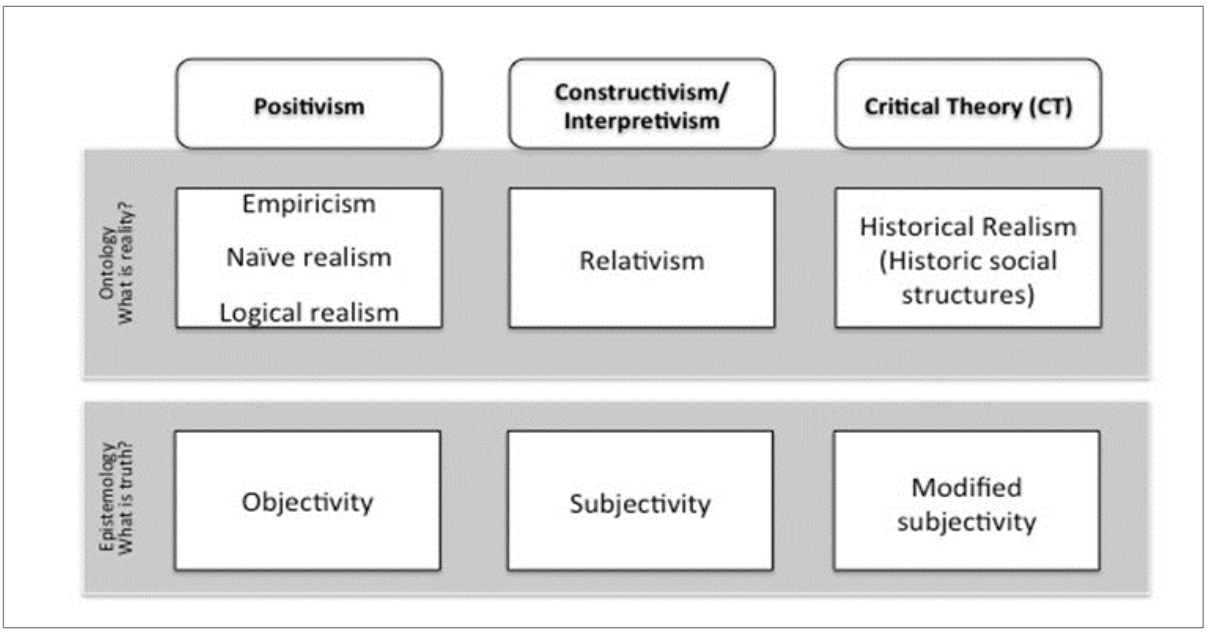


Figure 4.1: Philosophical paradigms

Source: Ryan (2018)

The three primary philosophical paradigms, each with its own set of beliefs and presumptions, are shown in Figure 4.1. Numerical data is carefully analysed using the positivist paradigm. This paradigm's ontology asserts that social reality is tangible, and

its epistemology holds that knowledge of social reality is acquired by scientific means, namely quantitative methodology. While interpretivism seeks to understand how people individually and collectively develop and interpret the social and physical environment within particular social historical contexts, its ontology is subjective and based on several practical and epistemological theories. The nature of interpretation is qualitative. Finally, critical theory focuses on social interactions in order to expose, question, and critique power structures, regardless of culture, values, or history.

The philosophy that this study adopted is ontology. Ontological assumptions are concerned with the reality of the social phenomena under investigation (Saunders et al. 2009). An objective view considers reality to be external to the mind of the researcher, while a subjective view defines reality as created in the mind of the social actor. Depending on the worldview of social phenomena, reality can be viewed from the realist or nominalist ontology for objective and subjective perspectives, respectively (Handema et al. 2023). This study adopted the positivist paradigm. According to Ryan (2018), positivism is frequently connected to experiments and quantitative research, and it is conceived as an extension of or a development of empiricism. Establishing and controlling the influence of all variables so that only the important variables are investigated. For example, only X could have produced Y, which is a fundamental objective of positivist experimentation. When it comes to this, positivist researchers are primarily concerned with the internal validity of the study, that is, how well the evidence collected and study design support statements about causal inference.

Assessment validity, which addresses how well a specific construct, such as an educational assessment or a psychological test, is measured, should not be confused with internal validity, which concentrates on causation (Park Konge and Artino 2020). However, positivist research does not always employ quantitative methods. For instance, the positivist paradigm is compatible with an experimental study that uses qualitative analysis to assess the effects of an intervention (Chua 2019). According to Al-Ababneh (2020), positivism is concerned with creating a comprehensive social structure that uses a scientific approach to analyse society and people for their own beneficial purposes. This study identified and incorporated key variables for access, quality, and reliability of water supply in Umzumbe Local Municipality, aiming to

determine their impact on household satisfaction. The research philosophy, pragmatic, allows for flexibility and the use of multiple methods to address research questions effectively, providing a holistic view of the phenomenon. This approach broadens the study's knowledge and facts, enhancing its overall understanding and enhancing the overall research strategy.

4.3 Research design

Research design refers to the plan or method used to collect and analyse data. Key research strategies include experiments, surveys, archival research, case studies, ethnographies, action research, grounded theory, and narrative inquiry (Saunders et al. 2016). Detailed discussions of each of these strategies are provided in many studies in the literature (Malhotra 2017; Pawar 2020; Saunders et al. 2016). Since this study aims to enhance water provision services in South African rural areas, the case study was adopted as the ideal strategy. The unique characteristics of case study research have made it possible for industrial marketing research to improve theory by providing deep insight into phenomena that are special to a given environment (Farquhar, Michels, and Robson 2020). This study used a case study approach with the aim of improving satisfaction with water services, specifically focusing on rural communities in Umzumbe.

Time horizon defines the time frame for the research. Using the “research onion” concept, Saunders et al. (2016) identify two main categories of time horizon, namely, cross-sectional and longitudinal time horizons. Cross-sectional studies are short-term studies where data is collected once-off at a certain time. On the other hand, longitudinal studies involve data gathering over a prolonged period to compare data (Melnikovas 2018; Saunders et al. 2016). Phair and Warren (2021) suggest that the primary influencing criteria when deciding on the time horizon are the type of study and its aim and objectives. Therefore, cross-sectional data was collected and analysed in this study. Wang and Cheng (2020) agree that cross-sectional studies' primary advantages are their affordability and speed of execution. Cross-sectional studies seek to produce solid results and new theories that can be explored through additional study by gathering dependable data (Zangirolami-Raimundo, de Oliveira Echeimberg,

and Leone 2018). A lot of cross-sectional research is conducted using interviews or questionnaires. While reaching a sizable sample of the target population with surveys is very cheap, low response rates may arise. Compared to surveys, interviews are expensive and more time-consuming, which may reduce the sample size but increase the response rate (Wang and Cheng 2020).

4.3 Research approach

Numerous factors, such as the study's application, goals, and information sought, are used to categorise various types of research (Taherdoost 2021). Depending on the type of data being sought, research can be divided into qualitative and quantitative methodologies. Quantitative research is associated with deductive procedures, while qualitative research is associated with inductive approaches from evidence to hypothesis and from theory to data. However, the research procedures used by researchers, whether quantitative or qualitative, can be found anywhere along the spectrum that inductive and deductive research approaches share (Young et al. 2020). Further, according to Saunders et al. (2016), there are three basic methods of theory development, namely, deductive, inductive and abductive methods. Deductive reasoning is used to test theories that already exist, while inductive reasoning is frequently used to construct theories or used in sectors where there have not been many studies on the subject (Melnikovas 2018). Abductive reasoning, also referred to as abductive approach is set to address weaknesses associated with deductive and inductive approaches (Żelechowska, Żyluk and Urbański 2020).

The aim of inductive research is to derive theoretical ideas and patterns from observable facts, whereas deductive research aims to examine theoretical ideas and patterns using fresh empirical evidence (Nayak and Singh 2021). This study adopted a deductive approach. The deductive method derives specific facts from general facts in social science, pre-theory, post-investigation, theoretical hypothesis investigation, observation and generalisation. Deductive research narrows information from a general to a more specific level (Kim 2021). The deductive approach is considered a top-down approach as the conclusion must arise logically from the premise (Alturki 2021). In order to increase average household satisfaction with water services in the

Umzumbe local municipality, the deductive technique was applied in the study. In accordance with this concept, the study chose variables to see if they had any effect on the reliability and quality of the water supply as well as satisfaction with the water. Upon completion, a conclusion is reached based on the findings obtained from the probit model, indicating whether a hypothesis is accepted or rejected.

4.4 Methodological choice

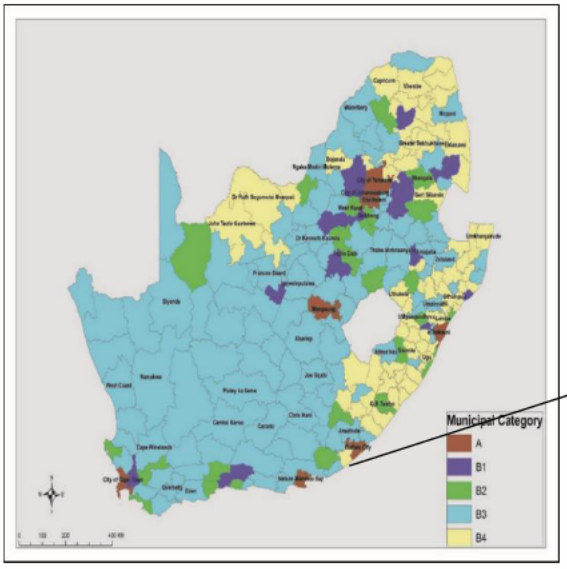
The choice of methodology concerns whether quantitative, qualitative, or mixed methods can be used (Melnikovas 2018). Choosing a methodology is a simple but crucial decision that should be made during research planning. Such choices include choosing between deductive and inductive approaches. Deductive choices typically result in the use of quantitative techniques, whereas inductive choices generally result in the use of qualitative methods (Sahay 2016). Literature also allows for the use of mixed methodologies where both quantitative and qualitative approaches are used. In this regard, a qualitative approach involves collecting and analysing data that is not in the form of numbers, for example, views, feelings, and experiences, while a quantitative approach entails the collection and analysis of numerical data using statistical procedures (Apuke 2017; Clark and Vealé 2018; Leavy 2017; Osuagwu 2020). On the other hand, a mixed-methods approach entails gathering and analysing both qualitative and quantitative data. Generally, mixed methods broaden and deepen study results (Kumar 2018; Rutberg and Bouikidis 2018; Schoonenboom and Johnson 2017).

This study used a mixed-methods approach to establish possible ways through which the delivery of potable water services could be improved to meet the expectations of rural citizens in South Africa. The mixed-methods approach was adopted because using a single approach would not have provided complete and sufficient information about the phenomenon investigated in this study. Thus, the use of a mixed-methods approach was warranted as the qualitative and quantitative components supplemented each other. To achieve the overall aim of this study, it was important to collect data from both municipal employees and households. Interviewing municipal employees provided insights and opinions from the perspective of the service provider,

while households provided insights into the water issues from the consumer's perspective. Since there was a smaller number of municipal employees, the qualitative data collected using in-depth interviews provided detailed information on the investigated phenomenon, while the quantitative approach was suitable for the collection of data from many households. Overall, the mixed-methods approach provided a comprehensive understanding of the investigated phenomenon.

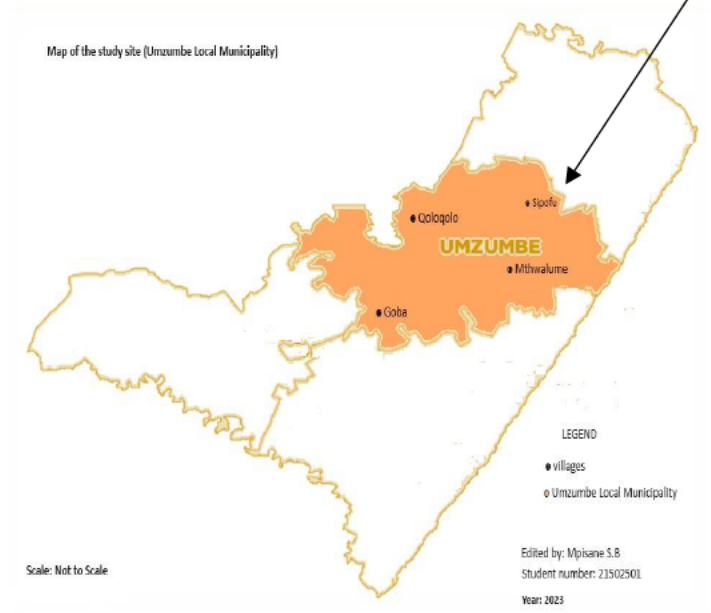
4.5 Study site and population

A study site entails the settings, context, environment and logistics, which may have an impact on how the study is conducted (Majid 2018). On the other hand, a study population refers to all the people or elements in the study site with the potential to be selected for participation in the study (Casteel and Bridier 2021; Majid 2018). This study was conducted in selected rural areas of the Umzumbe Local Municipality in the KwaZulu-Natal (KZN) province of South Africa. The municipality is one of the four local municipalities of the UGu District Municipality, which is situated in the southern part of KZN. It is one of the largest local municipalities within the district and is largely rural, with approximately 1% being semi-urban. The municipality is divided into twenty wards. Umzumbe Local Municipality 2023 reports that there are 139 045 people living in its area of management, with a negative growth rate of -0.95% per annum. The map of the municipality is shown in Figure 4.2.



Map A: South African Municipalities

Map B: UGu District Municipality



Map C: Umzumbe Local Municipality

Figure 4.2: Map of the study site

Source: Author's own diagram with maps from UGu District Municipality (2016)

The different South African municipalities are shown in Figure 4.2. More precisely, the four municipalities that make up the UGu District Municipality are shown in Map B: Umzumbe, the chosen research area, Umdoni, Ray Nkonyeni, and Umzuzwabantu. Map C illustrates the four areas that were chosen: Qoloqolo, Mthwalume, Sipofu, and Goba Village. It is important to note the Umzumbe Local Municipality does not provide water services to its residents; the UGu District Municipality, which is the authorised Water Services Authority (WSA), provides water services to the four local municipalities within its jurisdiction. The UGu District Municipality has a designated Water Services Department, which is responsible for planning and implementing decisions regarding the provision of water, sanitation and environmental services. There are 210 permanent employees in the Water Services Department. The Umzumbe Local Municipality is deemed an ideal study site to establish the preferences of rural citizens for water service delivery for several reasons. Some of the reasons include the residents' inability to access adequate, safe drinking water that meets national standards for health protection (Duma 2017).

4.6 Study sample

A sample is a subset of individuals, units, or elements with specific characteristics that the study intends to investigate (Taylor 2017). The amount of time spent on research can be reduced by obtaining data through sampling. Sampling the entire population or every single stakeholder involved is usually impractical and generally impossible (Endre 2021). Robust results can still be obtained even by selecting a representative, smaller sample. This means that the preferences of the chosen individuals must be in line with those of the overall population (Endre 2021). Various methodologies and online software exist to calculate the sample size. This is because a robust sample size is scientifically determined.

While several villages exist in the Umzumbe Local Municipality, data for this study was collected from four villages due to budget constraints. The villages targeted for data collection were Sipofu, Mthwalume, Qoloqolo, and Goba. These villages were selected primarily because residents in these villages still have huge challenges in terms of access to potable water services. Statistics show that residents in these villages

predominantly access water from rivers and streams (Statistics South Africa 2016). Only 0.9% of residents in Sipofu access piped water inside their homes, while in Qoloqolo only 0.2% access piped water inside their homes, and this figure is about 0.5% in the Goba village and 1.2% in the Mthwalume village. The four villages have a total population of 5 225 people, with 1 302 residing in Sipofu, 1 876 in Qoloqolo, 1 187 in Mthwalume, and 860 in Goba (Statistics South Africa 2016).

The target sample for this study is two-fold. First, quantitative data was collected from 358 household heads across the selected four villages. This sample size was calculated using the Raosoft sample size calculator with a 5% margin of error, a 95% confidence level, a total population size of 5 225 and a response distribution of 50%. Thus, a total of 358 responses was sufficient to produce robust results and reliable inferences. Although a minimum number was suggested, 360 responses were collected. More specifically, 90 responses came from Sipofu village, 90 from Qoloqolo village, 90 from Mthwalume village and 90 from Goba village.

Second, at least ten (10) employees from the Water Services Department of the UGu District Municipality were interviewed. While a minimum of 10 employees were targeted, data was collected until saturation was reached. This is consistent with many qualitative studies where saturation can be used to identify the appropriate sample size (Hennink, Kaiser and Weber 2019; Vasileiou et al. 2018). Thus, sampling was continued until no new information was obtained. In the context of this study, area managers, community liaison officers, superintendents, area foremen, control centres, electro-mechanical foremen, operator class 3, and general workers were specifically targeted for the qualitative component.

4.7 Sampling technique

Sampling is the process of selecting participants from the targeted population to such an extent that the results can be generalised to the same population (Etikan, Musa and Alkassim 2016). This is done to obtain accurate and reliable information about the population with minimum cost, time and energy (Pandey and Pandey 2015). Two main types of sampling techniques exist, namely, probability and non-probability sampling. Non-probability sampling is often referred to as judgemental sampling (Kapur 2018).

Generally, the non-probability sampling technique is considered optimal since it is simple and time-efficient, thus making it suitable for an exploratory study design (Taherdoost 2016). In probability sampling, each unit has an equal chance of being chosen, while non-probability sampling does not provide for a probability that all items will have an equal chance to be selected (Etikan and Bala 2017; Rahi 2017).

According to Elfil and Negida (2017), the latter exists when participants are chosen in a non-systematic manner that does not ensure equal chances for each potential respondent in the target population. The different classes of non-probability sampling are convenience sampling, genealogy-based sampling, volunteer sampling, quota sampling, matched sampling, convenient sampling and snowball sampling (Alvi 2016). On the other hand, the different classes of probability sampling are simple random, stratified random, systematic and clustered random sampling. In this study, participants for the quantitative survey were selected using the simple random sampling technique, while interview respondents were selected using the snowball sampling technique. The latter sampling technique involves approaching one element of the population at a time, requiring the said individual to direct potential respondents to the researcher (Kapur 2018).

On the other hand, the simple random sampling technique, also known as chance sampling, was utilised to give everyone in the target population an equal chance of participating in the survey (Kothari 2019). By ensuring that everyone in the target population has an equal chance of being selected, the simple random sampling approach removes bias in the selection of respondents. Generally, these techniques are employed because they work effectively for samples where people are extremely difficult to get hold of and when it is difficult to determine who belongs to the population (Easterby-Smith et al. 2021). When designing high-quality research procedures, establishing inclusion and exclusion criteria for the study's respondents is a standard and important component (Patino and Ferreira 2018). Demographic, clinical and regional factors are common inclusion and exclusion criteria. In the context of this study, employees in the Water Service Department of the UGu District Municipality were targeted as possible respondents in the qualitative component of the study since they had credible knowledge of existing water service policies and their implementation.

Therefore, the inclusion criteria for potential respondents in the qualitative component of the study was that each respondent must be a full-time employee of the UGu District Municipality working in the Water Service Department. On the other hand, the exclusion criteria included any employee who did not work in the Water Service Department of the UGu District Municipality and part-time employees in the Water Service Department. In terms of the household survey, the inclusion criteria were that each participant must be a rural citizen from one of the four selected villages (i.e., Sipofu, Mthwalume, Qoloqolo, and Goba) and should be a household head who is 18 years of age or older. Thus, any community member who was not a rural citizen, was under the age of 18, and did not reside in the four selected villages was excluded from the survey.

4.8 Data collection instruments

Data collection instruments are tools used to gather information from study respondents. This study used two data collection instruments, namely, a questionnaire and an interview schedule. The questionnaire was used to collect quantitative data, while the interview schedule was used to collect qualitative data. Questionnaires are designed and distributed to elicit responses to specific questions that feed into the research problem, aim and objectives of the study. A questionnaire is generally credited in the literature as an essential tool for gathering data from widely dispersed sources (Nayak and Singh 2021; Pandey and Pandey 2021). On the other hand, individual interviews can generally be conducted using either structured or unstructured forms. Structured interviews entail a list of pre-determined questions and standardised recording procedures where fixed alternative questions and open-ended questions are used (Kapur 2018). Meanwhile, unstructured interviews have a significantly wider degree of flexibility in engaging the respondents (Kapur 2018). In the study, semi-structured interviews were used because they provided flexibility in questions and probes and enabled the collection of detailed information (Baimyrzaeva 2018).

4.8.1 Questionnaire construction and structure

The questionnaire used in this study was developed using information obtained from similar studies in the literature. Thus, a thorough review of the literature informed question formulation. The questionnaire developed has two (2) sections: the first section collected the biographical data of participants, while the second section contained closed-ended questions that addressed the study objectives. The questions in the second section were dichotomous (yes or no) and Likert scale in nature. Two versions of the questionnaire were developed, one in the English language and the other in the isiZulu language. The isiZulu version was a direct translation of the English version because chances exist that many participants might not be conversant in the English language, which is usually the case in most rural areas. Therefore, the isiZulu version was used for respondents who were not comfortable with the English language. The two versions of the questionnaire are given in Appendix 7. Prior to data collection, the questionnaire was piloted with 10 residents from the same targeted communities. Generally, pilot surveys allow for a critical formulation of questions that effectively address the identified research objectives. Feedback from the pilot survey was used to improve the structure and design of the questionnaire.

4.8.2 Construction and structure of the interview schedule

Interview schedules enable the collection of in-depth qualitative data through direct interactions with respondents (Mligo 2016). According to Pandey and Pandey (2021), an interview can be used to gain certain sensitive information as it gives the respondent sufficient space to express themselves. The interview schedule developed in this study has two sections. The first section collected the biographical data of the respondents, while the second section contained open-ended questions with various probes in each main question. Two versions of the interview schedule were developed, one in the English language and the other in the isiZulu language. The isiZulu version was a direct translation of the English version. This was done to accommodate respondents who might be conversant in the English language. Thus, respondents who were not comfortable to be interviewed in the English language were interviewed in isiZulu. The two versions of the interview schedules are given in the Appendix 8.

Prior to the actual interviews, the schedule was piloted with three (3) experts, namely, a general manager, a supervisor and a technical specialist to establish its validity and reliability. Information collected from the pilot study was used to improve the questions on the interview schedule.

4.9 Data collection process

Data collection is the process of gathering information in order to understand and explain a phenomenon (Baimyrzaeva 2018; Bradshaw, Atkinson and Doody 2017). This is an essential component of research because it provides the facts required to address the problem statement (Kapur 2018). This section presents the data collection process adopted in this study. First, the section provides a discussion of how the survey was conducted to collect quantitative data from household heads in the selected villages. Second, a discussion of how qualitative data was collected from municipal employees at the Water Services Department of the UGu District Municipality is provided.

4.9.1 Collection of quantitative data

Prior to data collection, ethical clearance was obtained from the Institutional Research Ethics Committee (IREC) at the Durban University of Technology. A full ethical clearance was provided by IREC, a copy of which is attached as Appendix 6. Further, a gatekeeper's permission was obtained from the municipal manager at the Umzumbe Local Municipality. This permission, which is attached as Appendix 4, allowed the collection of data from the households. In line with ethical guidelines, a letter of information detailing the aim and objectives of the research and the rights of participants was presented to each potential participant prior to their participation in the study.

Two versions of this letter were prepared, one in the English language and the other in the isiZulu language. Respondents were presented with the letter of information in the language of their choice. Copies of the letters of information for households in the

two specified languages are presented in Appendix 1. Subsequently, respondents who agreed to participate in the survey were asked to give written, signed, and dated informed consent, while the rights of those who opted out were respected. Participation in the survey was voluntary and respondents were informed that they could withdraw from the study at any time if they wished not to continue with the process. Two versions of the informed consent were prepared, one in the English language and the other in isiZulu; copies of each are attached as Appendix 2. One questionnaire was given to each respondent to read, and one questionnaire was filled out by the researcher using the responses provided by the respondents. Data was collected in real time and the researcher left with the questionnaire immediately after each survey.

4.9.2 Collection of qualitative data

Interviews are a direct and easy way to collect precise and rich data on a certain phenomenon (Barrett and Twycross 2018). The interview questions were sent to the targeted municipal employees in the Water Service Department in advance to ensure that they had sufficient time to adequately prepare for the interview. Each targeted participant was informed about the research aim, that participation was voluntary, and that they could withdraw at any time during the interview if they preferred not to continue with the interview. Copies of the letters of information for the municipal employees in the two specified languages are presented as Appendix 2. A written, signed and dated informed consent was obtained from each respondent prior to the interview.

Prior to collecting data, the gatekeeper's consent was obtained. A letter was sent to the general manager of the UGu District Municipality asking permission to interview employees of the Water Service Department. The gatekeeper’s permission letter is attached as Appendix 5. Furthermore, complete permission from the IREC was obtained prior to data collection. All interviews were conducted virtually through the Microsoft Teams virtual platforms. This method is used because it gives researchers more opportunity to reach participants who are dispersed geographically and reduces the geographical restrictions associated with in-person interviews (Irani 2019).

4.10 Data analysis

Data analysis entails transforming raw quantitative and/or qualitative data into information that has meaning and value for the reader (Baimyrzaeva 2018). This is done through sorting and organising data to derive insights that aid decision-making. The purpose of data analysis is to uncover the underlying patterns, trends, and relationships that exist within and between phenomena (Albers 2017). The data analysis section is divided into two subsections, namely, quantitative data analysis and qualitative data analysis.

4.10.1 Analysis of quantitative data

Quantitative data analysis is essentially deductive since researchers would have carefully structured their objectives, identified key explanatory variables and expected outcomes in advance (Tolley 2016). In the context of this study, descriptive statistics and frequency distributions were used to report on the water service delivery issues in the Umzumbe Local Municipality. Both descriptive and frequency distribution statistics provide informative and summarised trends for the collected datasets (Allen 2017). Further to the descriptive and frequency distribution statistics, probit regression models were employed to scientifically establish household preferences for water service delivery at the selected study site. A probit regression model analyses binomial response variables by estimating the probability of seeing a 0 or 1 in the dependent variable given the values of the independent variables for a specific observation (Güneri and Durmuş 2020). The coefficient estimate for each independent variable is the amount by which the probability of the dependent variable having the value 1 increases (or decreases if the estimate is negative). The basic mathematical formulation of a probit regression model is:

$$\Pr(y_i \neq 0 | x_j = \Phi(x_j \beta) \quad (4.1)$$

Where $\Pr$ is the probability of the dependent variable; y_i is the dependent variable, which is a dichotomous variable (i.e., yes or no; true or false); x_j are the explanatory variables, which, in this study, are the possible determinants of citizen preferences; Φ is the standard cumulative normal; and β is the coefficient of each explanatory

variable. Using this model, variables that are statistically significant in improving household satisfaction with public water services are ascertained.

Using the mathematical formulation of a probit regression model expressed in equation 4.1, three empirical models were estimated. The three empirical models, respectively, estimate the effect of selected variables on household satisfaction with the water source, the reliability of the water supply and water quality. Biographical variables were also included in each model as control variables. In this study, the dependent variables are dummy variables, where 1 indicated those who respectively suggested that they were not satisfied with water access, water quality or water supply reliability. These three dummy variables were then expressed as dependent variables in three respective probit models that sought to establish the key drivers of dissatisfaction. In doing this, the study established factors that should be addressed to improve satisfaction (i.e., reduce dissatisfaction). Therefore, equation 4.1 was transformed to represent dissatisfaction with access to drinking water as follows:

$$Access_i = \alpha + \beta_1 Piped_i + \beta_2 Distance_i + \beta_3 TravelTime_i + \beta_4 Frequency_i + \beta_5 LongQ_i + \beta_6 Dangers_i + \beta_7 Female_i + \beta_8 Age_i + \beta_9 Hhsize_i + \beta_{10} MoreEdu_i + \beta_{11} Income_i + \varepsilon_i \quad (4.2)$$

where $Access_i$ represents water that is easily accessible and safe; $Piped$ is piped water inside or outside the dwelling; $Distance$ is the length travelled to the water source; $TravelTime$ is the minutes taken to reach the water source; $Frequency$ is the number of times travelled to fetch water; $LongQ$ is the probability of standing in a line at the water source; $Dangers$ is any exposure to risk injuries; $Female$ is the gender of the respondent; Age is the number of years measured by the birth date; $Hhsize$ is the number of people who live in a household; $MoreEdu$ is the highest level of education; $Income$ α is the intercept (constant), while $\beta_1 - \beta_{11}$ represents the marginal effect of each independent (explanatory) variable.

Further, a second probit regression model was estimated to establish the marginal effect of selected variables on household dissatisfaction with water quality. The empirical model for the water quality dissatisfaction model is expressed as follows:

$$Quality_i = \alpha + \beta_1 NotClear_i + \beta_2 BadTaste_i + \beta_3 BadSmell_i + \beta_4 HasColor_i + \beta_5 Boil_i + \beta_6 Bleach_i + \beta_7 Settle_i + \beta_8 Piped_i + \beta_9 Female_i + \beta_{10} Age_i + \beta_{11} Hhsize_i + \beta_{12} MoreEdu_i + \beta_{13} Income_i + \varepsilon_i \quad (4.3)$$

where $Quality_i$ represents the state of the water; $NotClear$ is the appearance of the water; $BadTaste$ is the presence of any taste in the water; $HasColor$ is the presence of colour in the water; $Boil$ is the heating of water to kill germs before consumption; $Bleach$ is adding bleach to the water to kill germs before consumption; $Settle$ is the allowing water to settle before use. A third probit regression model was estimated to establish the marginal effect of selected variables on household dissatisfaction with water supply reliability. The empirical model for the water supply reliability dissatisfaction model is expressed as follows:

$$Reliable_i = \alpha + \beta_1 Insufficient_i + \beta_2 NotAnnual_i + \beta_3 NoComplain_i + \beta_4 Store_i + \beta_5 MoreTT_i + \beta_6 OpenSource_i + \beta_7 Female_i + \beta_8 Age_i + \beta_9 Hhsize_i + \beta_{10} MoreEdu_i + \beta_{11} Income_i + \varepsilon_i \quad (4.4)$$

where $Reliable_i$ represents the amount of water required to satisfy the needs of the people is accessible when required; $Insufficient$ is the amount of water available from water source; $NotAnnual$ is whether water is accessible throughout the year; $NoComplain$ is complaints about the water supply; $Store$ is storing water for emergency; $MoreTT$ is the amount of time spent fetching water; $OpenSource_i$ is unprotected water source.

4.10.2 Analysis of qualitative data

Qualitative data is non-numeric, which means it consists of bits of speech, text, visual patterns, and the information obtained in response to open-ended questions (James 2017). This study uses the thematic analysis approach to analyse the qualitative data collected from municipal employees. According to Maguire and Delahunt (2017), a thematic analysis approach entails identifying patterns or themes in qualitative data. This method can be applied to a wide range of research questions as it allows for the connection of various concepts and opinions, comparing them to the data collected in different situations and at different times throughout a project (Nowell et al. 2017). It is

not a strictly linear process because it entails identifying themes relevant to the research and theoretical framework (Roberts, Dowell and Nie 2019). The summarised steps of the thematic approach followed in this study are given in Table 4.1.

Table 4.1: Steps taken in qualitative data analysis

Step	Explanation
Familiarisation	This is an essential step in qualitative data analysis because it allows the researcher to understand key ideas. To become familiar with the recorded data, the researcher will listen to audio recordings and read transcripts.
Generate initial codes	In this stage, the researcher arranges data, breaking down large amounts of data into manageable meaning units. There are several coding techniques, and the one to be chosen depends on the objectives of this study (Maguire and Delahunt 2017).
Identifying the thematic framework	After familiarisation, themes emerging from the collected data are identified. Proceedings taken during the familiarisation stage are used to filter and categorise the data into specific themes.
Review themes	In this stage, the first concepts that we found in Step 3 are reviewed, modified, and developed. It is helpful to compile all the information related to each subject at this time (Maguire and Delahunt 2017). Word processing systems like Microsoft Excel are used (Bree and Gallagher 2016).
Indexing	Indexing is the act of recognising some sections of the data that resemble a particular theme researched in the study. This involves statistically interpreting transcripts to detect consistencies through coding.
Charting	Charting involves reorganising the data to create order. This is done by lifting the data from its original textual setting and placing it in charts. Although the researcher will lift the data from their context, all cases are kept in the same order in each chart when developing the final coding.
Mapping and interpretation	This is the pictorial and graphical representation of themes, illustrating how the themes relate to each other. It involves an analysis of the key characteristics as set out in the charts.

4.11 Validity and reliability

According to Easterby-Smith et al. (2021), there is concern about whether the instruments and interview questions used to measure variables are reliable and adequately stable. The majority of this is determined by testing the instruments before

the real test, and hence measurements of reliability are crucial since they examine whether an instrument will yield the same score on each occasion that it is used. The validity and reliability of a research methodology are determined by the accuracy and consistency of the survey instruments (Taherdoost 2016). Thus, all research must be free of personal bias, and there should be no room for suggested alternatives based on the researcher's personal preferences (Olmos-Vega et al. 2020).

4.11.1 Validity

Validity refers to the ability of research results to be applied across multiple time frames and constraints. Unless otherwise specified as a specific limitation to a specific study, the results obtained must be applicable to similar conditions over multiple time frames and across geographical boundaries (Walia, Anubha and Manpreet 2020). On the other hand, reliability is a measure of the consistency of values obtained in repeated measurements under the same conditions with the same data collection instrument (Sürücü and Maslakçl 2020). According to Mueller and Knapp (2018), the validity of an instrument is determined by the extent to which the instrument measures what it is designed to measure or what it purports to measure; that is, it evaluates an instrument's relevance to address the purpose and research questions. In this study, validity was accomplished by making sure that the survey instruments were developed from an extensive review of the current literature. Further, the validity and reliability tests confirmed that the survey instruments were both valid and reliable for measuring the intended constructs. The modifications made after the pilot testing phase enhanced the instruments' clarity and reduced potential biases, ensuring the robustness of the data and results. The survey instruments were found to be both valid and reliable for measuring the intended constructs, as confirmed by the validity and reliability tests. The adjustments implemented following the pilot testing stage improved the instruments' comprehension and minimised possible biases, ensuring the reliability of the data and findings.

Equally, sufficient time was allocated for both data collection and analysis to improve the robustness of the data and results. This is consistent with studies in the literature that suggest that validity may be achieved through quality, rigour, and trustworthiness

(Cypress 2017). Furthermore, consistency, neutrality and applicability were used to maintain reliability (Noble and Smith 2015). This was accomplished by carefully planning and carrying out a series of interviews based on the four-dimension criteria of credibility, dependability, conformability and transferability to assess and ensure the study's robustness (Forero et al. 2018).

4.11.2 Reliability

Reliability relates to whether one receives the same response when they measure something more than once with the same instrument. Instruments can be devices (apparatuses), scales, or even questions that you ask individuals (Nayak and Singh 2021). According to Mueller and Knapp (2018), an instrument's dependability is concerned with the consistency of measurements: from time to time, from form to form, from item to item, or from one ratter to another. There are two sorts of dependability: stability and internal consistency reliability. Stability is described as a measure's capacity to remain constant throughout time despite uncontrolled testing, settings or the respondents themselves (Mohajan 2017). Respondents must maintain consistency, reliability and dependability when providing their replies. Even if they are repeatedly requested to supply the same responses, they should give the same response to each item. The researcher must design the questionnaire in such a way that it generates reliable and consistent results (Kapur 2018).

4.12 Ethical considerations

Ethical considerations are customs and morals of conduct that differentiate right from wrong. These customs and morals help to regulate the modification of accepted and unaccepted behaviour. When conducting research, ethical behaviour must be maintained. In addition to anonymity and confidentiality, other common ethical issues include informed consent, reflexivity, and various forms of trustworthiness. In this study, respondents were presented with an informed consent form prior to completing the survey. The informed consent form indicated that respondents were taking part in the survey voluntarily and could opt out at any time during the survey. Further,

reflexivity and trustworthiness were also maintained in the study in order to minimise bias and increase the reliability of the study. Open dialogues and discussions with respondents were maintained and key issues were captured to promote reflexivity.

4.12.1 Confidentiality

Confidentiality and anonymity are ethical principles aimed at protecting the privacy of respondents in a survey (Coffelt 2017). The gathering of sensitive and/or personal information from respondents entails researchers upholding anonymity and confidentiality (Surmiak 2018). The identities of respondents were not published; that is, the names, photographs, or any identifying information were treated as highly confidential and numbers were used to identify respondents. The study ensured confidentiality and that the data was not controversial, particularly personal data. This was accomplished by storing the completed questionnaires in the supervisor's locked cupboard at the office for five years and thereafter shredded. The electronic data from the recorded interviews were stored on a password-protected laptop for five years and thereafter deleted.

4.12.2 Anonymity

Anonymity goes a step further in terms of confidentiality and refers to protecting against identification, even from the researcher. An additional level of confidentiality, anonymity, refers to safeguarding against identification even by the researcher. Anonymously obtained information, data, and replies should not link any individual person to them (Zina 2021). Typically, while gathering quantitative data, respondents must be given the assurance that their names will not be made public and that only aggregate data will be (Kapur 2018).

4.12.3 Informed consent

Informed consent is made up of the words "informed" and "consent," each of which is significant and needs careful thought. Participants must be fully aware of all requirements, how their data will be utilised and potential outcomes, if any (Fleming and Zegwaard 2018). Therefore, participants can only give informed consent to participate in the research study if they are fully aware of the requirements for their involvement, including the time commitment, the nature of the activity, the subject that will be covered, and any potential risks to their physical and mental health (Zina 2021). Respondents received an informed consent letter, written in English and translated into IsiZulu before they participated in the study. The letter of informed consent is included as Appendix 3.

4.12.4. Reflexivity

Reflexivity is the procedure of carefully and critically considering how one's own presumptions, convictions, and judgements affect the research process. Reflective practice challenges and examines our identity as researchers and how this shapes our research (Jamieson, Pownall and Govaart 2022). Thus, a fundamental methodological concept and practice is reflexivity, which encourages considering the background of the study situation as well as their own social positions and subjectivities. In managing their inevitable engagement as co-constructors of observations, interview data, ethnographic material, or video data, researchers engage in reflecting on their roles and interactions within the field of study (von Unger 2021).

This research is a component of a process that forces the researcher to adjust and (re)construct their understanding throughout time (Barrett et al. 2020). The process, especially fieldwork, changes a qualitative researcher in numerous ways. Researchers realise the changes in themselves brought about by the research process and how these changes have impacted the research process through reflexivity (Palaganas et al. 2017). Being present as a self-aware person involves being able to analyse and draw lessons from one's own behaviours, ideas, and acts. It also means being able to keep track of one's own activities in the present, almost like looking down on oneself at the time (Shufutinsky 2020).

4.12.5 Trustworthiness

The trustworthiness of the research is one of those shared realities, although a subjective one, where readers and authors may discover overlap in their constructive processes (Stahl and King 2020). Different qualitative researchers frequently disagree on the optimal criteria for determining credibility. However, it is now agreed that the five criteria for assessing the credibility of research are credibility, transferability, dependability, conformability and authenticity (Kyngäs, Kääriäinen and Elo 2020). Extended participation, continuous observation, member verification, referential sufficiency, triangulation, negative case analysis, in-depth contextualization, reflexivity, and transparency were some of the techniques the study employed to guarantee the trustworthiness of its findings. These techniques made it possible to fully comprehend the viewpoints of the participants, accurately record and analyse their responses, and provide in-depth summaries of the research setting. The extensive description provided by the study enabled applicability to comparable contexts by documenting the participant responses, the interview process, and the background. Throughout the study, reflexivity was maintained in order to record ideas, choices, and potential biases. Transparency permitted an unbiased evaluation of the results, and referential sufficiency ensured correct citation of the data sources. Interviewing employees from various departments and levels within the Water Service Department allowed for the inclusion of varied viewpoints and ensured authenticity.

4.13 Delimitations of the study

Delimitations are essentially the boundaries that the researcher has purposefully established. In order to prevent the study's goals and objectives from becoming impractical to attain, they are concerned with the definitions that the researchers choose to establish as the borders or limitations of their work (Theofanidis and Fountouki 2018). Due to a lack of resources and time, the study's quantitative data collection was confined to the four selected rural areas rather than all of the villages in the Umzumbe Local Municipality.

4.14 Conclusion

The steps taken to gather and analyse the data for this study were clearly discussed in this chapter. In order to provide an accurate and sufficient path and information to address the research problem, the research philosophy, research strategy, methodological choice, study site and population, study sample, and measurement tools were all unpacked. This study employed ontology as its philosophical framework and the positivist paradigm was used. In order to address the needs of South African rural people, a mixed-methods approach was employed to identify potential improvements for the provision of potable water services. Further, a case study was with the aim of improving satisfaction with water services, specifically focusing on rural communities in Umzumbe Local Municipality. For this reason, this study gathers and analyses cross-sectional data.

The snowball sampling technique was employed for selecting interview respondents, whereas the simple random sampling technique was used to select participants for the quantitative survey. In addition, two methods were used to collect data: a questionnaire and an interview schedule. To analyse the data, descriptive statistics and frequency distributions were employed to report on the problems with water service delivery in the Umzumbe Local Municipality. While the thematic analysis method was employed to examine the qualitative information gathered from municipal employees, it is important to note that the validity and reliability of the information acquired for this study were also covered in this chapter. Finally, ethical issues were covered in depth, including informed consent, reflexivity, secrecy, and trustworthiness. The next chapter discusses the findings from the household survey.

Chapter 5

Findings from the household survey

5.1 Introduction

This study was set to achieve five main objectives. Firstly, the study intended to ascertain the extent of rural citizen satisfaction with water services in the Umzumbe Local Municipality. Secondly, the study hoped to establish the key determinants of current water service delivery levels in the municipality. Thirdly, the study sought to determine the effects of the current water service delivery levels in the municipality. Fourthly, the study intended to establish rural household preferences for water service delivery in the municipality. Finally, to recommend possible strategies that can be used to improve water service delivery in the Umzumbe Local Municipality. To achieve these objectives, a mixed-methods approach was used. A survey was conducted to collect quantitative data from households, while interviews were conducted to elicit the views, opinions, and experiences of employees in the Water Services Department at the UGu District Municipality. As explained earlier, the UGu District Municipality is both a WSA and a WSP, which supplies water to the Umzumbe Local Municipality and the other local municipalities under its jurisdiction. This chapter presents the quantitative results from the household survey. The rest of this chapter is organised into four main sections. The first section discusses the descriptive statistics of the data collected. Section two discusses household opinions regarding the reliability and quality of their drinking water. Section three presents empirical results on the marginal effects of selected variables, respectively, on water access, reliability and quality. The final section concludes the chapter.

5.2 Descriptive statistics

A survey was conducted with 360 household heads which were randomly sampled across four selected rural villages in the Umzumbe Local Municipality, namely, Sipofu, Mthwalume, Qoloqolo, and Goba. A self-designed questionnaire was administered by the researcher during the period from March to August 2023. The questionnaire was developed in the English language and translated into isiZulu, given the possibility that many respondents may not be fluent in the English language, as is usually the case in most rural areas. Table 5.1 presents the descriptive statistics of the collected information.

Table 5.1: Descriptive statistics of respondents in the household survey (n = 360)

		Statistic
Village (%)	Goba	25
	Sipofu	25
	Mthwalume	25
	Qoloqolo	25
Gender (%)	Female	63
	Male	37
Age (Years)	Mean	39
	Minimum	18
	Maximum	91
Household size (Number)	Mean	7
	Minimum	1
	Maximum	21
Education (%)	Never attended school	2
	Primary school	16
	High school	71
	Diploma	10
	Degree	2
Monthly income (R)	Mean	3 605
	Minimum	300
	Maximum	75 000
Primary source of drinking water (%)	Pipe water in the house	4
	Pipe water in the yard	61
	Public tap	21
	Borehole	2
	Rainwater collection	1
	Surface water	7
Travel Time (minutes)	Mean	25
	Minimum	2
	Maximum	60
Queue (%)	Yes	24
	No	34
	N/A	42
Danger (%)	Yes	6
	No	48
	N/A	46

Source: Author's own table

The descriptive statistics in Table 5.1 show that most of the respondents were female (63%), which correctly reflects the reality that many households in the study area are headed by women. This may be linked to the historical inclination that most men leave their rural homes to seek employment opportunities in urban areas while women stay behind to care for their families and homesteads (Statistics South Africa 2016). The average age for the sample was 39 years, with the youngest respondent being 18 years old, while the oldest respondent was 91 years old. The average household size for the sample was seven (7) people, while most of the respondents (71%) had a minimum of secondary school education. Omotayo et al. (2021) argue that the statistic for the average household size is slightly higher than the average for the KwaZulu-Natal Province, which is five (5) people per household according to the General Household Survey 2021. The average household income for the sample was R3 605 per month, which is roughly below South Africa's upper-bound poverty datum line if the revealed average household size of seven (7) people is to be considered. Thus, an average household income of R3 605 given seven (7) people in a household implies R515 per person, which is less than the monthly food poverty line of R760, let alone the monthly upper-bound poverty datum line of R1 558.

Regarding access to water services, 61% of the respondents indicated that they have piped water in their yards, with only 4% accessing water inside the house and 21% having access to piped water from public taps. Nevertheless, it is concerning to note that 7% of the respondents still use surface water from unprotected sources such as lakes, rivers, streams and poorly constructed wells. Usually, water from such sources is potentially contaminated and prone to waterborne diseases like cholera, dysentery and typhoid, among others (Pindihama and Malima 2022). Equally important, boreholes are not a popular source of drinking water in the surveyed villages, with only 2% of the respondents indicating that they access water from boreholes. According to Omarova et al. (2019), most respondents who lived in locations where boreholes served as the primary source generally expressed satisfaction with the dependability and quality of the water. This implies that there is an untapped potential for using boreholes as a source of water in rural areas. Subsequently, it is imperative to encourage rainwater harvesting at the study site since only 1% of the respondents indicated that they collect and store rainwater.

Furthermore, respondents take an average of 25 minutes to travel to the water source and back, with some respondents taking as long as 60 minutes to travel to the water source and back. The World Health Organisation (WHO) considers distances less than an hour to be reasonable (Pindihama and Malima 2022; Tantoh and McKay 2020). In addition, several respondents indicated that they further experience long queues to obtain water from their primary source, while 6% of the respondents indicated that collecting water exposes them to some dangers and risks. The risks mentioned by respondents include children being in accidents, adults being robbed by criminals, and being attacked by animals. Similar risks are also reported by Geere and Cortobius (2017) in a study that examined the implications of access to water in rural and urban areas.

5.3 Households opinions on the reliability and quality of drinking water

Respondents were also asked to share their opinions on the reliability and quality of their drinking water. Thirteen (13) questions related to the reliability and quality of the respondents' drinking water were asked using a 3-point Likert scale (agree, neutral, and disagree). Water quality questions asked for aspects relating to the physical structure of the water (colour, taste, smell, etc.), while various other questions were asked about the reliability of drinking water sources. Figure 5.1 presents the frequency distributions of the responses to households' opinions regarding water supply reliability and quality.

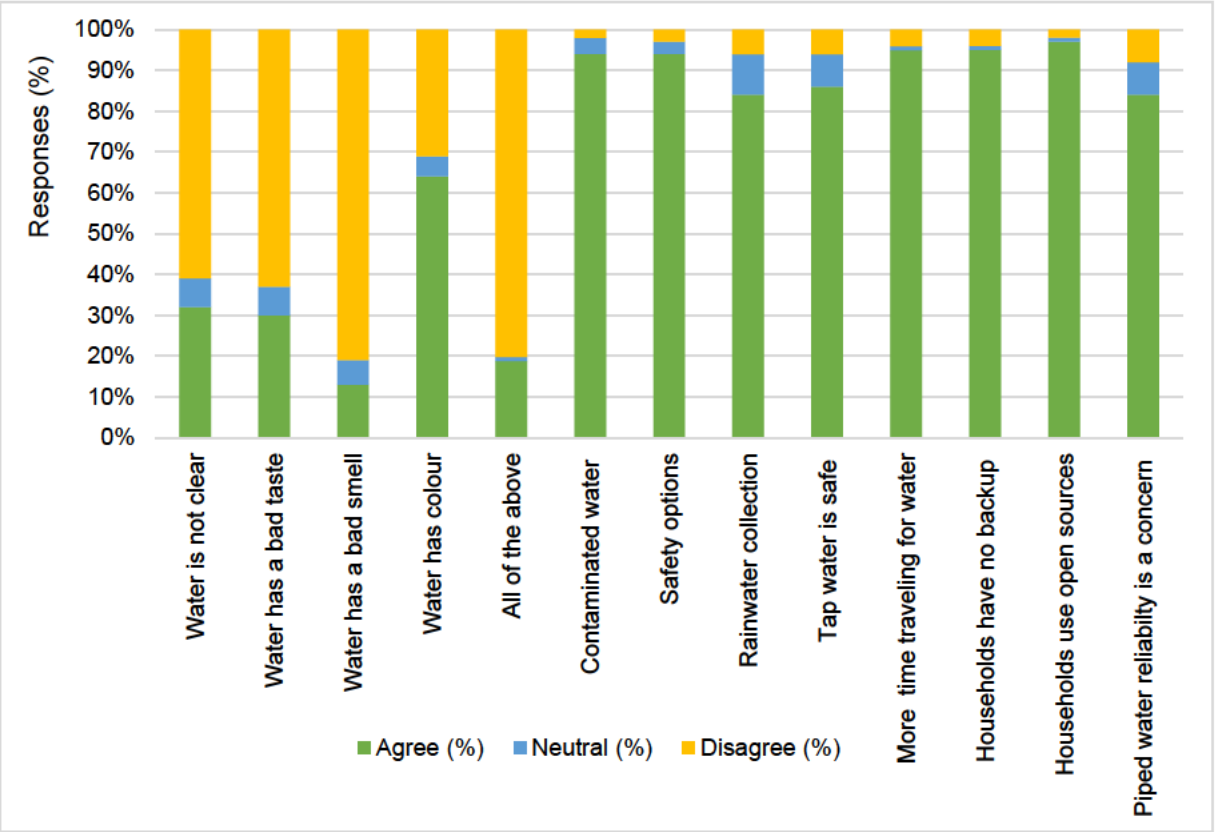


Figure 5.1: Responses on water quality and reliability (N=360)

Source: Author's own diagram

Around 30% of the respondents indicated that their drinking water was not clear and had a bad taste, while 13% of the respondents suggested that their drinking water had a bad smell. Mostly concerning is the revelation by 64% of the respondents that their drinking water had a colour. Generally, the physical nature of water is such that it should be clear, with neither a taste, smell, nor colour. However, revelations from the sample adopted in this study are such that several respondents indicated that the physical structure of the water they drink had either of these undesired properties, with 19% of the respondents indicating that their drinking water had all these undesired properties. On the other hand, about 94% of respondents concur that the spread of waterborne illnesses, including cholera, diarrhoea and dysentery, within their community is attributed to contaminated water. Ninety-four percent of the respondents indicated that they take precautionary measures such as boiling the water before consuming it, which has been proven to be a safer method to purify the water (Imtiyaz et al. 2021).

Rainwater collection is common during rainy seasons and used for domestic purposes; thus, 86% of respondents concur that this is a safe alternative. Meanwhile, 86% of respondents indicated that water from the tap is generally safe to drink in their community. Furthermore, about 94% of respondents indicated that people spend too much time travelling to fetch water. The majority of the respondents (98%) alluded to the fact that many households do not have a backup in the case of a water interruption and households without piped water fetch water from open sources. Consequently, about 84% of the respondents agreed that pipe water reliability is a major concern in their community.

Respondents were further asked eight dichotomous (yes or no) questions relating to the usual actions they take to make water safe for drinking (i.e., boil, use bleach, settle) and other supply-related issues. The latter included questions on whether the supply is reliable, whether water is sufficient, water is available all year, whether they complain to the municipality, and the regularity of communication on water issues from the municipality. Figure 5.2 presents the frequency distributions of the responses to these eight identified issues.

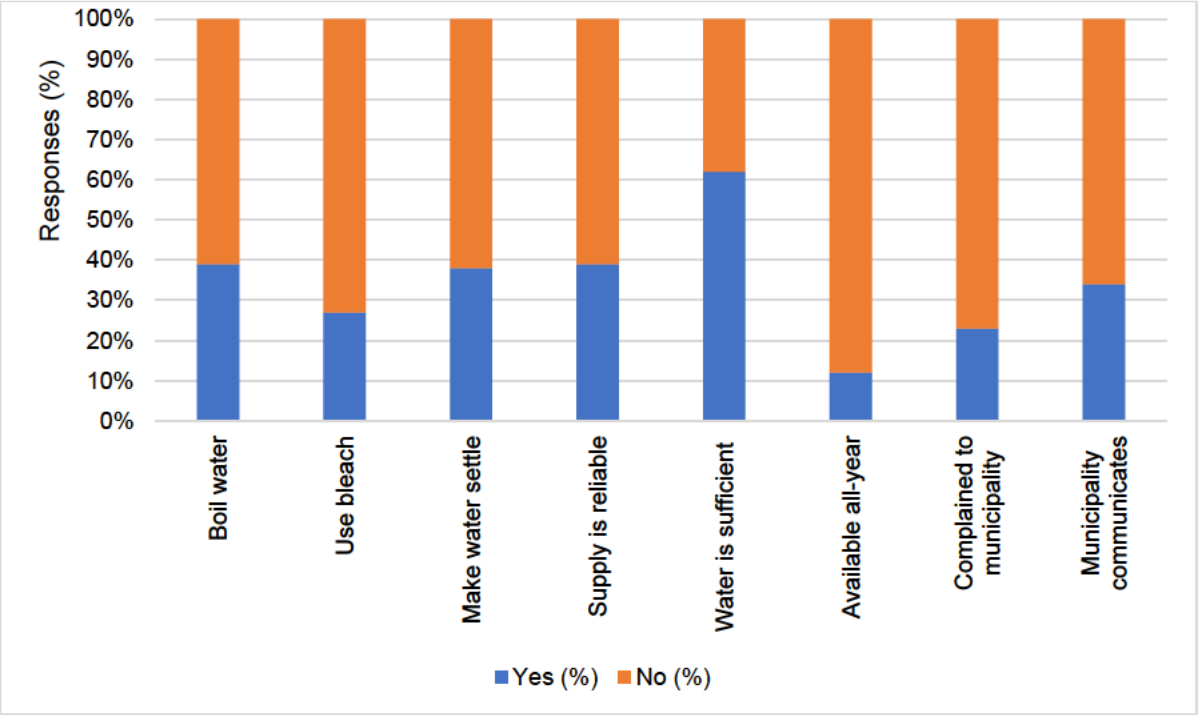


Figure 5.2: Responses on selected quality and reliability issues (N=360)

Source: Author's own diagram

To make water safe for consumption, Figure 5.2 shows that some respondents boil the water (39%), others add bleach or chlorine to kill bacteria (27%) and some respondents allow the water to settle before consumption (38%). These actions are consistent with the methods commonly used by households in several other rural areas when they make water safe to drink (Shah 2017). Rural households generally adopt these approaches because disinfection chemicals are expensive. In terms of the water supply issues, Figure 5.2 shows that the majority (88%) of the respondents indicated that their main source of drinking water does not provide water throughout the year, the water supply is not reliable (61%), and the municipality does not communicate with residents regarding water supply challenges (66%). Regardless of all these challenges, only 23% of the respondents indicated that they complain to the municipality in the event of water supply interruptions. The lack of interest in complaining during water supply interruptions could be an indication of households' lack of faith and trust in the local government officials to address water-related problems. This is commonly the case in many South African municipalities, where many residents have lost faith in the ability and sincerity of local government officials in addressing service delivery challenges (Adom, Simatele and Reid 2023; Bazaanah and Mothapo 2023; Tshililo et al. 2022).

Interestingly, respondents indicated that they usually experience serious water scarcity during the summer season. While this can be confusing because the summer season is usually the rainy season in the area, it is important to understand that heavy rains in this area usually damage water infrastructure, hence affecting water supply (Mkansi 2021). This revelation should also be read together with the indication in Table 5.1 that only 1% of the respondents harvest rainwater. Therefore, this implies that rainwater harvesting can be a short- to medium-term remedy to the water challenges experienced in this area during the summer season.

Respondents were further asked to state whether they were satisfied with how they access drinking water, the quality of the water they consume and the reliability of the water supply in their area. These were questions to gain some understanding of the level of household satisfaction with water access, quality and reliability. Figure 5.3 shows the frequency distribution of the responses, given that the questions were dichotomous (yes or no).

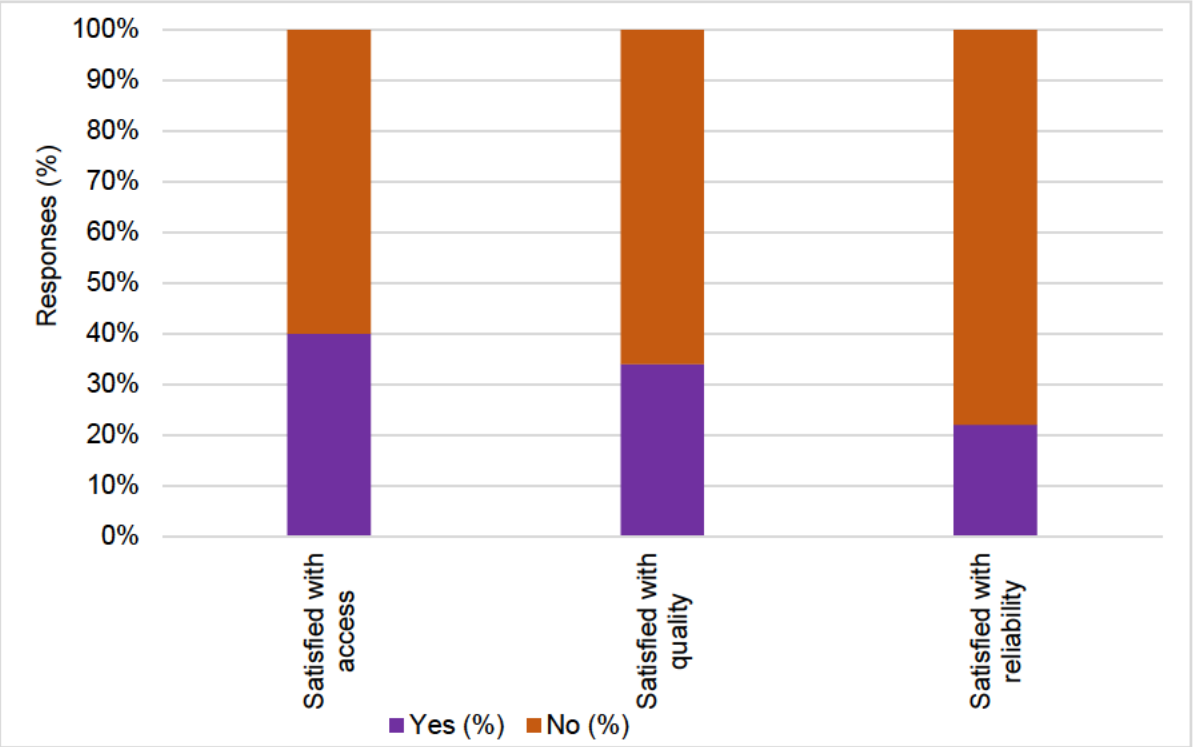


Figure 5.3: Satisfaction with access, quality, and reliability

Source: Author's own diagram

Figure 5.3 shows that most of the respondents were not satisfied with the access, quality and reliability of their drinking water supply. The ratios of those not satisfied with access, quality and reliability were, respectively, 60%, 66% and 78%. This implies that the municipality has a substantial responsibility towards addressing the causes of households' dissatisfaction with water access, quality, and reliability. These revelations are generally consistent with findings in several studies in the literature, which show that many South Africans, especially those in rural areas, townships and informal settlements, are predominantly not satisfied with municipal water services (Duma 2017; Tshililo et al. 2022). Therefore, there is a need to examine the key drivers of household dissatisfaction with water service provision in each area. The next section of this chapter establishes the key determinants of household dissatisfaction with access to water, reliability, and quality in the context of the selected study site.

5.4 Determinants of dissatisfaction with access, quality, and reliability

Empirical models expressed in the previous chapter indicated the possible determinants of household satisfaction with water access, water quality and water supply reliability. As a recap, six possible factors were identified as potential determinants of household satisfaction with access to water (i.e., Piped, Distance, TravelTime, Frequency, LongQ, dangers). The study also controlled for five biographical characteristics of the respondents (i.e., Female, Age, Hhsize, MoreEdu, Income). In terms of household satisfaction with water quality, eight key factors were selected as potential determinants (i.e., NotClear, BadTaste, BadSmell, HasColour, Boil, Bleach, Settle, and Piped). The same biographic characteristics used in the access model were also used as control variables in the quality model. For household satisfaction with water supply reliability, six key factors were selected as potential determinants (i.e., Insufficient, NotAnnual, NoComplain, Store, TravelTime, and OpenSource). Equally, the same biographic characteristics used in the access and quality models were also used as control variables in the reliability model.

Understanding the individual relationships between the independent variables is essential before variables can be used in any regression model. This is because if independent variables are strongly correlated, the problems of multicollinearity and serial correlation may produce biased results (Gujarati, Porter and Gunasekar 2012). More specifically, the existence of multicollinearity among the independent variables will affect the fitting of the estimated probit models, thus producing unreliable results. Therefore, this study used a variance inflation factor (VIF) to separately test for the presence of multicollinearity among the selected independent variables in each of the three specified models. VIF is generally used to calculate how much the variance of the estimated regression coefficient is inflated when the independent variables are correlated (Murwirapachena and Kabange 2023; Shrestha 2020). The general rule is that multicollinearity exists if the VIF value is 10 or higher, implying that VIF values below 10 are the most desired (Shrestha 2020). Appendix 9 shows the VIF values for the explanatory variables, respectively, used for the water access model (1.35), water quality (1.37), and the water supply reliability model (1.37). These VIF values are way below the maximum acceptable value of 10, implying that the problem of correlation is

very minimal in the selected variable, hence they can be included in the same respective regression models.

Therefore, the three probit regression models mentioned in the previous chapter as equations 2, 3 and 4 are estimated. Thus, this section is further divided into three subsections. The first subsection presents the marginal effects of selected variables on water access; the second subsection presents the marginal effects of selected variables on quality; and the last subsection presents the marginal effects of selected variables on reliability.

5.4.1 Marginal effects of selected variables on satisfaction with water access

As explained in the previous chapter, probit regression models analyse binomial response variables by estimating the probability of seeing a 0 or 1 in the dependent variable given the values of the independent variables for a specific observation (Akçay 2013). Respondents in this study were asked to indicate whether they were satisfied with how they access drinking water and 60% of them (according to Figure 5.3 presented earlier) suggested that they were not satisfied with their current access to drinking water. As such, we created a dummy variable where 1 represented those that indicated that they were not satisfied with how they currently access drinking water, and 0 otherwise. We then adopted this dummy as the dependent variable and used probit modelling to regress it against the potential determinants of household satisfaction with water access that were specified earlier. This was done to establish whether the selected variables are significant determinants of household dissatisfaction with access to drinking water. In doing this, we can establish factors that should be addressed to reduce household dissatisfaction (i.e., improve satisfaction) with access to drinking water at the selected study site. The results of the marginal effects of each potential determinant on household dissatisfaction with access to drinking water are presented in Table 5.2.

Table 5.2: Marginal effect of selected variables on satisfaction with access to water

	Marginal effect	Standard error	p-value
Piped	-0.148	0.098	0.130
Distance	0.342**	0.144	0.018
TravelTime	0.003	0.002	0.165
Frequency	-0.029***	0.009	0.001
LongQ	0.174*	0.072	0.016
Dangers	-0.0138	0.126	0.913
Female	0.0429	0.532	0.420
Age	0.002	0.002	0.920
Hhsize	-0.004	0.007	0.573
MoreEdu	0.110	0.073	0.132
Income	1.34e-06	5.75e-06	0.816

*Note: ***, ** and * = statistical significance at 1%, 5%, 10% level*

The results in Table 5.2 are interpreted according to the statistical significance, sign and magnitude of the marginal effect of each variable. A statistically significant variable is one with a marginal effect whose p-value is less than 0.001 (i.e., significance at 1%), or is greater than 0.001 but less than 0.005 (i.e., significance at 5%), or is greater than 0.005 but less than 0.010 (i.e., significance at 10%). A positive and statistically significant marginal effect value in the context of this study implies a positive relationship between the variable and dissatisfaction with current water access levels, while a negative and statistically significant marginal effect means otherwise. For example, the positive and statistically significant marginal effect of the variable Distance of 0.342 suggests that increasing the distance of the water source to more than 200 metres increases household dissatisfaction with water access. The direct translation of the marginal effect magnitude for this variable is such that a unit increase in the distance beyond 200 metres increases household dissatisfaction by about 0.342 units. More explicitly, a 10% increase in distance beyond 200 metres increases dissatisfaction by about 3.42%. This revelation implies that the sampled households prefer accessing water from sources within 200 metres of their homes. This is basically

in line with the Free Basic Water Policy of 2001, which suggests, among other things, that households should access water services within 200 metres of their homes.

Apart from Distance, the only other variables that are statistically significant in Table 5.2 are Frequency and LongQ. The former has a negative marginal effect of -0.029, which is strongly significant at a 1% level. This implies that households' dissatisfaction decreases as the number of times they go to fetch water increases. A priori expectations were that households would prefer to fetch water less frequently thus a positive relationship. The negative marginal effect could imply that households prefer having access to the water source as many times as possible. Differently, the positive and statistically significant marginal effect for LongQ of 0.174 is consistent with our a priori expectations. This result implies that dissatisfaction increases when households experience long queues at the water source. Thus, interventions that can reduce queues at the water source improve household satisfaction with access to water. This revelation aligns with findings in several other studies in the literature (Aikowe and Mazancová 2021; Bazaanah and Mothapo 2023). Equally important to note is that all selected biographic variables had no statistically significant marginal effects on households' dissatisfaction with access to drinking water.

5.4.2 Marginal effects of selected variables on satisfaction with water quality

As previously mentioned, binomial response variables are analysed using probit regression models, which calculate the probability of observing a 0 or 1 in the dependent variable based on the values of the independent variables for a particular observation (Akçay 2013). Respondents in this study were asked to indicate whether they were satisfied with the current water quality and 66% of them (according to Figure 5.3 presented earlier) suggested that they were not satisfied with their current water quality. As such, we created a dummy variable where 1 represented those that indicated that they were not satisfied with the current water quality, and 0 otherwise. We then adopted this dummy as dependent variable and used probit modelling to regress it against the potential determinants of household satisfaction with water quality that were specified earlier. This was done with the intention to establish whether the selected variables are significant determinants of household dissatisfaction with

water quality. In doing this, we can establish factors that should be addressed to reduce household dissatisfaction (i.e., improving satisfaction) with water quality in the selected study site. Results of the marginal effects of each potential determinant on household dissatisfaction with water quality are presented in Table 5.3.

Table 5.3: Marginal effect of selected variables on satisfaction with quality

	Marginal effect	**Standard error**	**p-value**
NotClear	0.093	0.063	0.143
BadTaste	0.104	0.080	0.193
BadSmell	-0.035***	0.105	0.001
HasColour	0.164***	0.049	0.001
Boil	0.387	0.066	0.563
Bleach	-0.214**	0.074	0.004
Settle	0.065	0.050	0.191
Piped	-0.015	0.078	0.847
Female	0.094*	0.048	0.048
Age	0.001	0.002	0.586
Hhsize	0.006	0.007	0.416
MoreEdu	0.060	0.071	0.398
Income	5.12e-06	7.04e-06	0.467

*Note: ***, ** and * = statistical significance at 1%, 5%, 10% level*

The results in Table 5.3 are interpreted according to the statistical significance, sign and magnitude of the marginal effect of each variable. BadSmell was found to be statistically significant. The former has a negative marginal effect of -0.035, which is strongly significant at the 1% significance level. This suggests that households' dissatisfaction decreases as the variable 'water has no bad smell' increases. A priori expectations were that households would prefer the water to have no smell, thus a positive relationship. The negative marginal effect could imply that households basically prefer water to have a smell.

The only other variables in Table 5.3 that have statistical significance, apart from BadSmell are HasColour, Bleach and Female. The magnitude of 0.164 for HasColour

indicates an increase in colour in the water household dissatisfaction increase. The direct translation of the marginal effect magnitude for this variable is such that a unit increase in colour increases household dissatisfaction by about 0.164 units. More explicitly, a 1% increase in water colour dissatisfaction is 16.4%. The implication of this revelation is that the sampled households prefer the water to be colourless. This finding is in line with Figure 5.2, where respondents indicated that the water has colour; hence, a decrease in the water colour will increase household satisfaction.

Further, a Bleach value of -0.214 suggests that with an increase in households adding bleach to the water before consuming it, household dissatisfaction decreases. The direct translation of the marginal effect magnitude for this variable is such that a unit increase in adding bleach to the water increases household dissatisfaction by -0.214 units. More explicitly, a 5% increase in adding bleach to the water decreases dissatisfaction by 21.4%. This finding suggests that the sampled households prefer not to add bleach to the water before consuming it. As reported reported by Moropeng and Momba (2020), one of the main reasons Makawane households prefer not to use bleach was cost. Most of them are unemployed, and the inadequate amount of money they receive from government grants prevents them from buying the liquid bleach needed to treat their households' drinking water. Differently, the positive and statistically significant marginal effect is Females at 0.094. This suggests that when females get low-quality water from their water source, their level of dissatisfaction increases. Therefore, measures that can improve the quality of the water at the source increase the satisfaction of women with the water. This may be explained in the African context by the fact that women are more likely than men to take on household management responsibilities, including securely boiling and storing water ensuring little risk of contamination (Fotuè 2013; Shah 2017).

5.4.3 Marginal effects of selected variables on satisfaction with reliability

As explained in the previous chapter, probit regression models analyse binomial response variables by estimating the probability of seeing a 0 or 1 in the dependent variable given the values of the independent variables for a specific observation (Akçay 2013). Respondents in this study were asked to indicate whether they were

satisfied with the water supply reliability and 78% of them (according to Figure 5.3 presented earlier) suggested that they were not satisfied with their water supply reliability. As such, we created a dummy variable where 1 represented those that indicated that they were not satisfied with the water supply reliability and 0 otherwise. We then adopted this dummy as a dependent variable and used probit modelling to regress it against the potential determinants of household satisfaction with water supply reliability that were specified earlier. This was done with the intention of establishing whether the selected variables are significant determinants of household dissatisfaction with water supply reliability. In doing this, we can establish factors that should be addressed to reduce household dissatisfaction (i.e., improve satisfaction) with water supply reliability at the selected study site. The results of the marginal effects of each potential determinant on household dissatisfaction with the water supply reliability are presented in Table 5.4.

Table 5.4: Marginal effect of selected variables on satisfaction with supply reliability

	Marginal effect	Standard error	p-value
Insufficient	0.015	0.044	0.728
NotAnnual	0.105	0.060	0.078
NoComplain	0.107**	0.048	0.025
Store	0.026	0.043	0.540
TravelTime	0.038	0.088	0.667
OpenSource	0.231*	0.126	0.068
Female	0.012	0.044	0.785
Age	0.001	0.001	0.378
Hhsize	-0.016***	0.006	0.008
MoreEdu	0.056	0.064	0.376
Income	6.16e-06	6.79e-06	0.364

*Note: ***, ** and * = statistical significance at 1%, 5%, 10% level*

The results in Table 5.4 are interpreted according to the statistical significance, sign and magnitude of the marginal effect of each variable. NoComplain of 0.107 suggests that an increase in respondents not complaining increases household dissatisfaction with water supply reliability. The direct translation of the marginal effect magnitude for this variable is such that a unit increase in respondents not complaining increases household dissatisfaction by about 0.107 units. More explicitly, a 5% increase in respondents not complaining increases dissatisfaction by about 1.07%. This finding suggests that the households in the sample would rather not voice concerns regarding the reliability of the water supply to the municipality. The only other variables in Table 5.4 that are statistically significant, apart from NoComplain, are OpenSource and Hhsize. OpenSource has a positive marginal effect of 0.231, which is a weak significance at a 10% significant level. This implies that households' dissatisfaction increases with the use of open sources. This could be due to the readily available access to unimproved sources (Gebremichael et al. 2021). Subsequently, Hhsize of -0.016 is determined to be statistically significant. The former has a negative marginal effect of -0.016 which is strongly significant at 1% significant level. This suggests that as the number of households increases, household dissatisfaction decreases. The

negative marginal effect could indicate that as the number of people in the household who depend on water increases, so does their dissatisfaction due to a greater demand for the water supply.

5.5 Conclusion

The descriptive statistics were discussed in this chapter, and the frequency distributions presented the opinions of households on the reliability and quality of the water supply. Water service dissatisfaction is influenced by factors such as reliability, quality, and accessibility. Therefore, three models were developed to determine which variables affected water access, quality and reliability of the water supply. A variance inflation factor test was used to determine whether the independent variables chosen for each of the three models were multicollinear, which would affect the probit model results. Further, the marginal effect was used to determine whether selected key variables were statistically significant. The key variables for the access model that were found to be statistically significant were distance of 200 metres, frequency and long queues. In the quality model, four variables were found to be statistically significant: bad odour, has colour, bleach, and female. Finally, three variables were identified in the supply reliability model: no complain, open source, and household size. These findings will be useful to policymakers since they will guide how to improve household satisfaction with water services. The findings of the interviews with employees of the UGu District Municipality will be discussed in the following chapter.

Chapter 6

Findings from municipal employee

6.1 Introduction

This study was designed to accomplish the four key objectives mentioned in Chapter 1. To achieve these objectives, a mixed-methods approach was employed. Data was obtained from municipal employees through semi-structured interviews. The qualitative data obtained from the employees are presented in this chapter. Three primary sections constitute the rest of this chapter. The demographic profiles of the participants are discussed in the first section. The second section includes the empirical findings and consists of subsections that provide themes linked to the objectives of the study as well as subthemes that elaborate on the themes. The chapter is concluded in the final section.

6.2 Demographic profiles of the participants

Qualitative data was collected from employees in the Water Services Department of the UGu District Municipality in July 2023. The objectives of the study influenced the selection of these participants. The participants selected were considered to be more equipped to offer expert opinions on the delivery of water services in the municipality because they regularly deal with water service issues within the municipality. Although the study was originally intended to involve ten participants, data was only obtained from seven participants, representing a 70% response rate. The seven participants had extensive experience working in the Water Services Department and were selected from different designations within the department. Due to their extensive workload and dedication to the municipality, the three remaining participants were not available for the interview sessions. Virtual interviews were conducted with the chosen

participants using Microsoft Teams Video Conferencing. Participants received the login link information and a set of open-ended interview questions before the interview.

The researcher informed the participants before the interviews of the measures taken to guarantee confidentiality, anonymity and other important ethical considerations. The duration of the interview was about twenty to thirty minutes. In addition, demographic data assists in placing research findings within particular populations or groups. It enables a clear interpretation of the data, considering the possibility that various demographic groups may have varied experiences, viewpoints, or reactions to a given phenomenon. In this study, the real names of participants were replaced by numbers to protect their identities. Numeric pseudonyms (1 to 7) were used to identify participants and promote anonymity and confidentiality, as usually recommended in the research ethics literature (Klimczuk, 2021; Pascale et al. 2022). The demographic profiles of the participants are presented in Table 6.1.

Table 6.1: Demographic profiles of the participants

	Position	**Education**	**Age**	**Gender**	**Race**	**Years in the unit**
1	Area Manager	Civil Technician	39	Male	African	7
2	Supervisor	Diploma	40	Male	African	16
3	Superintend	Diploma	39	Male	African	13
4	Controller	Higher Certificate	42	Male	African	15
5	Metering officer	National Diploma	37	Female	African	13
6	Area Foreman	Matric	59	Male	African	18
7	Community liaison officer	National Diploma	29	Female	African	6

Source: Author's own table

According to Table 6.1, seven employees were interviewed. The participants hold different positions within the Water Services Department of the UGu District Municipality. All participants report to the area manager. The department consists of four areas that render water services, namely, area north, area south-west, area south central, and area south. The area manager of the selected study, Umzumbe Local Municipality, falls under the northern area. All participants, except one, had at least an

undergraduate degree. The average age was 41 years, with the youngest participant being 29 and the oldest being 59. Only two participants were female. There were more male participants than female participants. Male dominance in the unit in terms of the statistical data that is currently available on the employees is due to the employees employed by the Water Services Department of the UGu District Municipality. All participants were African. In summary, the participants had an average experience of 13 years, with the longest serving participant reaching 18 years and the lowest being 6 years. This shows that all participants spent a considerable amount of time working for the municipality. Therefore, they have a wealth of experience working in the unit, which is crucial to the accuracy of the data collected as these participants are expected to be competent.

6.3 Empirical results

The empirical results are consistent with the objectives of the study. As the previous chapter underlined, the thematic analysis approach was employed to evaluate qualitative data obtained from the employees. Each objective thus serves to highlight a certain area of research. One strategy used by researchers to methodically organise and analyse complicated data sets is thematic analysis, which is a qualitative research technique. This is a theme-finding process used to identify narratives within datasets (Zinyama et al. 2022). According to Nowell et al. (2017), the main benefits of theme analysis are its adaptability and simplicity of application. Kampira and Meyer (2021) argue that it is fundamental and incredibly useful for determining the significance of qualitative data.

Braun and Clarke (2006) concur that theme analysis is fundamental and can be used as a starting point for more thorough qualitative data analysis procedures. Subthemes are then used to elaborate on each theme. In the context of thematic analysis, a subtheme is a subdivision or subtopic within an overall theme. Furthermore, themes can also be presented quantitatively as frequencies; for example, charts ranking the various themes according to the number of codes they contain can be generated. This could help provide an overview of your research (Waeraas 2022). Table 6.2 summarises the empirical findings from employees at the UGu District Municipality's

Water Services Department. Detailed discussions of these results will be provided subsequently.

Table 6.2: Summary of the empirical results

	Theme	Sub-theme	Frequency
1.	Rural citizen satisfaction with water services.	a) Good water quality	7
		b) Rely on water trucks	5
2.	Determinants of water service delivery.	a) Climate change	7
		b) Aged infrastructure	6
		c) Limited budget	7
		d) Illegal connections	4
		e) Increase population	5
		f) Load shedding	2
3.	Effectives of current water service.	a) Protest levels	4
		b) Unreliable water	4
4.	Municipal platforms used to communicate with communities.	a) Call centre	6
		b) Ward councillors	7
		c) Road shows	7
		d) Imbizo	7
5.	Strategies to improve water supply.	a) Borehole installation	7
		b) Watertank programme	5
		c) Spring protection	3

Source: Author's own table

6.3.1 Theme 1: Opinions on rural citizen satisfaction with water services

The study's first objective was to determine whether households are satisfied with the current water services. It is critical to comprehend the perspectives of rural residents' satisfaction with water services for several reasons. First, it can be useful to assess the efficiency and quality of water service providers and identify the weaknesses and challenges in the provision of water services. Second, it can support the development and execution of water policies and programmes that are considerate of the needs

and preferences of rural residents. Third, it can encourage public involvement and engagement in water governance and help to improve the accountability and transparency of water sector actors. Fourth, by ensuring that rural households have access to clean, readily available, and reasonably priced water, they can enhance their health and general well-being (Mekuriaw and Gurmessa 2020; Ochoa-Rico et al. 2023; Romero-Subia et al. 2022; Tian, Chen and Wang 2021). Two subthemes emerged under this theme. Specifically, good water quality and reliance on water trucks. These subthemes are discussed in detail below.

a) Good water quality

The municipality is compiled to supply safe and clean water to the community. The municipality is obligated to follow the Blue Drop and Green Drop criteria to evaluate water quality. All participants (100%) stated that the municipality offers high-quality water. One participant stated*, "The water quality is good because the municipality extracts raw water from the river, which is then treated"*. In addition, the municipality has a team tasked with assessing the amount of chemicals added to the water during the treatment process and testing the water every hour. The purpose of this exercise is to routinely verify that the water quality remains safe for human consumption. In addition, Umgeni Water, a third-party organisation, inspects the water and, upon completion of the investigation, issues a report on whether the municipality has passed or failed the audit.

b) Relying on water truckers

Particular areas rely heavily on water trucks to meet their needs due to water shortages. The water in the water trucks is also tested before it is distributed to the community. The majority of the participants (70%) concurred that people depend on water tankers. One participant indicated that *"A schedule has been put in place regarding the location and timing of the trucks to enhance water availability in areas lacking piped water supplies and during periods of water outages"*. Unfortunately, poor road infrastructure, which is beyond the municipalities' responsibility, affects this schedule, especially during the rainy season. The road gets muddy, and the vehicles are unable to move the water. The municipality also faces the significant issue of a shortage of trucks. The literature supports the argument that road conditions, traffic

jams, weather-related events and security threats can cause delays and disruptions for water trucks to transport water (Fuster and Donoso 2018; Tucho 2022).

6.3.2 Theme 2: Key determinants of current water service delivery

The main drivers of the current provision of water services are the factors that affect the accessibility, affordability, availability, quality and sustainability of water services. Recognising these factors can assist in determining the advantages and disadvantages of the current water service delivery system and the obstacles and opportunities for improvement. The following six factors were found to be important determinants: load shedding, unauthorised connections, budget constraints, ageing infrastructure, and population growth. The explanations for these important factors follow.

a) Climate change

According to Kaya et al. (2020), the accessibility of water is dependent on the current climate. All participants (100%) asserted that climate change has a negative effect on the water supply because, in periods of decreased precipitation, rivers receive less water, and in periods of increased precipitation, rivers overflow and cause damage to pumps. One participant stated, *"It becomes challenging to treat the water coming from the dam during heavy rainfall because the water gets extremely dirty, requiring a modification in the chemical used to treat the water. Consequently, there is a need to look for new supplies".* Mkansi (2021) reported that an increase in floods caused by heavy rainfall events, such as those that occurred in certain areas of South Africa in the summer of 2020, can affect groundwater recharge, reduce the amount of potable drinking water available and increase the risk to people's lives and livelihoods.

b) Aged infrastructure

A primary focus in the management and utilisation of water resources should be the country's ageing water infrastructure, as it also plays a role in the physical scarcity of water (Mkansi 181). Almost all participants (90%) agreed that existing infrastructure is older than ten years. One participant alluded, *"There is no infrastructure at all in some*

areas". Where water infrastructure is present, the challenge of ensuring dependable water access is exacerbated by ageing and poorly maintained systems, especially for those living in marginalised peri-urban and rural areas (Adeyeye, Gibberd and Chakwizira 2020).

c) Limited budget

All participants agreed that the municipality has limited funds. The municipality's limited budget hinders it from maintaining ageing infrastructure. It becomes more difficult to maintain outdated infrastructure, such as old pipelines that cannot be replaced or repaired. One participant alluded, *"The problem with budgeting is, for example, that sand must be extracted from the dam, and the municipality cannot afford to purchase a specialised machine to do it".* Many municipalities are unable to perform one or more of their fundamental duties, such as providing services such as water and thereby realising the socioeconomic rights of the residents living under their jurisdiction, because they lack the necessary funding and the capacity to manage it responsibly.

d) Illegal connections

Approximately half of the participants argued that the number of illegal connections has increased recently, affecting water supply reliability. One participant stated that, *"Burst pipes are not reported on time due to illegal connections, even though there are platforms to report such as WhatsApp and an app to log any water issue".* The increase in illegal connections has resulted in people going without water five days a week. Similar to urban areas, increasing general population growth contributes to illegal connections. The departments tasked with managing urban services are unable to satisfy the growing needs of the general populace (Ngcobo, Murwirapachena and Reddy 2023).

In addition, not reporting leaks wastes water that is so hard to save. A participant stated, *"People also do not know how to apply for water services properly, so they steal it instead"*. This places the system under stress and leaves households questioning why their water supply has been cut off. The municipality is responsible for developing strategies to educate people on how to properly apply for water service installations in their houses. By doing this, it will become easier to track the number of

households receiving municipal water services ultimately reducing the number of unauthorised connections.

e) Increased population

All participants stated that one of the main challenges in reaching water demand is population growth. The water plant's original purpose was to supply a specific population. However, the water supply has been unable to keep up with population growth over time. One participant mentioned that *"The municipality does not have a large dam, even though the population is expanding".* Kojo and Paschal (2018), suggest that strain on water resources due to population growth is one of the effects of overpopulation.

f) Load shedding

Only 30% of the participants reported that municipalities within Umgeni Water's service area are experiencing difficulties receiving drinking water due to power load shedding. During periods of load shedding and frequently extending beyond as water supply infrastructure recovers from the effects of power outages, thousands of consumers within the uMgungundlovu District Municipality, Msunduzi Local Municipality, iLembe District Municipality, UGu District Municipality, Harry Gwala District Municipality, King Cetshwayo District Municipality, and the eThekwini Metropolitan Municipality experience an inconsistent supply of drinking water or, at times, face water shutdowns from their taps (uMngeni-uThukela Water 2023).

In the absence of electricity, the water pumps become inoperative as they require electrical power to function. This results in a disruption to the water supply, leading to unavailability of water. The prevalence of load shedding, or extended blackouts, is greatest in rural areas. When the power supply is cut off, raw sewage pumping systems and wastewater treatment facilities cannot operate properly, which leads to an overflow of untreated wastewater. The capacity to supply water to elevated tanks that supply water to high-lying areas is also impacted. Long-term power outages cause a decrease in or complete loss of water supply, even in areas that are low-lying and receive water from reservoirs through gravity (Potgieter et al. 2019).

6.3.3 Theme 3: Effects of current water service levels.

The study's third goal corresponds to theme 3. The purpose of this objective is to determine the impact of current water service levels. Comprehending the consequences of the existing water service levels in rural areas may assist in recognising the issues and deficiencies in the provision of water services, along with possible solutions. Additionally, it can ensure that the needs and preferences of rural populations are considered and addressed by informing and influencing the policy- and decision-making processes for the delivery of water services (Gomez, Perdiguero, and Sanz 2019; Makaya et al. 2020; Mvongo, Defo, and Tchoffo 2021). Protests and unstable water were the two subthemes that arose from the main theme. A detailed explanation of each of these subthemes is provided below.

a) Protests

When people are not satisfied with the quantity of water they receive, they are likely to protest. Approximately 60% of participants asserted that during protests, people go to the homes of community leaders and assault them by setting their homes on fire, burning tyres, closing roads, and putting the leaders' lives in danger. One participant stated, *"People sometimes protest outside the municipal offices, which draws attention to parliament and holds them accountable"*. Protests against the depletion of essential resources, such as water, are not exclusive to South Africa; they are also common in other countries like Venezuela (Masiangoako, Khunou and Potter 2022).

b) Unreliable water

As a water storage intervention, the municipality operates the Vula Vala project, which opens and closes the water at specific times. This might be among the causes of the water supply's unreliability. Communities that lack access to water may choose dangerous alternatives, thereby endangering their health and well-being. A participant indicated, *"The effects vary depending on geography; for example, people travelling great distances to rivers to gather water are exposed to poor water quality, are bitten by snakes, raped and robbed".* The participants' comment was in line with the findings of the household, which showed that participants felt more satisfied when they could access water from open sources such as rivers, even though there was a health risk associated with using unprotected water.

6.3.4 Theme 4: Communication platforms used by the municipality

In rural areas, communication platforms play a crucial role in disseminating information and educating the populace about the causes, consequences and solutions of issues related to water, including scarcity, quality, governance and management (Abu et al. 2021). They serve to encourage and empower rural communities to monitor and assess the performance of water services and participate in the formulation of policies and decisions about water (Rolandi et al. 2021). The community is encouraged to participate in any meetings held by the municipality and to provide their opinions. The municipality has established channels of communication to engage with the community regarding any water-related issues. The channels of communication include a 24-hour call centre, eight applications for reporting issues with the water supply, reaction forums, war rooms and a WhatsApp group where we draft statements that are sent to the ward councillors who are in charge of sharing the information.

a) Call centre

Approximately 90% of participants stated that the municipality has a team in the call centre unit dedicated to handling any issues relating to water, and that team works hard to resolve issues related to water. For instance, when someone calls, the call centre team provides them with a reference number that can be used to inquire further about the matter. Furthermore, the contact centre number is free and open 24 hours a day, seven days a week. This ensures that people can report problems or complaints without depending on airtime.

b) Ward councillors

Ward councillors serve as community representatives and play an important role in service delivery. All participants stated that ward councillors rely on the people and the municipality to escalate and dispatch information. A participant mentioned, *"The people should use the ward councillor because they are very powerful in getting the needs of people heard and action to be taken"*. Ward councillors and their staff hold a community gathering to discuss water service challenges and possible solutions to the present water supply levels. Ward councillors then present the municipality with the issues raised.

c) Roadshows

Road shows are a form of communication in which a target audience is presented with information, goods, or services while travelling to various locations. Every year, the municipality organises a road show to engage the public in water issues. If complaints were made in the previous year, the municipality offers feedback on the resolutions.

d) Imbizo gatherings

All participants described the Imbizo meeting as a platform used by the municipality to bring people together, to sit down and discuss water concerns, as well as allow them to contribute to the integrated development plan (IDP). Furthermore, not only do these platforms allow people to donate to the IDP, but they are also used to communicate with people if, for example, reservoirs are closed, pipework is underway, or damaged pipes have been repaired. A participant mentioned that *"When the municipality hosts these events, there is a register that the people must sign and put their contact details for any communications, but the people usually put incorrect details which hinders communication"*.

e) Social media

Social media is an effective tool that is used globally. This method is very effective when applied correctly and can quickly reach several people. The municipality uses the Facebook and WhatsApp social media platforms. A participant mentioned that *"The WhatsApp group includes all ward councillors, and the Municipality communication unit completes a statement that is forwarded to the ward councillors who are in charge of disseminating the information"*. Regarding communicating with rural populations, social media is crucial because it can help reach and engage those who might not have as much access to other media such as radio, television, or newspapers (Özkent 2022).

6.3.5 Theme 5: Possible strategies to improve water service delivery

The challenges and gaps in the delivery of water services, as well as the advantages and results of that delivery for rural populations, make it crucial to have strategies in

place to improve the delivery of water services in those areas. Several suggestions for enhancing water delivery were made by the participants. Subthemes included the installation of boreholes, the programme for water tanks, and the spring protection plan. These subthemes will be discussed in more detail below.

a) Borehole installation

All participants agreed that the municipality's installation of boreholes in areas lacking water infrastructure is an advantageous intervention. The municipality completed more than fifty installations. A participant mentioned that "*Minister Mchunu has allocated R150 million to assist the municipality in installing boreholes"*. According to Taonameso et al. (2019), installing and maintaining borehole water systems can be expensive and difficult, particularly in isolated and difficult-to-reach places. This may call for sufficient institutional arrangements, resources, and capacity. Nevertheless, the advantages of boreholes in rural areas, such as borehole water, can provide rural communities with a dependable and secure supply of water, particularly in places where surface water is limited, contaminated, or only available occasionally (Taonameso et al. 2019).

b) Water tanks programme

For rural communities in periods of emergency or temporary shortages of water caused by conflicts, floods, droughts, or other crises, water trucks can be a lifesaver (Fuster and Donoso 2018; Tucho 2022). The strategy for the water tanks includes a schedule for when trucks need to get to specific places. This intervention helps homes without piped water as well as situations where there is no water for a variety of reasons. It is a temporary solution.

c) Spring-protect programme

Groundwater has proven to be the most dependable alternative water supply for rural communities to meet their daily water needs. Nkuna, Mamakoa and Mothetha (2014) state that this is primarily because most rural villages are spread out over difficult-to-reach geographic areas because of their unfavourable topography. Springs are an essential source of fresh water for human survival (Ranjan and Pandey 2021). Human activity and climate change have caused the drying out and contamination of spring

sheds in recent years. Examples include growing urbanisation, development (roads, hotels, tourist attractions, housing and other infrastructure), agricultural practices, deforestation and the disposal of industrial, residential and agricultural waste. Therefore, creating a thorough plan for the development and preservation of the spring shed will aid in preventing drying out and contamination. To address this issue, South Africa's Groundwater Plan places a strong emphasis on actions to raise public awareness of the significance and potential of groundwater resources (Nkuna, Mamakoa and Mothetha 2014).

6.4 Conclusion

This chapter presented the study's findings regarding the data that was collected from employees in the Water Services Unit of the UGu District Municipality. The major themes and supporting themes in the data were identified and thoroughly explored. This chapter presented important insights into the challenges and potential solutions concerning the delivery of water services in rural areas, emphasising the need for focused interventions and effective communication. The next chapter concludes the study and provides recommendations for improving rural citizens' satisfaction with water services.

Chapter 7

Conclusion

7.1 Introduction

The previous two chapters provided findings from the household survey and employee interviews, respectively. This chapter concludes the study by providing a summary of the study, a triangulation of results from the preceding two chapters, providing recommendations and identifying areas for future research. As such, the rest of this chapter is organised into five sections. Section 2 provides a summary of the study. Section 3 triangulates the quantitative and qualitative results. Section 4 provides recommendations. Section 5 discusses some areas for future research. Finally, the last section concludes this chapter.

7.2 Summary of the study

The study aimed to establish possible ways through which water supply can be improved to satisfy South African rural citizens, using a case study of four rural villages in the Umzumbe Local Municipality, KwaZulu-Natal. This broader aim was broken down into five primary objectives. First, to determine the extent of rural citizens' satisfaction with the drinking water supply in the municipality. Second, to establish the key determinants of the current water supply levels in the municipality. Third, to determine the effects of the current water supply in the municipality. Fourth, to establish household preferences for water service delivery in the rural areas of the municipality. Finally, to recommend possible strategies that can be used to improve water service delivery in the Umzumbe Local Municipality. A mixed-methods approach was adopted, where quantitative data was collected from 360 household heads across the selected villages and qualitative data was collected from seven (7) employees at the Water Service Department of the UGu District Municipality. It is important to recall

that the UGu District Municipality is both the WSA and WSP for the Umzumbe Local Municipality. The probit regression modelling technique was then used to analyse the quantitative data from the household survey, while a manual thematic approach was used to analyse the quantitative data from municipal employees.

Results from the household survey projected three key outcomes. First, most households revealed that they are dissatisfied with their current access to drinking water. The key determinants of household dissatisfaction with access to water were revealed as the distance to the water source, the frequency of fetching water, and queues, which are generally long at the drinking water source. Second, most households indicated that they were not satisfied with the quality of the water they drank. Most importantly, drinking water generally has an unpleasant smell and a colour. As such, households predominantly use bleach to make water safe to drink. In this regard, it is important to also note that females were more dissatisfied with poor water quality than males. Third, most households indicated that they were not satisfied with the reliability of the water supply. Those dissatisfied are even reluctant to express their concerns to the municipality, which may be perceived to imply their lack of trust in the municipality. Household size emerged as a significant determinant of dissatisfaction with water supply reliability, with smaller households being more dissatisfied with water supply reliability.

The qualitative data collected from municipal employees revealed four key findings. First, municipal employees suggested that rural households are currently satisfied with the quality of their drinking water supply. Second, municipal employees identified load shedding, illegal connections, budget constraints, ageing infrastructure, and climate change among the key factors affecting effective water service delivery in the municipality. The major implications of these factors include insufficient and unreliable potable water supply, which usually leads to both health challenges from drinking water from unprotected sources as well as social unrest such as service delivery protests. Third, municipal employees revealed that communication platforms like social media, a call centre, ward councillors, road shows, and imbizo gatherings are commonly used to promote public participation in service delivery. More precisely, these communication channels receive complaints, share information, and encourage community involvement in water-related discussions. Finally, water tanks, spring

protection, and borehole installation were among the potential strategies proposed to enhance the water supply at the study site. Generally, boreholes are considered a long-term intervention, while water tanks are used to mitigate short-term water shortages. On the other hand, preserving groundwater sources is vital for spring protection because these sources are vital to rural communities' plans.

7.3 Triangulation of the household and employee findings

Municipal employees continue to believe that rural households are satisfied with water quality, while households indicated that they are dissatisfied with the quality of water, citing problems like bad smell and colour. This contradiction emphasises the necessity of conducting an in-depth investigation to determine the underlying reasons for this misconception and to close the knowledge gap between employees' perspectives and the realities encountered by citizens. Different viewpoints and standards for evaluating water quality could be the cause of these differences. Consequently, municipal employees may depend on recognised water testing results or technical standards, which may not accurately represent the various subjective experiences and perceptions of households.

Further, households voiced concerns about the reliability of the water supply. Meanwhile, employees of the municipality acknowledged that the provision of water services was impacted by load shedding, unauthorised connections, financial restraints, ageing infrastructure and climate change. Although municipal employees have determined some of the major factors that impact water supply, municipality can implement control measures to mitigate the adverse effects on water supply, such as ageing infrastructure, illegal connections, and financial limitations. The municipality can improve the reliability of the water supply system by concentrating on elements that are under its jurisdiction, such as resolving illicit connections, making the best use of budgetary resources, and effectively managing the ageing infrastructure. A comprehensive approach that ensures households receive reliable and sustainable water service delivery must include strategic planning, community engagement, and the adoption of modern technologies.

Moreover, the municipality communicates with the households using a range of communication channels. Households' reluctance to communicate, however, indicates a weakness in these channels' effectiveness. It reflects scepticism among households about expressing their concerns to the municipality. As a result, there is a chance to improve methods of communication to address issues experienced by households and build confidence. Establishing trust needs not only efficient channels but also a dedication to meaningful community involvement, cultural sensitivity and responsive action. To facilitate more informed decision-making and enhance the general well-being of the community, the municipality should address these issues and encourage an environment in which households feel free to voice their concerns.

7.4 Policy implications

According to the research results, five recommendations were made. First, it is recommended that the municipality measure and analyse the quality of drinking water in rural households in an objective manner and establish a comprehensive water quality assessment. The parameters that this assessment should concentrate on are colour, smell and any possible contaminants. For the assessment process to be transparent and credible, the municipality should consult with independent specialists in water quality, and ensure a more solid and reliable water supply, give priority to measures that address issues like outdated infrastructure and illegal connections. McNicholl et al. (2019) agree that improving water supply reliability starts with infrastructure upgrades. Thus, a properly implemented plan can reduce interruptions and increase household satisfaction.

Second, it is crucial to perform a communication needs assessment to identify deficiencies in existing communication strategies. This can be done by interacting with people in the community to identify their preferred methods of communication and eradicate any barriers to expressing concerns. Increase accessibility and transparency by implementing a multi-channel communication strategy that includes social media, community gatherings, and direct interaction with local leaders. Launch an initiative that encourages trust to enhance the community's relationship with the municipality. Furthermore, as part of this initiative engage in transparent communication about

ongoing water-related projects, provide frequent updates on service enhancements, include feedback mechanisms establish trust which is essential to motivating households to voice issues and take an active role in the decision-making process. Since members of the communities are the ones who ultimately benefit from the decisions and actions taken, such collaborative efforts can result in a deeper understanding of the perceptions of the community, which is critical to the decision-making process (Mumbi and Watanabe 2020).

Third, households should participate in community hall meetings, community gatherings and other forums for engagement that the municipality hosts. Participate actively in conversations about water quality and reliability, share their experiences, and voice their concerns. By actively participating, households can ensure that their distinct perspectives are considered during the decision-making process (Davids et al. 2021). Households should make use of approved channels for feedback, like internet forums or community surveys, to offer helpful criticism on the dependability and quality of the water; elaborate on their issues and recommendations for improvement; and give municipal employees precise and helpful feedback, which makes it easier for them to comprehend the scope of the problems and enable focused interventions.

Fourth, to enhance the availability of potable water, establishing strategically positioned community water points to minimise the distance that households must cover to obtain potable water is recommended. Households that are located far from current water sources may find a considerable reduction in burden as a result. Further, employ queue management techniques like adding more taps, making improvements to water collection locations, or implementing scheduling systems to more effectively distribute water and act to minimise long lines at drinking water sources.

Finally, to improve water quality perform assessments at various distribution points and implement regular comprehensive testing. This approach will assist in identifying pollutants that produce disagreeable colours and smells. Collaboration with specialists in environmental health is imperative to make sure assessments are thorough. Community education programmes on appropriate water treatment techniques provided by Water Treatment Education are recommended. To further assist families, the municipality should provide bleach substitutes and better water filtration devices. This comprehensive strategy aims to address water quality issues systematically and

empower both individuals and communities in promoting healthier and safer water sources.

7.5 Areas of future research

The results of this study are vital in guiding the development of Umzumbe Local Municipality's water policy. Given the current lack of research in this area, future studies should expand their scope to include additional municipalities within the UGu District Municipality as the WSA and WSP. Due to financial and time limitations, the study focused on 360 respondents. Therefore, it is recommended that future studies aim for a larger sample size to improve the certainty of their findings. It is imperative to acknowledge that the findings derived from this research are particular to Umzumbe Local Municipality. Applying these findings to municipalities beyond Umzumbe Local Municipality should be done with caution, considering the findings may not be as applicable in other local contexts. Future studies should therefore focus on a broader geographic range to provide a thorough understanding of the issues surrounding water and the implications for policy in various municipalities.

7.6 Conclusion

This study is a substantial addition to the current conversation about rural South Africa’s access to water. Its comprehensive approach not only reveals the complex issues that households face but also illuminates the perspectives of municipal employees involved in the provision of water services. The study’s recommendations for improving policies and empowering communities are not just theoretical but also offer practical and achievable paths forward. This study provides a critical basis for well-informed decision-making as South Africa struggles with the complexities of water management. It emphasised the necessity of citizen, government and research collaboration for equitable and sustainable water solutions.

Furthermore, this study’s ability to break down the complexities in the context of rural water supply is one of its main advantages. Using a mixed-methods approach, this

study explored household quantitative data and municipal employees' qualitative insights. A more comprehensive understanding of the obstacles that households face in obtaining clean, reliable water is made possible using this approach's numerous components. The results provide insight into the interrelated factors affecting citizen satisfaction, water quality, and service reliability beyond the surface level.

Moreover, the study gained depth by including municipal employees' perspectives. Municipal employees are directly involved in providing water services, and their perspectives offer important background information on the difficulties faced by local communities. The study acknowledges that although household and municipal employees' perceptions may differ, it is important to comprehend both perspectives to develop effective policies. This all-encompassing method ensures that suggestions are based on a thorough understanding of the dynamics operating within the water management system.

The study recommendations provided feasible and achievable methods for policy improvement rather than being limited to ambitious goals. For example, the need for an impartial evaluation of water quality, the engagement of external experts, and the focus on updating water infrastructure directly address the issues raised. These suggestions are not only feasible but can also significantly raise the standard and reliability of the water supply. This type of pragmatism is essential to ensuring that the conclusions of the study have practical applications.

Finally, beyond just identifying issues, the study also empowered communities by promoting dialogue and active engagement. Acknowledging households' scepticism and reluctance to express concerns, the study promoted enhanced channels of communication and the development of trust. This emphasis on community empowerment is revolutionary because it acknowledges that the very communities impacted by water-related issues must actively participate in finding sustainable water solutions. This study contributed to the overall success of water management initiatives by laying the foundation for encouraging a sense of ownership and responsibility among citizens.

References

Abu Bakar, M.F., Wu, W., Proverbs, D. and Mavritsaki, E., 2021. Effective communication for water resilient communities: A conceptual framework. *Water*, *13*(20), pp.1-17.

Abui, Y.M., Garba, D.P., Rikichi, B. and Stephen, S., 2016. The challenges of rural water supply in Nigeria. *International Journal of Environmental Science and Technology*, *1*(4), pp.24-30.

Adams, J.S., 1963. Towards an understanding of inequity. *The Journal of Abnormal and Social Psychology*, *67*(5), pp.422–436.

Adams, J.S., 1965. Inequity in social exchange. *In Advances in Experimental Social Psychology*. Available: https://doi.org/10.1016/S0065-2601(08)60108-2 [Accessed 14 April 2022].

Adelodun, B., Ajibade, F.O., Ighalo, J.O., Odey, G., Ibrahim, R.G., Kareem, K.Y., Bakare, H.O., Tiamiyu, A.O., Ajibade, T.F., Abdulkadir, T.S. and Adeniran, K.A., 2021. Assessment of socioeconomic inequality based on virus-contaminated water usage in developing countries: A review. *Environmental Research*, *192*, pp.1-14.

Adeoti, O. and Fati, B.O., 2022. Factors constraining household willingness to pay for piped water tariffs: The case of Ekiti State, Nigeria. *H2Open Journal*, *5*(1), pp.115-133.

Adeyeye, K., Gibberd, J. and Chakwizira, J., 2020. Water marginality in rural and peri-urban communities. *Journal of Cleaner Production*, *273*, pp.1-27.

Adom, R.K., Simatele, M.D. and Reid, M., 2023. Assessing the social and economic implications on water security in the Nelson Mandela Bay Metropolitan Municipality, Eastern Cape of South Africa. *Journal of Water and Health*, *21*(7), pp.939-955.

Afroz, R. and Rahman, A., 2017. Health impact of river water pollution in Malaysia. *International Journal of Advanced and Applied Sciences*, *4*(5), pp.78-85.

Agbemor, B.D., Kumasi, T.C., Brown, K., Ewura, A., Dugbartey, D.D., Ayi-Bonte, V., Tsidzi, F., Amartei, G., Adii, A.E., Ballans, V. and Adomako-Adjei, T., 2017. Drivers

and barriers to coordination and harmonisation of water service delivery at the district level. *Accra, Ghana: IRC and Community Water and Sanitation Agency (CWSA)*.

Ahmed, S.A., Guerrero Flórez, M. and Karanis, P., 2018. The impact of water crises and climate changes on the transmission of protozoan parasites in Africa. *Pathogens and Global Health*, *112*(6), pp.281-293.

Ahmed, T., Zounemat-Kermani, M. and Scholz, M., 2020. Climate change, water quality and water-related challenges: A review with focus on Pakistan. *International Journal of Environmental Research and Public Health*, *17*(22), pp.1-22.

Aikowe, J.O. and Mazancová, J., 2021. Barriers to water access in rural communities: Examining the factors influencing water source choice. *Water*, *13*(19), pp.1-24.

Al-Ababneh, M., 2020. Linking ontology, epistemology and research methodology. *Science and Philosophy*, *8*(1), pp.75-91.

Alayande, A.B., Akinlolu-Raphael, S.J., Jentoft, S., Bissonette, J.A., Storch, I., Davidson-Harden, A., Spronk, S., McDonald, D., Bakker, K., Wilson, E. and MacGregor, J., 2019. Nigeria water crisis: A function of failed governmental planning and policies. *IGLUS Quarterly*, *5*(1), pp.27-31.

Albers, M.J., 2017. Quantitative data analysis—In the graduate curriculum. *Journal of Technical Writing and Communication*, *47*(2), pp.215-233.

Alharahsheh, H.H. and Pius, A., 2020. A review of key paradigms: Positivism VS interpretivism. *Global Academic Journal of Humanities and Social Sciences*, *2*(3), pp.39-43.

Allen, M., 2017. *Communication research methods*. United States of America: Sage Publications.

Almeida, V.A.C.C., 2023. The impact of flexibility on demand-side management and the need for consumer-oriented demand response. Available: https://tedebc.ufma.br/jspui/handle/tede/tede/5019 [Accessed 29 November 2023]

Altieri, D., 2016. The effects of overpopulation on water resources and water security. *Department of Engineering, Swarthmore College.* Available: fubini. swarthmore. edu/~ ENVS2/dan/Essay4 [Accessed 29 November 2023]

Alturki, R., 2021. Research onion for smart IoT-enabled mobile applications. *Scientific Programming*, *2021*, pp.1-9.

Alvez, A., Aitken, D., Rivera, D., Vergara, M., McIntyre, N. and Concha, F., 2020. At the crossroads: Can desalination be a suitable public policy solution to address water scarcity in Chile's mining zones? *Journal of Environmental Management*, *258*, pp.1-22.

Alvi, M., 2016. A manual for selecting sampling techniques in research. Available: https://mpra.ub.uni-muenchen.de/id/eprint/70218 [Accessed 6 June 2022].

Al-Zawahreh, A. and Al-Madi, F., 2012. The utility of equity theory in enhancing organizational effectiveness. *European Journal of Economics, Finance and Administrative Sciences*, *46*(3), pp.159-169.

Amin, M.E.K., Nørgaard, L.S., Cavaco, A.M., Witry, M.J., Hillman, L., Cernasev, A. and Desselle, S.P., 2020. Establishing trustworthiness and authenticity in qualitative pharmacy research. *Research in Social and Administrative Pharmacy*, *16*(10), pp.1472-1482.

Angel, J. and Loftus, A., 2019. With-against-and-beyond the human right to water. *Geoforum*, *98*, pp.206-213.

Apeh, C.C., Onyekuru, A.N., Offorma, J.T. and Akogwu, C.I., 2020. Rural transformation in Liberia: Strategies for civil society participation. *International NGO Journal*, *15*(1), pp.1-6.

Apuke, O.D., 2017. Quantitative research methods: A synopsis approach. *Kuwait Chapter of Arabian Journal of Business and Management Review*, *33*(5471), pp.1-8.

Arimoro, A.E. and Musa, H., 2020. Towards sustainable water resource management in rural Nigeria: The role of communities. *Journal of Sustainable Development Law and Policy (The)*, *11*(1), pp.1-17.

Aronson, E., 1992. The return of the repressed: Dissonance theory makes a comeback. *Psychological inquiry*, *3*(4), pp.303-311.

Asenahabi, B.M., Busula, A.O. and Ronoh, R., 2019. A choice dilemma in selecting an appropriate Research Design. *International Journal of Advanced Research in Computer Engineering and Technology (IJARCET)*, *8*(8), pp.348-356.

Askham, T.M. and Van der Poll, H.M., 2017. Water sustainability of selected mining companies in South Africa. *Sustainability*, *9*(6), pp.1-16.

Baimyrzaeva, M., 2018. Beginners' Guide for Applied Research Process: What Is It, and Why and How to Do It. *University of Central Asia*, *4*(8).

Barrett, A., Kajamaa, A. and Johnston, J., 2020. How to… be reflexive when conducting qualitative research. *The Clinical Teacher*, *17*(1), pp.9-12.

Barrett, D. and Twycross, A., 2018. Data collection in qualitative research. *Evidence-Based Nursing*, 21, pp.63-64.

Bazaanah, P. and Mothapo, R.A., 2023. Sustainability of drinking water and sanitation delivery systems in rural communities of the Lepelle Nkumpi Local Municipality, South Africa. *Environment, Development and Sustainability*, pp.1-33.

Bekturganov, Z., Tussupova, K., Berndtsson, R., Sharapatova, N., Aryngazin, K. and Zhanasova, M., 2016. Water related health problems in Central Asia—A review. *Water*, *8*(6), pp.1-13.

Berezin, A., Sergi, B.S. and Gorodnova, N., 2018. Efficiency assessment of public-private partnership (PPP) projects: The case of Russia. *Sustainability*, *10*(10), pp.1-18.

Bhorat, H. and Kimani, M., 2018. South Africa's growth trap: The constraints on economic growth and the role of water. *Water Resources Commission*, *2601*(1), pp.1-28.

Bivins, A.W., Sumner, T., Kumpel, E., Howard, G., Cumming, O., Ross, I., Nelson, K. and Brown, J., 2017. Estimating infection risks and the global burden of diarrheal

disease attributable to intermittent water supply using QMRA. *Environmental Science and Technology*, *51*(13), pp.7542-7551.

Bohler-Muller, N., Davids, Y.D., Roberts, B., Kanyane, B., Struwig, J., Masiya, T. and Nomdo, A., 2016. Service delivery challenges in South Africa. South African Social Attitudes Survey (SASAS): Compendium of results. Available: http://hdl.handle.net/20.500.11910/10377 [Accessed on 8 March 2021]

Boru, T., 2018. Chapter five research design and methodology 5.1. *Introduction.* Available: https:// doi:10.13140/RG.2.2.21467.62242 [Accessed 12 May 2022].

Botai, C.M., Botai, J.O. and Adeola, A.M., 2018. Spatial distribution of temporal precipitation contrasts in South Africa. *South African Journal of Science*, *114*(7-8), pp.70-78.

Bradshaw, C., Atkinson, S. and Doody, O., 2017. Employing a qualitative description approach in health care research. *Global Qualitative Nursing Research*, *4*, pp.1-8.

Breakfast, N., Bradshaw, G. and Nomarwayi, T., 2019. Violent service delivery protests in post-apartheid South Africa, 1994–2017-a conflict resolution perspective. *African Journal of Public Affairs*, *11*(1), pp.106-126.

Casteel, A. and Bridier, N.L., 2021. Describing populations and samples in doctoral student research. *International Journal of Doctoral Studies*, *16*(1), pp.339-362.

Cattaneo, A., Adukia, A., Brown, D.L., Christiaensen, L., Evans, D.K., Haakenstad, A., McMenomy, T., Partridge, M., Vaz, S. and Weiss, D.J., 2022. Economic and social development along the urban–rural continuum: New opportunities to inform policy. *World Development, 157*, pp.1-18.

Chakrabarti, S., 2020. Water security and the role of new technology: A South Asian regional framework. *International Journal of Modern Agriculture*, *9*(3), pp.1476-1490.

Chamberlain, L. and Potter, A., 2022. An analysis of South Africa's provision of emergency water supply during the covid-19 pandemic: Accountability and expiration. *Potchefstroom Electronic Law Journal (PELJ)*, *25*(1), pp.1-42.

Check, N.A., 2023. Community and political based protests in South Africa*. Issues, Challenges, and Lessons for the Continent. African Journal of Development Studies (formerly AFFRIKA Journal of Politics, Economics and Society)*, *13*(2), pp.289-310.

Chersich, M.F., Wright, C.Y., Venter, F., Rees, H., Scorgie, F. and Erasmus, B., 2018. Impacts of climate change on health and wellbeing in South Africa. *International Journal of Environmental Research and Public Health*, *15*(9), pp.1-14.

Christensen, T. and Lægreid, P., 2017. *Transcending New Public Management*. London: Taylor and Francis.

Chua, W.F., 2019. Radical developments in accounting thought? Reflections on positivism, the impact of rankings and research diversity. *Behavioral Research in Accounting*, *31*(1), pp.3-20.

Chukwuma, O.M., 2017. Patterns and problems of domestic water supply to rural communities in EnUGu State, Nigeria. *Journal of Agricultural Extension and Rural Development*, *9*(8), pp.172-184.

Clark, K.R. and Vealé, B.L., 2018. Strategies to enhance data collection and analysis in qualitative research. *Radiologic Technology*, *89*(5), pp.482-485.

Coffelt, T. A. 2017. Confidentiality and anonymity of participants. In: Allen, M. ed. *The SAGE Encyclopedia of Communication Research Methods.* Thousand Oaks, CA: Sage.

Cole, M.J., Bailey, R.M., Cullis, J.D. and New, M.G., 2018. Spatial inequality in water access and water use in South Africa*. Water Policy*, *20*(1), pp.37-52.

Creswell, J. W. and Creswell, J. D. 2018*. Research design: Qualitative, quantitative and mixed approach.*5th edition. Los Angeles: SAGE publication, Inc.

Creswell, J.W., 2013. *Research design: Qualitative, quantitative, and mixed-methods approaches*. Thousand Oaks: Sage publications.

Crouch, M.L., Jacobs, H.E. and Speight, V.L., 2021. Defining domestic water consumption based on personal water use activities. *AQUA—Water Infrastructure, Ecosystems and Society*, *70*(7), pp.1002-1011.

Cypress, B.S., 2017. Rigor or reliability and validity in qualitative research: Perspectives, strategies, reconceptualization, and recommendations. *Dimensions of Critical Care Nursing*, *36*(4), pp.253-263.

Daud, M.K., Nafees, M., Ali, S., Rizwan, M., Bajwa, R.A., Shakoor, M.B., Arshad, M.U., Chatha, S.A.S., Deeba, F., Murad, W. and Malook, I., 2017. Drinking water quality status and contamination in Pakistan. *BioMed Research International.* Available: https://doi.org/10.1155/2017/7908183 [Accessed 6 April 2022].

Davids, G., Prince, T., Makiva, M. and Fagbadebo, O.M., 2021. A rural perspective on the practice and challenges of community participation in post-apartheid South Africa insights from rural Beaufort-West Municipality. *Public Policy and Administration Research*. Available: https://doi.org/10.1002/jtr.2480 [Accessed 5 December 2023]

De Juan, A. and Wegner, E. 2019. Social inequality, state-centered grievances, and protest: Evidence from South Africa. *Journal of Conflict Resolution*, *63*(1), pp. 31-58.

Denhardt, R.B. and Denhardt, J.V., 2000. The new public service: Serving rather than steering. *Public Administration Review*, *60*(6), pp.549-559.

Department of Water and Sanitation., 2018. *National water and sanitation master plan (draft)*. Pretoria: Government Printer.

Dos Santos, S., Adams, E.A., Neville, G., Wada, Y., De Sherbinin, A., Bernhardt, E.M. and Adamo, S.B., 2017. Urban growth and water access in sub-Saharan Africa: Progress, challenges, and emerging research directions. *Science of the Total Environment*, *607*, pp.497-508.

Draycott, S., 2012. Dissonance, resistance and commitment: A pilot analysis of moderated mediation relationships. *Criminal Behaviour and Mental Health*, *22*(3), pp.181-190.

Duboz, P., Boëtsch, G., Gueye, L. and Macia, E., 2017. Self-rated health in Senegal: A comparison between urban and rural areas. *PloS One*, *12*(9), pp.1-27.

Duma, C.M., 2017. Water access and provisioning in UMzumbe Local Municipality under the UGu District Municipality, KwaZulu-Natal. Doctoral., University of Zululand.

Easterby-Smith, M., Jaspersen, L.J., Thorpe, R. and Valizade, D., 2021. Management and business research. 7th edition. United Kingdom. Sage.

Edokpayi, J.N., Enitan-Folami, A.M., Adeeyo, A.O., Durowoju, O.S., Jegede, A.O. and Odiyo, J.O., 2020. Recent trends and national policies for water provision and wastewater treatment in South Africa. In *Water Conservation and Wastewater Treatment in BRICS Nations*. Available: https://doi.org/10.1016/B978-0-12-818339-7.00009-6 [Accessed 12 April 2022].

Edokpayi, J.N., Rogawski, E.T., Kahler, D.M., Hill, C.L., Reynolds, C., Nyathi, E., Smith, J.A., Odiyo, J.O., Samie, A., Bessong, P. and Dillingham, R., 2018. Challenges to sustainable safe drinking water: A case study of water quality and use across seasons in rural communities in Limpopo province, South Africa. *Water*, *10*(2), pp.1-18.

Elfil, M. and Negida, A., 2017. Sampling methods in clinical research: An educational review. *Emergency*, *5*(1), pp. 52-59.

Enaifoghe, A., 2022. Challenges of municipal service delivery and instruments for enhancing South African local government administration. *African Journal of Development Studies, 12*(3), pp.1-24.

Endre, G., 2021. Research methods for managers. Available: Level 7 Assignment 7 - Research Methods for Managers (andrewsnotes.com) [Accessed 4 June 2022].

Enqvist, J.P. and Ziervogel, G., 2019. Water governance and justice in Cape Town: An overview. *Wiley Interdisciplinary Reviews: Water*, *6*(4), pp.1-16.

Erevelles, S. and Leavitt, C., 1992. A comparison of current models of consumer satisfaction/dissatisfaction. *The Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, *5*, pp.104-114.

Etikan, I. and Bala, K., 2017. Sampling and sampling methods. *Biometrics and Biostatistics International Journal*, *5*(6), pp.1-3.

Etikan, I., Musa, S.A. and Alkassim, R.S., 2016. Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), pp.1-4.

Etongo, D., Fagan, G.H., Kabonesa, C. and Asaba B, R., 2018. Community-managed water supply systems in rural Uganda: The role of participation and capacity development. *Water*, *10*(9), pp.1-18.

Fanadzo, M. and Ncube, B., 2018. Challenges and opportunities for revitalising smallholder irrigation schemes in South Africa. *Water SA*, *44*(3), pp.436-447.

Farmani, R., Dalton, J., Charalambous, B., Lawson, E., Bunney, S. and Cotterill, S., 2021. Intermittent water supply systems and their resilience to COVID-19: IWA IWS SG survey. *AQUA—Water Infrastructure, Ecosystems and Society*, *70*(4), pp.507-520.

Farquhar, J., Michels, N. and Robson, J., 2020. Triangulation in industrial qualitative case study research: Widening the scope. *Industrial Marketing Management*, *87*, pp.160-170.

Farrar, L., Prof, A. and Rivett, U., 2012. Is South Africa's free basic water policy working? A quantitative analysis of the effectiveness of the policy implementation. Available: WISA2012-P030.pdf [Accessed 14 February 2022].

Festinger, L., 1957. *A theory of cognitive dissonance (Vol. 2).* California: Stanford University Press.

Festinger, T., 2002. After adoption: Dissolution or permanence? *Child Welfare*. Available: https://www.jstor.org/stable/45390073 [Accessed 14 February 2022].

Fleming, J. and Zegwaard, K.E., 2018. Methodologies, Methods and Ethical Considerations for Conducting Research in Work-Integrated Learning. *International Journal of Work-Integrated Learning*, *19*(3), pp.205-213.

Forero, R., Nahidi, S., De Costa, J., Mohsin, M., Fitzgerald, G., Gibson, N., McCarthy, S. and Aboagye-Sarfo, P., 2018. Application of four-dimension criteria to assess rigour

of qualitative research in emergency medicine. *BMC Health Services Research*, *18*(1), pp.1-11.

Foster, T. and Hope, R., 2017. Evaluating waterpoint sustainability and access implications of revenue collection approaches in rural Kenya. *Water Resources Research*, *53*(2), pp.1473-1490.

Fotuè, L.A.T., 2013. Awareness and the demand for improved drinking water source in Cameroon. *International Journal of Economic Practices and Theories*, *3*(1), pp.50-59.

Fuster, R. and Donoso, G., 2018. Rural water management. *Water policy in Chile*, pp.151-163. Available: https://link.springer.com/chapter/10.1007/978-3-319-76702-4_10 [Accessed 30 November 2023].

Gebremichael, S.G., Yismaw, E., Tsegaw, B.D. and Shibeshi, A.D., 2021. Determinants of water source use, quality of water, sanitation and hygiene perceptions among urban households in North-West Ethiopia: A cross-sectional study. *Plos one*, *16*(4), pp.1-21.

Geere, J.A. and Cortobius, M., 2017. Who carries the weight of water? Fetching water in rural and urban areas and the implications for water security. *Water Alternatives*, *10*(2), pp.513-540.

Geere, J.A., Bartram, J., Bates, L., Danquah, L., Evans, B., Fisher, M.B., Groce, N., Majuru, B., Mokoena, M.M., Mukhola, M.S. and Nguyen-Viet, H., 2018. Carrying water may be a major contributor to disability from musculoskeletal disorders in low income countries: A cross-sectional survey in South Africa, Ghana and Vietnam. *Journal of Global Health*, *8*(1), pp.1-24.

Glimmerveen, L., Ybema, S. and Nies, H., 2022. Who participates in public participation? The exclusionary effects of inclusionary efforts. *Administration and Society, 54*(4), pp.543-574.

Gomez, M., Perdiguero, J. and Sanz, A., 2019. Socioeconomic factors affecting water access in rural areas of low- and middle-income countries. *Water*, *11*(2), pp.1-21.

Govender, D., 2019. Delivering on infrastructure maintenance for socio-economic growth: exploration of South African infrastructure for a sustained maintenance strategy. *WIT Transactions on Ecology and the Environment*, *238*, pp.495-506.

Gujarati, D., Porter, D. and Gunasekar, S. 2012. *Basic econometrics*. New Delhi: McGraw-Hill.

Güneri, ö.i. and Durmuş, b., 2020. Dependent dummy variable models: An application of logit, probit and tobit models on survey data. *International Journal of Computational and Experimental Science and Engineering*, *6*(1), pp.63-74.

Handema, M., Lungu, J., Chabala, M. and Shikaputo, C., 2023. Conceptualising the Philosophical Underpinning of the Study: A Practical Perspective. *Open Journal of Philosophy*, *13*(2), pp.257-268.

Harmon-Jones, E. (1999). Toward an understanding of the motivation underlying dissonance effects: Is the production of aversive consequences necessary? *Cognitive Dissonance: Progress on a Pivotal Theory in Social Psychology* (pp. 71–99). Available: https://doi.org/10.1037/10318-004 [Accessed 12 May 2022].

Haydam, N.E. and Steenkamp, P., 2020. A methodological blueprint for social sciences research–the social sciences research methodology framework. *EIRP Proceedings*, *15*(1), pp.1-22.

Hennink, M.M., Kaiser, B.N. and Weber, M.B., 2019. What influences saturation? Estimating sample sizes in focus group research. *Qualitative Health Research*, *29*(10), pp.1483-1496.

Herbig, F.J., 2019. Talking dirty-effluent and sewage irreverence in South Africa: A conservation crime perspective. *Cogent Social Sciences*, *5*(1), pp.1-18.

Hinojosa, A.S., Gardner, W.L., Walker, H.J., Cogliser, C. and Gullifor, D., 2017. A review of cognitive dissonance theory in management research: Opportunities for further development. *Journal of Management*, *43*(1), pp.170-199.

Hlavsa, T., Hruška, M. and Turková, E., 2017. The impact of investment support from the Rural Development Programme of the Czech Republic for 2007-2013 on the economic efficiency of farms. *Studies in Agricultural Economics*, *119*(1), pp.11-17.

Hofmans, J., 2012. Individual differences in equity models. *Psicologica: International Journal of Methodology and Experimental Psychology*, *33*(3), pp.473-482.

Homans, G.C., 1958. Social behavior as exchange. *American Journal of Sociology*, *63*(6), pp.597-606.

Hood, C., 1991. A public management for all seasons? *Public Administration*, *69*(1), pp.3-19.

Humphreys, E., van der Kerk, A. and Fonseca, C., 2018. Public finance for water infrastructure development and its practical challenges for small towns. *Water Policy*, *20*(S1), pp.100-111.

Hutton, G. and Chase, C., 2018. *Water supply, sanitation, and hygiene*. 3rd edition. Washington (DC): The International Bank for Reconstruction and Development/ The World Bank.

Hyndman, N. and Liguori, M., 2016. Public sector reforms: Changing contours on an NPM landscape. *Financial Accountability and Management*, *32*(1), pp.5-32.

Igwenagu, C. 2016. *Fundamentals of research methodology and data collection*. 18th ed. LAP Lambert Academic Publishing.

Imtiyaz, I., Putri, G.L., Hartono, D.M., Zulkarnain, F. and Priadi, C.R., 2021. Effect of boiling and water storage practices on E. coli contamination of drinking water in the city of Bekasi (case study: Jatiluhur, Sumur Batu, and Jatirangga Villages). In *IOP Conference Series: Earth and Environmental Science* 633 (1), pp.1-9.

Irani, E., 2019. The use of videoconferencing for qualitative interviewing: Opportunities, challenges, and considerations. *Clinical Nursing Research*, *28*(1), pp.3-8.

Iyer, D. and Tewari, D.D., 2017. An Analysis of the State's Obligation to Provide Access to Sufficient Water: A South African Perspective. *African Journal of Legal Studies*, *10*(2-3), pp.127-140.

James, G., 2017. Cul-de-sacs and narrative data analysis–A less than straightforward journey. *The Qualitative Report*, *22*(12), pp.3102-3117.

Jamieson, L. and Van Blerk, L., 2022. Responding to COVID-19 in South Africa–social solidarity and social assistance. Children's Geographies, *20*(4), pp.427-436.

Jamieson, M.K., Pownall, M. and Govaart, G.H., 2022. Reflexivity in quantitative research: A rationale and beginner's guide. Available: 10.31234/osf.io/xvrhm [Accessed on 7 July 2022].

Javadi, M. and Zarea, K., 2016. Understanding thematic analysis and its pitfall. *Demo*, *1*(1), pp.33-39.

John, M., Selaelo John, M. and Khutso Lavhelani, K.F., 2022. The contemporary challenges municipalities face in effectively implementing municipal service partnerships. EUREKA: *Social and Humanities, 2,* pp.58-69.

Johnson, T.P., 2014. Snowball sampling: Introduction. *Wiley StatsRef: Statistics Reference Online.* Available: https://doi.org/10.1002/9781118445112.stat05720 [Accessed on 12 July 2021].

Kalin, R.M., Mwanamveka, J., Coulson, A.B., Robertson, D.J., Clark, H., Rathjen, J. and Rivett, M.O., 2019. Stranded assets as a key concept to guide investment strategies for sustainable development goal 6. *Water*, *11*(4), pp.1-22.

Kampira, A. and Meyer, J., 2021. A brief introduction to thematic analysis. Available: Doi:10.13140/RG.2.2.25899.57128 [Accessed 29 November 2023].

Kapur, R., 2018. Research methodology: Methods and strategies. Available: Kapur - Research methodology Methods and strategies.pdf (ihmc.us) [Accessed 6 June 2022]

Kativhu, T., Mazvimavi, D., Tevera, D. and Nhapi, I., 2018. Implementation of Community Based Management (CBM) in Zimbabwe: The dichotomy of theory and

practice and its influence on sustainability of rural water supply systems. *Physics and Chemistry of the Earth, Parts A/B/C*, *106*, pp.73-82.

Kelly, J.W., 1998. The alternative conformations of amyloidogenic proteins and their multi-step assembly pathways. *Current Opinion in Structural Biology*, *8*(1), pp.101-106.

Kim, S.M., 2021. Inductive or deductive? Research by maxillofacial surgeons. *Journal of the Korean Association of Oral and Maxillofacial Surgeons*, *47*(3), pp.151-152.

Klien, M. and Salvetti, M., 2018. Water services in selected Central and Eastern European countries. *Facing the Challenges of Water Governance*. Available: https://doi.org/10.1007/978-3-319-98515-2 [Accessed 17 February 2022].

Klimczuk, A. 2021. *Introductory chapter. Demographic analysis: Selected concepts, tools, and application.* London, United Kingdom: IntechOpen.

Kojo, R. and Paschal, N., 2018. Urban population growth and environmental sustainability in Nigeria. *Journal of Empirical Studies*, *5*(1), pp.12-19.

Kothari, C.R., 2019. *Research methodology: Method and techniques.* 2nd revised edition. New Delhi. New Age International (P) Ltd. Publisher.

Kumar, R., 2018. *Research methodology: A step-by-step guide for beginners*. 5th ed. United Kingdom: Sage.

Kumatongo, B. and Muzata, K.K., 2021. Research paradigms and designs with their application in education. *Journal of Lexicography and Terminology (Online ISSN 2664-0899. Print ISSN 2517-9306).5*(1), pp.16-32.

Kumwenda, S., 2019. *Challenges to hygiene improvement in developing countries*. London, United Kingdom: IntechOpen.

Kyngäs, H., Kääriäinen, M. and Elo, S., 2020. The trustworthiness of content analysis. *In the Application of Content Analysis in Nursing Science Research*, pp. 41-48. Available: https://doi.org/10.1007/978-3-030-30199-6_5 Accessed [6 July 2020].

Ladychenko, V., Yara, O., Golovko, L. and Serediuk, V., 2019. Groundwater Management in Ukraine and the EU. *European Journal of Sustainable Development*, *8*(1), pp.31-31.

Langa, M. and Kiguwa, P., 2013. Violent masculinities and service delivery protests in post-apartheid South Africa: A case study of two communities in Mpumalanga. *Agenda*, *27*(1), pp.20-31.

Lazard, L. and McAvoy, J., 2020. Doing reflexivity in psychological research: What's the point? What's the practice? *Qualitative Research in Psychology*, *17*(2), pp.159-177.

Leavy, P. 2017. *Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches.* New York, London: The Guilford Press.

Leventhal, G.S., 1980. *What should be done with equity theory? In social exchange*. New York: Plenum Press.

Li, H., Cohen, A., Li, Z., Lv, S., He, Z., Wang, L. and Zhang, X., 2020. Intermittent water supply management, household adaptation, and drinking water quality: A comparative study in two Chinese provinces. *Water*, *12*(5), pp.1-22.

Li, P. and Wu, J., 2019. Drinking water quality and public health. *Exposure and Health*, *11*(2), pp.73-79.

Loubser, C., Chimbanga, B.M. and Jacobs, H., 2021. Intermittent water supply: A South African perspective. *Water SA*, *47*(1), pp.1-9.

Lynn Jr, L.E., 1998. The new public management: How to transform a theme into a legacy. *Public Administration Review*. Available: https://doi.org/10.2307/976563 [Accessed 23 February 2022].

Mabeba, S.J., 2021. The impact of corruption on service delivery: A topical matter in the South African Municipalities. *The Business and Management Review*, *12*(1), pp.165-169.

Mabizela, H. and Matsiliza, N.S., 2020. Uncovering the gaps in the provision of services in the rural Okhahlamba Municipality of KwaZulu-Natal province. *Africa's Public Service Delivery and Performance Review*, *8*(1), pp.1-9.

Maguire, M. and Delahunt, B., 2017. Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. *All Ireland Journal of Higher Education*, *9*(3). Available: http://ojs.aishe.org/index.php/aishe-j/article/view/335 Accessed [5 July 2022].

Mahaye, N.E., Dlomo, S.S. and Ajani, O.A., 2023. Impact of public protests on Education system: A case of 2021 political unrest in South Africa*. International Journal of Research in Business and Social Science (2147-4478), 12*(2), pp.348-357.

Majid, U., 2018. Research fundamentals: Study design, population, and sample size. *Undergraduate Research in Natural and Clinical Science and Technology Journal*, *2*, pp.1-7.

Makalela, K.I. and Asha, A.A., 2019. Rural household's satisfaction with access to basic services in Lepelle-Nkumpi local municipality, Limpopo province. *International Journal of Economics and Finance Studies*, *11*(1), pp.49-63.

Makaya, E., Rohse, M., Day, R., Vogel, C., Mehta, L., McEwen, L., Rangecroft, S. and van Loon, A.F., 2020. Water governance challenges in rural South Africa: Exploring institutional coordination in drought management. *Water Policy*, *22*(4), pp.519-540.

Malhotra, G., 2017. Strategies in research. *International Journal for Advance Research and Development*, *2*(5), pp.172-180.

Mamokhere, J., 2019. An exploration of reasons behind service delivery protests in South Africa: A case of Bolobedu South at the Greater Tzaneen Municipality. Available: http://hdl.handle.net/10386/2669 [Accessed 12 May 2022].

Mandiriza, T. and Fourie, D.J., 2023. Factors influencing the adoption of municipal public-private partnerships in water-infrastructure projects in South Africa. *Africa Today, 69*(4), pp.3-28.

Masiangoako, T., Khunou, K. and Potter, A., 2022. Fighting for water in South Africa: Public participation, water rights claiming and strengthening governance. *H2Open Journal*, *5*(1), pp.98-114.

Masiya, T., Davids, Y.D. and Mangai, M.S., 2019. Assessing service delivery: Public perception of municipal service delivery in South Africa. Available: https://www.ceeol.com/search/article-detail?id=764379 [Accessed 12 May 2022].

Masuku, M.M. and Jili, N.N., 2019. Public service delivery in South Africa: The political influence at local government level. *Journal of Public Affairs*, *19*(4), pp.1-24.

Mateo-Sagasta, J., Zadeh, S.M., Turral, H. and Burke, J., 2017. *Water pollution from agriculture: A global review. Executive summary*. Rome, Italy: FAO Colombo, Sri Lanka: International Water Management Institute (IWMI). CGIAR Research Program on Water, Land and Ecosystems.

Matikinca, P., Ziervogel, G. and Enqvist, J.P., 2020. Drought response impacts on household water use practices in Cape Town, South Africa. *Water Policy*, *22*(3), pp.483-500.

Mazele and Amoah 2022. The causes of poor infrastructure management and maintenance in South African municipalities. *Property Management, 40*(2), pp.192-206).

McNicholl, D., Hope, R., Money, A., Lane, A., Armstrong, A., Van Der Wilk, N., Dupuis, M., Harvey, A., Nyaga, C., Womble, S. and Favre, D., 2019. Performance-based funding for reliable rural water services in Africa. Available: Performance-based funding for reliable rural water services in Africa — Vrije Universiteit Amsterdam (vu.nl) [Accessed 7 December 2023].

Mekuriaw, A. and Gurmessa, B., 2020. User satisfaction with rural water drinking points in Woliso District, Central Ethiopia. *Water Supply*, *20*(8), pp.3330-3340.

Melnikovas, A., 2018. Towards an explicit research methodology: Adapting research onion model for futures studies. *Journal of Futures Studies*, *23*(2), pp.29-44.

Miles, E.W., Hatfield, J.D. and Huseman, R.C., 1994. Equity sensitivity and outcome importance. *Journal of Organizational Behavior*, *15*(7), pp.585-596.

Miller, M.K., Clark, J.D. and Jehle, A., 2015. *Cognitive dissonance theory (Festinger): The Blackwell Encyclopedia of sociology*. United States of America: RandD Strategic Solutions.

Mishra, B.K., Kumar, P., Saraswat, C., Chakraborty, S. and Gautam, A., 2021. Water security in a changing environment: Concept, challenges and solutions. *Water*, *13*(4), pp.198-216.

Mitlin, D., Beard, V.A., Satterthwaite, D. and Du, J., 2019. Unaffordable and undrinkable: Rethinking urban water access in the global south. Available: https://apo.org.au/sites/default/files/resource-files/2019-08/apo-nid253621.pdf [Accessed on 15 January 2024].

Mkansi, L. 2021. Southern African catholic bishops' conference parliamentary liaison office. *SA's Underlying Water Infrastructure Challenges.* Available: BP-521-SA-Water-Infrastructure-Challenges-LM.pdf (cplo.org.za) [Accessed on 5 October 2023].

Mligo, E.S., 2016. *Introduction to research methods and report writing: A practical guide for students and researchers in social sciences and the humanities*. United States of America: Wipf and Stock Publishers.

Mohajan, H.K., 2017. Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University. Economic Series*, *17*(4), pp.59-82.

Mokhomole, T.D., Khosa, D. and Olutola, A., 2023. Exploring the Impact of arrests and prosecution on the perpetrators of service delivery protests crimes in South Africa. *International Journal of Social Science Research and Review*, *6*(6), pp.1-18.

Moropeng, R.C. and Momba, M.N.B., 2020. Assessing the sustainability and acceptance rate of cost-effective household water treatment systems in rural communities of Makwane Village, South Africa. *Crystals*, *10*(10), pp.1-16.

Motho, M., Kolawole, O.D., Motsholapheko, M.R. and Mogomotsi, P.K., 2022. Influence of household demographic and socio-economic factors on water demand in Ngamiland District, Botswana. *Water Science*, *36*(1), pp.48-59.

Mueller, R.O. and Knapp, T.R., 2018. Reliability and validity. *In the Reviewer's Guide to Quantitative Methods in the Social Sciences*. pp. 397-401 Available: https://doi.org/10.4324/9781315755649 [Accessed on 5 July 2022].

Mumbi, A.W. and Watanabe, T., 2020. Differences in risk perception of water quality and its influencing factors between lay people and factory workers for water management in River Sosiani, Eldoret Municipality Kenya. *Water*, *12*(8), pp1-25.

Murwirapachena, G. and Kabange, M.M., 2023. Can commercialisation address consumer debt in local government: a case of South African metropolitan municipalities? *Canadian Journal of Development Studies*. Available: https://doi.org/10.1080/02255189.2023.2212897 [Accessed on 5 October 2023].

Murwirapachena, G., 2021. Understanding household water-use behaviour in the city of Johannesburg, South Africa. *Water Policy*, *23*(5), pp.1266-1283.

Murwirapachena, G., Dikgang, J. and Mulwa, R., 2024. Benchmarking South African water utilities using three efficiency analysis methods. *Applied Economics,* https://doi.org/10.1080/00036846.2024.2364074 [Accessed on 6 August 2024].

Musara, M., Niyimbanira, F. and Madzivhandila, T.S., 2022. Towards the entrepreneurial municipality: A proposed framework for service delivery improvement in South Africa. *Journal of Public Administration, 57*(1), pp.87-105.

Mvongo, V.D., Defo, C. and Tchoffo, M., 2021. Sustainability of rural water services in rural sub-Saharan Africa environments: developing a Water Service Sustainability Index. *Sustainable Water Resources Management*, *7*(3), pp.30-46.

Mwelase, L.T., 2021. Water supply interruptions in Umzinto water system: Ugu district, South Africa. *International Journal of Water Resources and Environmental Engineering*, *13*(2), pp.135-153.

Narzetti, D.A. and Marques, R.C., 2022. Policies and incentives for developing universal access to water and sanitation for vulnerable families. *Water Policy, 24*(3), pp.485-499.

Nayak, J.K. and Singh, P., 2021*. Fundamentals of research methodology problems and prospects*. New Delhi. SSDN Publishers and Distributors.

Ndevu, Z. and Muller, K., 2017. A conceptual framework for improving service delivery at local government in South Africa. *African Journal of Public Affairs*, *9*(7), pp.13-24.

Ndimande, N., 2022. Equitable Access to Water at Alfred Duma Local Municipality. In *Handbook of Research on Resource Management and the Struggle for Water Sustainability in Africa*, pp. 149-178.

Negharchi, S.M. and Shafaghat, R., 2020. Leakage estimation in water networks based on the BABE and MNF analyses: A case study in Gavankola village, Iran. *Water Supply*, *20*(6), pp.2296-2310.

Nephawe, N., Mwale, M., Zuwarimwe, J. and Tjale, M.M., 2021. The impact of water-related challenges on rural community's food security initiatives. *AGRARIS. Journal of Agribusiness and Rural Development Research*, *7*(1), pp.11-23.

Netswera, F.G., 2014. The underlying factors behind violent municipal service delivery protests in South Africa. *Journal of Public Administration*, *49*(1), pp.261-273.

Ngcobo, M., Murwirapachena, G. and Reddy, M., 2023. Water consumption behaviour and the use of technology among households in Durban, South Africa. *Water Policy, 25*(5), pp.523-543.

Ngobeni, V. and Breitenbach, M.C., 2021. Production and scale efficiency of South African water utilities: The case of water boards. *Water Policy*, *23*(4), pp.862-879.

Nkuna, Z., Mamakoa, E. and Mothetha, M., 2014. The important role of springs in South Africa's rural water supply: The case study of two rural communities in South Africa. *OIDA International Journal of Sustainable Development*, *7*(12), pp.11-20.

Noble, H. and Smith, J., 2015. Issues of validity and reliability in qualitative research. *Evidence-Based Nursing*, *18*(2), pp.34-35.

Nowell, L.S., Norris, J.M., White, D.E. and Moules, N.J., 2017. Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, *16*(1), pp.1.22.

Nthunya, L.N., Maifadi, S., Mamba, B.B., Verliefde, A.R. and Mhlanga, S.D., 2018. Spectroscopic determination of water salinity in brackish surface water in Nandoni Dam, at Vhembe District, Limpopo Province, South Africa. *Water*, *10*(8), pp.1-13.

Ntjatsane, M. and Kodongo, O., 2017. Financing of infrastructure maintenance in South Africa. (*Unpublished Master's thesis). University of Witwatersrand Business School, Johannesburg*.

Nwokorie, E.C., 2018. Public-Private Partnership Coordination: Lessons from Tanzanian Water Sector. Available: https://doi.org/10.1007/978-3-319-31816-5_3548-1 [Accessed on 8 April 2021].

Ochoa-Rico, M.S., Río, J.A.J.D., Romero-Subia, J.F. and Vergara-Romero, A., 2023. Study of Citizen Satisfaction in Rural Versus Urban Areas in Public Services: Perspective of a Multi-group Analysis. *Social Indicators Research*, pp.1-24. Available: https://doi.org/10.1007/s11205-023-03242-2 [Accessed on 8 April 2021].

Oliver, R.L. and Swan, J.E., 1989. Equity and disconfirmation perceptions as influences on merchant and product satisfaction. *Journal of Consumer Research*, *16*(3), pp.372-383.

Oliver, R.L., 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, *17*(4), pp.460-469.

Olmos-Vega, F.M., Stalmeijer, R.E., Varpio, L. and Kahlke, R., 2023. A practical guide to reflexivity in qualitative research: AMEE Guide No. 149. *Medical teacher*, *45*(3), pp.241-251.

Olufunke, K.A., 2022. Water pollution in Nigeria and its effect on agriculture: A case study of Niger delta. *Research and Science Today*, (1), pp.21-31.

Omarova, A., Tussupova, K., Hjorth, P., Kalishev, M. and Dosmagambetova, R., 2019. Water supply challenges in rural areas: a case study from Central

Kazakhstan. *International Journal of Environmental Research and Public Health*, *16*(5), pp.1-14.

Omotayo, A.O., Olagunju, K.O., Omotoso, A.B., Ogunniyi, A.I., Otekunrin, O.A. and Daud, A.S., 2021. Clean water, sanitation and under-five children diarrhea incidence: Empirical evidence from the South Africa's General Household Survey. *Environmental Science and Pollution Research*, *28*, pp.63150-63162.

Osborne, S.P., Radnor, Z. and Nasi, G., 2013. A new theory for public service management? Toward a (public) service-dominant approach. *The American Review of Public Administration*, *43*(2), pp.135-158.

Osei-Kyei, R. and Chan, A.P., 2017. Implementing public–private partnership (PPP) policy for public construction projects in Ghana: Critical success factors and policy implications. *International Journal of Construction Management*, *17*(2), pp.113-123.

Osuagwu, L., 2020. Research methods: Issues and research direction. *Business and Management Research*, *9*(3), pp.46-55.

Owuamalam, C.K., Rubin, M. and Spears, R., 2016. The system justification conundrum: Re-examining the cognitive dissonance basis for system justification. *Frontiers in Psychology*, *7*, pp.1-4.

Özkent, Y., 2022. Social media usage to share information in communication journals: An analysis of social media activity and article citations. *Plos one*, *17*(2), pp.1-22.

Palaganas, E.C., Sanchez, M.C., Molintas, V.P. and Caricativo, R.D., 2017. Reflexivity in qualitative research: A journey of learning. *Qualitative Report*, *22*(2), pp.426-438.

Pandey, P. and Pandey, M.M., 2015. *Research methodology: Tools and techniques.* Romania, European Union: Brigde Center.

Pandey, P. and Pandey, M.M., 2021. *Research methodology: tools and techniques*. Romania, European Union: Bridge Center.

Panhwar, A.H., Ansari, S. and Shah, A.A., 2017. Post-positivism: An effective paradigm for social and educational research. *International Research Journal of Arts and Humanities (IRJAH)*, *45*(45).pp.1-22.

Paret, M. and Runciman, C., 2016. The 2009+ South African protest wave. *WorkingUSA*, *19*(3), pp.301-319.

Park, Y.S., Konge, L. and Artino Jr, A.R., 2020. The positivism paradigm of research. *Academic Medicine*, *95*(5), pp.690-694.

Pascale, J., Lineback, J.F., Bates, N. and Beatty, P., 2022. Protecting the identity of participants in qualitative research. *Journal of Survey Statistics and Methodology*, *10*(3), pp.549-567.

Patino, C.M. and Ferreira, J.C., 2018. Inclusion and exclusion criteria in research studies: definitions and why they matter. *Jornal Brasileiro de Pneumologia*, *44*, pp.84-84.

Pawar, N. 2020. 6. *Type of Research and Type Research Design*. Haryana, India. KD Publications

Payus, C., Ann Huey, L., Adnan, F., Besse Rimba, A., Mohan, G., Kumar Chapagain, S., Roder, G., Gasparatos, A. and Fukushi, K., 2020. Impact of extreme drought climate on water security in North Borneo: Case study of Sabah. *Water*, *12*(4), pp.1130-1135.

Phair, D. and Warren, K., 2021. Saunders' Research Onion: Explained simply peeling the onion, layer by layer with examples. Available: Saunders' Research Onion: Explained Simply (+ Examples) - Grad Coach [Accessed 3 July 2020].

Pindihama, G.K. and Malima, T.P., 2022. Potable Water Security in Rural South Africa: A Case Study of Vhembe District. *African Journal of Governance and Development*, *11*(1.2), pp.256-275.

Polidano, C., 1999. *The new public management in developing countries*. Manchester: Institute for Development Policy and Management.

Pollitt, C., 2000. Is the emperor in his underwear? An analysis of the impacts of public management reform. *Public Management an International Journal of Research and Theory*, *2*(2), pp.181-200.

Potgieter, J.C., Herold, C., Van Dijk, M. and Bhagwan, J.N., 2019. Economic benefit of ensuring uninterrupted water supply during prolonged electricity disruptions–City of Tshwane case study. *Journal of the South African Institution of Civil Engineering*, *61*(4), pp.19-28.

Potgieter, N., Karambwe, S., Mudau, L.S., Barnard, T. and Traore, A., 2020. Human enteric pathogens in eight rivers used as rural household drinking water sources in the northern region of South Africa. *International Journal of Environmental Research and Public Health*, *17*(6), pp.1-15.

Prashad, J., 2020. Latin America's Water Pollution Crisis and its Effects on Children's Health Available:https://www.humanium.org/en/latin-americas-water-pollution-crisis-and-its-effects-on-childrens-health/#:~:text=The%20effects%20of%20unsafe%20drinking,of%20Latin%20America%2C%202013 [Accessed 15 January 2024].

Pritchard, R.D., 1969. Equity theory: A review and critique. *Organizational Behavior and Human Performance*, *4*(2), pp.176-211.

Proctor, C.R., Rhoads, W.J., Keane, T., Salehi, M., Hamilton, K., Pieper, K.J., Cwiertny, D.M., Prévost, M. and Whelton, A.J., 2020. Considerations for large building water quality after extended stagnation. *AWWA Water Science*, *2*(4), pp.1-27.

Qian, N., House, S., Wu, A.M. and Wu, X., 2020. Public–private partnerships in the water sector in China: A comparative analysis. *International Journal of Water Resources Development*, *36*(4), pp.631-650.

Rahi, S., 2017. Research design and methods: A systematic review of research paradigms, sampling issues and instruments development. *International Journal of Economics and Management Sciences*, *6*(2), pp.1-5.

Raithatha, Y., 2017. *Understanding the economic impact terrorism has on the destination decision making: Northern Irish tourists* (Doctoral dissertation, Dublin Business School).

Rakubu, K.A., Masuku, S.C. and Madima, K., 2023. A criminological analysis of violent nature of protests in Vuwani Area, Vhembe District of Limpopo Province. *International Journal of Research in Business and Social Science (2147-4478), 12*(2), pp.547-559.

Ranjan, P. and Pandey, P.K., 2021. Spring protection: Step towards water security and sustainable rural water supply. *Annals of the Romanian Society for Cell Biology*, pp.1216-1222.http://www.annalsofrscb.ro/index.php/journal/article/view/1071 [Accessed on 15 January 2024].

Reisinger, Y. and Turner, L., 1997. Cross-cultural differences in tourism: Indonesian tourists in Australia. *Tourism Management*, *18*(3), pp.139-147.

Reisinger, Y. and Turner, L., 1997. Tourist satisfaction with hosts: A cultural approach comparing Thai tourists and Australian hosts. *Pacific Tourism Review*, *1*(2), pp.147-159.

Roberts, K., Dowell, A. and Nie, J.B., 2019. Attempting rigour and replicability in thematic analysis of qualitative research data: A case study of codebook development. *BMC Medical Research Methodology*, *19*(1), pp.1-8.

Rolandi, S., Brunori, G., Bacco, M. and Scotti, I., 2021. The digitalization of agriculture and rural areas: Towards a taxonomy of the impacts. *Sustainability*, *13*(9), pp.1-16.

Romero-Subia, J.F., Jimber-del Rio, J.A., Ochoa-Rico, M.S. and Vergara-Romero, A., 2022. Analysis of Citizen Satisfaction in Municipal Services. *Economies*, *10*(9), pp.1-24.

Rosado-García, F.M., Guerrero-Flórez, M., Karanis, G., Hinojosa, M.D.C. and Karanis, P., 2017. Water-borne protozoa parasites: the Latin American perspective. *International Journal of Hygiene and Environmental Health*, *220*(5), pp.783-798.

Rulashe, T. and Ijeoma, E.O., 2022. An exploration of public accountability and service delivery at the Buffalo City Metropolitan Municipality in the Eastern Cape province,

South Africa. *Africa's Public Service Delivery and Performance Review, 10*(1), pp.1-22.

Rutberg, S. and Bouikidis, C.D., 2018. Focusing on the fundamentals: A simplistic differentiation between qualitative and quantitative research. *Nephrology Nursing Journal*, *45*(2), pp.209-213.

Ryan, G., 2018. Introduction to positivism, interpretivism and critical theory. *Nurse Researcher*, *25*(4), pp.41-49.

Sahay, A., 2016. Peeling Saunder's research onion. *Research Gate, Art*, pp.1-5.

Salehi, M., 2022. Global water shortage and potable water safety; Today's concern and tomorrow's crisis. *Environment International, 158*, pp.1-7.

Saunders, M., Lewis, P. and Thornhill, A., 2009. *Research methods for business students*. England: Pearson Education Limited.

Schoonenboom, J. and Johnson, R.B., 2017. How to construct a mixed methods research design. *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *69*(2), pp.107-131.

Selvan, S.G. 2017. *Empirical research: A study guide.* Makuyu: Paulines Publication Africa

Shaw, K.H. and Liao, H.Y., 2021. Does benevolent leadership promote follower unethical pro-organizational behavior? A social identity perspective. *Journal of Leadership and Organizational Studies*, *28*(1), pp.31-44.

Shrestha, N., 2020. Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics and Statistics*, *8*(2), pp.39-42.

Shufutinsky, A., 2020. Employing use of self for transparency, rigor, trustworthiness, and credibility in qualitative organizational research methods. *OD practitioner*, *52*(1), pp.50-58.

Sileyew, K.J., 2019. *Research design and methodology.* In *Cyberspace*. IntechOpen.

Silva, B.B., Sales, B., Lanza, A.C., Heller, L. and Rezende, S., 2020. Water and sanitation are not gender-neutral: Human rights in rural Brazilian communities. *Water Policy*, *22*(1), pp.102-120.

Slavik, I., Oliveira, K.R., Cheung, P.B. and Uhl, W., 2020. Water quality aspects related to domestic drinking water storage tanks and consideration in current standards and guidelines throughout the world–a review. *Journal of Water and Health*, *18*(4), pp.439-463.

Snyder, H., 2019. Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, pp.333-339.

Sommer, M., Ferron, S., Cavill, S. and House, S., 2015. Violence, gender and WASH: Spurring action on a complex, under-documented and sensitive topic. *Environment and Urbanization*, *27*(1), pp.105-116.

South Africa, Department of Water and Sanitation. 1997. *Water Services Act 108 of 1997*. Pretoria: Department of Water and Sanitation. Available: https://www.gov.za/sites/default/files/gcis_document/201409/a108-97.pdf [Accessed on 15 January 2024].

South Africa, Department of Water and Sanitation. 1998. *National Water Act 36 of 1998*. Pretoria: Department of Water and Sanitation. Available: https://www.gov.za/documents/national-water-act [Accessed on 15 January 2024].

South Africa, Department of Water and Sanitation. 2019. *Annual report water is life - sanitation is dignity 2019/2020*. Pretoria: Government Printer.

South Africa, Local Government. 2000. *Municipal Systems Act 32 of 2000*. Pretoria: Local Government. Available:https://www.gov.za/documents/local-government-municipal-systems-act [Accessed on 15 January 2024].

Sovacool, B.K., Axsen, J. and Sorrell, S., 2018. Promoting novelty, rigor, and style in energy social science: Towards codes of practice for appropriate methods and research design. *Energy Research and Social Science*, *45*, pp.12-42.

Stahl, N.A. and King, J.R., 2020. Expanding approaches for research: Understanding and using trustworthiness in qualitative research. *Journal of Developmental Education*, *44*(1), pp.26-28.

Statistics South Africa, 2018. Men, women and children. *Findings of the Living Conditions Survey,2014/2015*. Available: https://www.statssa.gov.za/publications/Report-03-10-02%20/Report-03-10-02%202015.pdf [Accessed on 24 March 2022].

Statistics South Africa., 2017. The state of basic service delivery in South Africa: In-depth analysis of the Community Survey 2016 data. South Africa: Pretoria. Available: https://www.statssa.gov.za/publications/Report [Accessed on 31 March 2022].

Statistics South Africa.,2021. *General Household Survey 2019*. Pretoria: Government Printer.

Surmiak, A.D., 2018. Confidentiality in qualitative research involving vulnerable participants: Researchers' perspectives. In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* 19(3), pp.1-20.

Sürücü, L. and Maslakçl, A., 2020. Validity and reliability in quantitative research. *Business and Management Studies: An International Journal*, *8*(3), pp.2694-2726.

Sycheva, I.N., Ovchinnicov, Y.L., Voronkova, O.Y., Akhmetshin, E.M., Kolmakov, V.V. and Vasilieva, A.G., 2018. Economic potential and development prospects of small businesses in rural areas. Available: https://www.um.edu.mt/library/oar//handle/123456789/37345 [Acessed on 7 March 2021]

Taherdoost, H. 2016. Sampling methods in research methodology: How to choose a sampling technique for research. *International Journal of Academic Research in Management, 5*(2), pp.18-27.

Taherdoost, H., 2021. Data collection methods and tools for research: A step-by-step guide to choose data collection technique for academic and business research projects. *International Journal of Academic Research in Management (IJARM)*, *10*(1), pp.10-38.

Tantoh, H. and Mckay, M., 2020. Investigating community constructed rural water systems in Northwest Cameroon: Leadership, gender and exclusion. *International Development Planning Review*, *42*(4), pp.1-22.

Taonameso, S., Mudau, L.S., Traoré, A.N. and Potgieter, N., 2019. Borehole water: A potential health risk to rural communities in South Africa. *Water Supply*, *19*(1), pp.128-136.

Terry, G., Hayfield, N., Clarke, V. and Braun, V., 2017. Thematic analysis. *The Sage Handbook of Qualitative Research in Psychology*, pp.17-37.

Terry, L.D., 2015. *Leadership of public bureaucracies: The administrator as conservator: The Administrator as Conservator*. 2nd edition. New York: Routledge.

Theofanidis, D. and Fountouki, A., 2018. Limitations and delimitations in the research process. *Perioperative Nursing-Quarterly Scientific, Online Official Journal of GORNA*, *7*(3 September-December 2018), pp.155-163.

Thusi, X., Matyana, M. and Jili, N., 2023. Lack of political will: A barrier to public service delivery in South Africa and a high cost for citizens. Journal of Studies in Social Sciences and Humanities (JSSSH) E-ISSN, 9(2), pp.137-147.

Tian, K., Chen, Z. and Wang, H., 2021. How do citizens feel about their water services in the water sector? Evidence from the UK. *Environmental Sciences Europe*, *33*, pp.1-15.

Tolley, E.E., Ulin, P.R., Mack, N., Robinson, E.T. and Succop, S.M. 2016. Qualitative methods in public health: *A field guide for applied research*. 2nd ed. United States of America: John Wiley and Sons.

Too, J.K., Kipkemboi Sang, W., Ng'ang'a, Z. and Ngayo, M.O., 2016. Fecal contamination of drinking water in Kericho District, Western Kenya: Role of source and household water handling and hygiene practices. *Journal of Water and Health*, *14*(4), pp.662-671.

Tshililo, F.P., Mutanga, S., Sikhwivhilu, K., Siame, J., Hongoro, C., Managa, L.R., Mbohwa, C. and Madyira, D.M., 2022. Analysis of the determinants of household's

water access and payments among the urban poor. A case study of Diepsloot Township. *Physics and Chemistry of the Earth, Parts A/B/C*, *127*, pp.1-8.

Tucho, G.T., 2022. A review on the socio-economic impacts of informal transportation and its complementarity to address equity and achieve sustainable development goals. *Journal of Engineering and Applied Science, 69*(1), pp.1-16.

Ugu District Municipality., 2016. Overview. Available: https://ugu.gov.za/Pages/About-Us.aspx [Accessed on 29 November 2023].

uMngeni-uThukela Water., 2023 Statement: Electricity load shedding takes its toll on drinking water supply by umgeni water and exacerbated as stage 6 is increasingly implemented. Available: 17-04-2023-Load-Shedding-and-Impact-on-Water-Supply.pdf (umgeni.co.za) [Accessed on 29 November 2023].

Umra, R., 2020. Investigating water interruptions, household improvement of drinking water, and diarrhoea among children under five in South Africa (Doctoral dissertation).

United Nations Children's Fund., 2017. Thirsting for a future: *Water and children in a changing climate*. Unicef.

United Nations Water, 2020. Equitable access to water and sanitation is still a challenge for Europe. Available: https://www.unwater.org/equitable-access-to-water-and-sanita-tion-is-still-a-challenge-for-europe/ [Accessed on 11 January 2022].

University of Oklahoma. Institute of Group Relations and Sherif, M., 1961. Intergroup conflict and cooperation: *The Robbers Cave experiment*. Norman, OK: University Book Exchange.

Vasileiou, K., Barnett, J., Thorpe, S. and Young, T., 2018. Characterising and justifying sample size sufficiency in interview-based studies: Systematic analysis of qualitative health research over a 15-year period. *BMC Medical Research Methodology*, *18*(1), pp.1-18.

Vaughan, G. and Hogg, M.A., 2005. *Introduction to Social Psychology. 4th ed.* Frenchs Forest, Sydney, Australia: Pearson Education Australia.

Venkataramanan, V., Collins, S.M., Clark, K.A., Yeam, J., Nowakowski, V.G. and Young, S.L., 2020. Coping strategies for individual and household-level water insecurity: A systematic review. *Wiley Interdisciplinary Reviews: Water*, *7*(5), pp.1-20.

Viljoen, G. and van der Walt, K., 2018. South Africa's water crisis-an interdisciplinary approach. *Tydskrif vir Geesteswetenskappe*, *58*(3), pp.483-500.

Von Unger, H., 2021. Ethical reflexivity as research practice. *Historical Social Research/Historische Sozialforschung*, *46*(2), pp.186-204.

Vyas-Doorgapersad, S., 2011. Paradigm shift from new public administration to new public management: Theory and practice in Africa. *TD: The Journal for Transdisciplinary Research in Southern Africa*, *7*(2), pp.235-250.

Wæraas, A., 2022. Thematic analysis: Making values emerge from texts. In *Researching values: Methodological approaches for understanding values work in organisations and leadership* (pp. 153-170) Available:https://doi.org/10.1007/978-3-030-90769-3_13 [Accessed on 15 January 2024].

Wang, X. and Cheng, Z., 2020. Cross-sectional studies: strengths, weaknesses, and recommendations. *Chest*, *158*(1), pp. 65-71.

Weaver, M.J.T., Hamer, N., O'Keeffe, J. and Palmer, C.G., 2017. Water service delivery challenges in a small South African municipality: Identifying and exploring key elements and relationships in a complex social-ecological system. *Water SA*, *43*(3), pp.398-408.

Westbrook, R.A. and Reilly, M.D., 1983. Value-percept disparity: An alternative to the disconfirmation of expectations theory of consumer satisfaction. *ACR North American Advances*. Available: Value-Percept Disparity: An Alternative to the Disconfirmation of Expectations Theory of Consumer Satisfaction | ACR (acrwebsite.org) [Accessed on 11 January 2022].

World Health Organisation, 2022. Drinking- water. Available: https://www.who.int/news-room/fact-sheets/detail/drinking-water [Accessed on 14 March 2022].

WWAP (UNESCO World Water Assessment Programme), 2019. The United Nations world water development report 2019: Leaving no one behind.

Xolani, T., Mkhize, N. and Mlambo, V.H., 2022. The Meaning of Service Delivery Protest: A Case Study of South African Local Government. *Humanities and Social Sciences, 29*(4), pp.131-140.

Ya Metsi, K., 2018. The water and sanitation sector is currently not financially sustainable. National Water and Sanitation Master Plan. Available: https://www.nbi.org.za/wp-content/uploads/2019/05/NBI_KYM-Report-2_Strengthening-WSAs.pdf [Accessed on 10 May 2022].

Young, M., Varpio, L., Uijtdehaage, S. and Paradis, E., 2020. The spectrum of inductive and deductive research approaches using quantitative and qualitative data. *Academic Medicine*, *95*(7), pp.1-30.

Yüksel, A. and Yüksel, F., 2008. Consumer satisfaction theories: A critical review. *Tourist Satisfaction and Complaining Behavior: Measurement and Management Issues in the Tourism and Hospitality Industry*, pp.65-88. Available: Consumer_Satisfaction_Theories_A_Critica20210918-8949-1f2so0l-libre.pdf (d1wqtxts1xzle7.cloudfront.net) [Accessed on 10 May 2022].

Zangirolami-Raimundo, J., de Oliveira Echeimberg, J. and Leone, C., 2018. Research methodology topics: Cross-sectional studies. *Journal of Human Growth and Development*, *28*(3), pp.356-360.

Żelechowska, D., Żyluk, N. and Urbański, M., 2020. Find out a new method to study abductive reasoning in empirical research. *International Journal of Qualitative Methods*, *19*, pp.1-11.

Zhang, C., Bengio, S., Hardt, M., Recht, B. and Vinyals, O., 2021. Understanding deep learning (still) requires rethinking generalization. *Communications of the ACM*, *64*(3), pp.107-115.

Zhang, Y., Deng, J., Qin, B., Zhu, G., Zhang, Y., Jeppesen, E. and Tong, Y., 2023. Importance and vulnerability of lakes and reservoirs supporting drinking water in China. *Fundamental Research, 3*(2), pp.265-273.

Zina, O., 2021. *The essential guide to doing your research project.* 4th edition. United Kingdom. Sage.

Zinyama, M., Chimbganda, S., Matare, F. and Shava, P.G.N., 2022. Analysing qualitative data in research, processes and features. *International Journal of Innovative Science and Research Technology*, *7*(10), pp.924-930.

Žukauskas, P., Vveinhardt, J. and Andriukaitienė, R., 2018. Philosophy and paradigm of scientific research. *Management culture and corporate social responsibility*. London, United Kingdom. IntechOpen.

Appendices

Appendix 1A: Letter of information for the household survey (English version)

Title of the Study: Improving rural citizen satisfaction with water services: A case of the Umzumbe Local Municipality

Principal Investigator/s/researcher: Sinethemba Beryl Mpisane (Master of Management Sciences in Public Management)

Supervisor: Dr Genius Murwirapachena (PhD Economics)

Good morning

My name is Sinethemba Beryl Mpisane, I am pursing a Master's degree in Public Management at the Durban University of Technology.

Brief Introduction and Purpose of the Study: I am conducting a study that seeks to explore ways through which water service delivery can be improved to meet the needs of rural communities in the Local Umzumbe Local Municipality. The purpose of this study is to fulfil the requirements of my Masters programme. South African rural households experience several water services challenges. In some rural areas, households do not have access to potable water services and rely on natural sources like rivers, wells, and springs. The consequences of water from such sources are far-reaching. Where rural households access potable water, they mostly use community taps which in many cases are further from their dwellings. Evidence also exists that water service reliability and quality are major concerns in many rural areas. This study aims to establish possible ways through which potable water service delivery can be improved to meet the needs of rural citizens in South Africa. The study uses a case of selected rural areas in the Umzumbe Local Municipality. A mixed-methods approach is adopted where quantitative data is collected from 358 household heads across selected villages, while qualitative data is collected from at least 10 employees in the Water Services Department at the UGu District Municipality, which is the Water Services Authority (WSA) for the Umzumbe Local Municipality.

Outline of the Procedures: I would like to invite you to participate in the research. Research is a systematic search or enquiry for generalised new knowledge. The participants will be asked to voluntarily participate in the survey and complete the

questionnaires that will be given to them. The participants will be asked to return the questionnaires upon completion. The questionnaires will take approximately 10 minutes to complete. I would like to request your assistance in gathering data for the aforementioned study topic. Please be assured that your responses will be kept with extreme confidentiality and will not be used for any other purpose other than research exploration. Anonymity will be maintained in this study. The respondent's input will not be linked to a specific individual. The researcher will not subject the participant to any harm or illness, and whether or not they agree to be a part of the study, their privacy will be maintained in this study. The research may withdraw from the study at any time and will not be forced to participate.

Risks or Discomforts to the Participant: There will be no discomfort or risk to you as a participant.

Explain to the participant the reasons he/she may be withdraw from the Study: There will be no negative consequences if you choose not to participate or withdraw participation in the survey.

Benefits: Findings from the study will be made available to any parties who are interested and will also be published as a journal article.

Remuneration: There will be no compensation for your participation.

Costs of the Study: There will not be any expenses incurred by participating.

Confidentiality: Your name will not be written on the questionnaire, kindly ensure anonymity and confidentiality.

Results: Findings from the study will be made available to any parties who are interested and they will also be published as a journal article.

Research-related Injury: There will be no research- related injury when answering the questionnaire.

Storage of all electronic and hard copies including tape recordings: To ensure confidentiality completed

questionnaires will be stored for 5 years in a locked cupboard at the supervisor’s office and shredded thereafter.

Persons to contact in the Event of Any Problems or Queries: My supervisor, Dr G Murwirapachena on 031 373 5198 or geniusm@dut.ac.za. Myself, Sinethemba Beryl Mpisane on 060 876 3974 or snezzympisane18@gmail.com, or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

APPENDIX 1B: Letter of information for the household survey (isiZulu version)

Isihloko Sesifundo: Ukwenza ngcono ukwaneliseka kwesakhamuzi sasemakhaya ngezinsizakalo zamanzi: Icala likaMasipala Wendawo yaseMzumbe

Umphenyi/abaphenyi/umcwaningi: Sinethemba Beryl Mpisane (Master of Management Sciences in Public Management)

Umqondisi: uDkt Genius Murwirapachena (PHD Economics)

Sawubona: Sanibonani

Zazise kobambe iqhaza: Igama lami nginguSinethemba Beryl Mpisane, ngenza iziqu zeMasters kuPublic Management eDurban University of Technology.

Isingeniso Esifushane Nenhloso Yocwaningo: Ngenza ucwaningo oluhlose ukubheka izindlela okungathuthukiswa ngazo ukuhlinzekwa kwezidingongqangi zamanzi ukuze kuhlangatshezwane nezidingo zemiphakathi yasemakhaya kuMasipala Wendawo yaseMzumbe. Inhloso yalolu cwaningo ukufeza izidingo zohlelo lwami lweMasters. Imizi yasemakhaya yaseNingizimu Afrika ihlangabezana nezinselele eziningana zezinsiza zamanzi. Kwezinye izindawo zasemakhaya, amakhaya awawatholi amanzi aphuzwayo futhi athembele emithonjeni yemvelo efana nemifula, imithombo kanye nemithombo. Imiphumela yamanzi avela emithonjeni enjalo mikhulu. Lapho imindeni yasemakhaya ithola amanzi aphuzwayo, ivamise ukusebenzisa ompompi bomphakathi izikhathi eziningi abaqhelelene nasekhaya. Kukhona nobufakazi bokuthi ukwethembeka kanye nekhwalithi yenkonzo yamanzi kuyizinto ezikhathaza kakhulu ezindaweni eziningi zasemakhaya. Lolu cwaningo luhlose ukusungula izindlela okungenzeka ngazo ukulethwa kwezinsiza zamanzi aphuzwayo kuthuthukiswe ukuze kuhlangatshezwane nezidingo zezakhamuzi zasemakhaya eNingizimu Afrika. Ucwaningo lusebenzisa indawo yasemakhaya ekhethiwe kuMasipala waseMzumbe. Kusetshenziswa izindlela ezixubile lapho kuqoqwa khona idatha yobuningi ezindlini ezingama-358 ezigodini ezikhethiwe, kanti imininingwane iqoqwa okungenani kubasebenzi abayi-10 boMnyango Wezinsizakalo Zamanzi kuMasipala Wesifunda UGu, okuyi-Water Services Authority (WSA) kuMasipala waseMzumbe.

Isimemo salowo ongahle abambe iqhaza: Ngithanda ukukumema ukuthi ubambe iqhaza ocwaningweni. Abahlanganyeli bazocelwa ukuthi bahlanganyele ngokuzithandela ocwaningweni futhi bagcwalise uhlu lwemibuzo abazolunikezwa. Abahlanganyeli bazocelwa ukuthi babuyisele uhlu lwemibuzo lapho sebeqedile. Uhlu

lwemibuzo luzothatha cishe imizuzu eyi-10 ukuphothula. Ngingathanda ukucela usizo lwakho ekuqoqeni idatha yesihloko socwaningo esishiwo ngenhla. Sicela uqiniseke ukuthi izimpendulo zakho zizogcinwa kuyimfihlo enkulu futhi ngeke zisetshenziselwe enye inhloso ngaphandle kokuhlola ucwaningo. Ukungaziwa kuzogcinwa kulolu cwaningo. Okufakiwe kophendulayo ngeke kuxhunywe kumuntu othile. Umcwaningi ngeke abeke umhlanganyeli kunoma yikuphi ukulimala noma ukUGula, futhi noma uvuma noma cha ukuba yingxenye yocwaningo, ubumfihlo bakhe buzogcinwa kulolu cwaningo. Ucwaningo lungahoxa ocwaningweni nganoma yisiphi isikhathi futhi angeke luphoqeleke ukuthi lubambe iqhaza.

Luyini Ucwaningo: Ucwaningo wusesho oluhlelekile noma uphenyo lokuthola ulwazi olusha olujwayelekile.

Uhlaka Lwezinqubo: Ngithanda ukukumema ukuthi ubambe iqhaza ocwaningweni.

Izingozi noma Ukungaphatheki kahle Kubambe iqhaza: Ngeke kube khona ukungakhululeki noma ingozi kuwena njengomhlanganyeli.

Chazela umhlanganyeli izizathu zokuthi angahoxa Ocwaningweni: Angeke kube nemiphumela engemihle uma ukhetha ukungabambi iqhaza noma ukuhoxisa ukubamba iqhaza ocwaningweni.

Izinzuzo: Okutholakele ocwaningweni kuzokwenziwa kutholakale kunoma yibaphi abathintekayo abanentshisekelo futhi kuzoshicilelwa njengendatshana yejenali.

Iholo: Ngeke kube khona isinxephezelo ngokubamba kwakho iqhaza.

Izindleko Zocwaningo: Ngeke kube nezindleko ezitholwa ngokubamba iqhaza.

Ukugcinwa okuyimfihlo: Igama lakho ngeke libhalwe kuhlu lwemibuzo, sicela uqinisekise ukuthi igama lakho lingaziwa futhi liyimfihlo.

Imiphumela: Okutholakele ocwaningweni kuzokwenziwa kutholakale kunoma yibaphi abathintekayo abanentshisekelo futhi kuzoshicilelwa njengendatshana yejenali.

Ukulimala Okuhlobene Nocwaningo: Ngeke kube khona ukulimala okuhlobene nocwaningo lapho kuphendulwa uhlu lwemibuzo.

Ukugcinwa kwawo wonke amakhophi e-elekthronikhi kanye namakhophi aqinile okuhlanganisa namakhasethi aqoshiwe: Ukuqinisekisa ukugcinwa kuyimfihlo uhlu lwemibuzo luzogcinwa iminyaka emi-5 ekhabetheni elikhiyiwe ehhovisi lomphathi, bese lisihliwe ngemva kwalokho.

Abantu ongabathinta uma kunezinkinga noma imibuzo: Umphathi wami, uDkt G Murwirapachena ku-031 373 5198 noma ku-geniusm@dut.ac.za. Mina, uSinethemba Beryl Mpisane ku-060 876 3974 noma snezzympisane18@gmail.com, noma i-

Institutional Research Ethics Administrator ku-031 373 2375. Izikhalo zingabikwa kuMqondisi woPhiko lwezoCwaningo kanye ne-Postgraduate Support uDkt L Linganiso ku-031 2or57dut noma ucwaningo.ac.za.

Appendix 2A: Letter of information for the municipal employees (English version)

Title of the Research Study: Improving rural citizen satisfaction with water services: A case of the Umzumbe Local Municipality

Principal Investigator/s/researcher: Sinethemba Beryl Mpisane (Master of Management Sciences in Public Management)

Supervisor/s: Dr Genius Murwirapachena (PhD Economics)

Greeting: Good morning

Introduce yourself to the participant: My name is Sinethemba Beryl Mpisane, I am pursing a Master's degree in Public Management at the Durban University of Technology**.**

Brief Introduction and Purpose of the Study: I am conducting a study that seeks to explore ways through which water service delivery can be improved to meet the needs of rural communities in the Local Umzumbe Local Municipality. The purpose of this study is to fulfil the requirements of my Masters programme. South African rural households experience several water services challenges. In some rural areas, households do not have access to potable water services and rely on natural sources like rivers, wells, and springs. The consequences of water from such sources are far-reaching. Where rural households access potable water, they mostly use community taps which in many cases are further from their dwellings. Evidence also exists that water service reliability and quality are major concerns in many rural areas. This study aims to establish possible ways through which potable water service delivery can be improved to meet the needs of rural citizens in South Africa. The study uses a case of selected rural areas in the Umzumbe Local Municipality. A mixed-methods approach is adopted where quantitative data is collected from 358 household heads across selected villages, while qualitative data is collected from at least 10 employees in the Water Services Department at the UGu District Municipality, which is the Water Services Authority (WSA) for the Umzumbe Local Municipality.

Outline of the Procedures: I would like to invite you to participate in the research. Research is a systematic search or enquiry for generalised new knowledge. As a participant, you will be requested to freely engage in a scheduled online interview using Zoom/MS Teams platforms. These platforms were adopted as a measure to

minimise direct contact during the COVID-19 pandemic. However, face to face meetings may be arranged should you prefer such, and all COVID-19 protocols will be observed if such meetings happen. The interview session will take around 30 minutes to complete. Please be assured that your responses will be kept with extreme confidentiality and will not be used for any other purpose other than research exploration. Anonymity will be maintained in this study. The respondent's input will not be linked to a specific individual. The researcher will not subject the participant to any harm or illness, and whether or not they agree to be a part of the study, their privacy will be maintained in this study. The research may withdraw from the study at any time and will not be forced to participate.

Risks or Discomforts to the Participant: There will be no discomfort or risk to you as a participant.

Explain to the participant the reasons he/she may be withdraw from the Study: There will be no negative consequences if you choose not to participate or withdraw participation in the interview.

Benefits: Findings from the study will be made available to any parties who are interested and they will also be published as a journal article.

Remuneration: There will be no compensation for your participation.

Costs of the Study: There will be no expenses incurred by participating.

Confidentiality: Your name will not be written in the notes that will be taken by the researcher, kindly ensure anonymity and confidentiality.

Results: Findings from the study will be made available to any parties who are interested and they will also be published as a journal article.

Research-related Injury: There will be no research- related injury since the interviews will be conducted virtually.

Storage of all electronic and hard copies including tape recordings: To ensure confidentiality electronic data collected from municipal employees through interviews will be stored for 5 years in a password- protected laptop and deleted thereafter.

Persons to contact in the Event of Any Problems or Queries: My supervisor, Dr G Murwirapachena on 031 373 5198 or geniusm@dut.ac.za. Myself, Sinethemba Beryl Mpisane on 060 876 3974 or snezzympisane18@gmail.com, or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za

Appendix 2B: Letter of information for the municipal employees (isiZulu version)

Isihloko socwaningo locwaningo: Ukwenza ngcono ukwaneliseka kwezakhamizi zasemakhaya ngezinsiza zamanzi: Icala likamasipala waseMzumbe

Umphenyi/abaphenyi/umcwaningi: Sinethemba Beryl Mpisane (Master of Management Sciences in Public Management)

Umqondisi: uDkt Genius Murwirapachena (PhD Economics)

Sawubona: Sanibonani

Zazise kobambe iqhaza: Igama lami nginguSinethemba Beryl Mpisane, ngenza iziqu zeMasters kuPublic Management eDurban University of Technology.

Isingeniso Esifushane Nenhloso Yocwaningo: Ngenza ucwaningo oluhlose ukubheka izindlela okungathuthukiswa ngazo ukuhlinzekwa kwezidingongqangi zamanzi ukuze kuhlangatshezwane nezidingo zemiphakathi yasemakhaya kuMasipala Wendawo yaseMzumbe. Inhloso yalolu cwaningo ukufeza izidingo zohlelo lwami lweMasters. Imizi yasemakhaya yaseNingizimu Afrika ihlangabezana nezinselele eziningana zezinsiza zamanzi. Kwezinye izindawo zasemakhaya, amakhaya awawatholi amanzi aphuzwayo futhi athembele emithonjeni yemvelo efana nemifula, imithombo kanye nemithombo. Imiphumela yamanzi avela emithonjeni enjalo mikhulu. Lapho imindeni yasemakhaya ithola amanzi aphuzwayo, ivamise ukusebenzisa ompompi bomphakathi izikhathi eziningi abaqhelelene nasekhaya. Kukhona nobufakazi bokuthi ukwethembeka kanye nekhwalithi yenkonzo yamanzi kuyizinto ezikhathaza kakhulu ezindaweni eziningi zasemakhaya. Lolu cwaningo luhlose ukusungula izindlela okungenzeka ngazo ukulethwa kwezinsiza zamanzi aphuzwayo kuthuthukiswe ukuze kuhlangatshezwane nezidingo zezakhamuzi zasemakhaya eNingizimu Afrika. Ucwaningo lusebenzisa indawo yasemakhaya ekhethiwe kuMasipala waseMzumbe. Kusetshenziswa izindlela ezixubile lapho kuqoqwa khona idatha yobuningi ezindlini ezingama-358 ezigodini ezikhethiwe, kanti imininingwane iqoqwa okungenani kubasebenzi abayi-10 boMnyango Wezinsizakalo Zamanzi kuMasipala Wesifunda UGu, okuyi-Water Services Authority (WSA) kuMasipala waseMzumbe.

Uhlaka Lwezinqubo: Ngithanda ukukumema ukuthi ubambe iqhaza ocwaningweni. Ucwaningo wusesho oluhlelekile noma uphenyo lokuthola ulwazi olusha olujwayelekile. Njengombambi qhaza, uzocelwa ukuthi uhlanganyele ngokukhululekile

kunhlolokhono ye-inthanethi ehleliwe usebenzisa izinkundla ze-Zoom/MS Teams. Lezi zinkundla zamukelwa njengesinyathelo sokunciphisa ukuxhumana okuqondile phakathi nobhadane lwe-COVID-19. Kodwa-ke, imihlangano yobuso nobuso ingase ihlelwe uma uthanda kanjalo, futhi zonke izimiso ze-COVID-19 zizogcinwa uma imihlangano enjalo yenzeka. Iseshini yenhlolokhono izothatha cishe imizuzu engama-30 ukuqedwa. Sicela uqiniseke ukuthi izimpendulo zakho zizogcinwa kuyimfihlo enkulu futhi ngeke zisetshenziselwe enye inhloso ngaphandle kokuhlola ucwaningo. Ukungaziwa kuzogcinwa kulolu cwaningo. Okufakiwe kophendulayo ngeke kuxhunywe kumuntu othile. Umcwaningi ngeke abeke umhlanganyeli kunoma yikuphi ukulimala noma ukUGula, futhi noma uvuma noma cha ukuba yingxenye yocwaningo, ubumfihlo bakhe buzogcinwa kulolu cwaningo. Ucwaningo lungahoxa ocwaningweni nganoma yisiphi isikhathi futhi angeke luphoqeleke ukuthi lubambe iqhaza.

Izingozi noma Ukungaphatheki kahle Kubambe iqhaza: Ngeke kube khona ukungakhululeki noma ingozi kuwena njengomhlanganyeli.

Chazela umhlanganyeli izizathu zokuthi angahoxa Ocwaningweni: Ngeke kube nemiphumela engemihle uma ukhetha ukungabambi iqhaza noma ukuhoxisa ukubamba iqhaza kwinhlolokhono.

Izinzuzo: Okutholakele ocwaningweni kuzokwenziwa kutholakale kunoma yibaphi abathintekayo abanentshisekelo futhi kuzoshicilelwa njengendatshana yejenali.

Iholo: Ngeke kube khona isinxephezelo ngokubamba kwakho iqhaza.

Izindleko Zocwaningo: Ngeke kube nezindleko ezizotholwa ngokubamba iqhaza.

Ukugcinwa okuyimfihlo: Igama lakho ngeke libhalwe kumanothi azothathwa umcwaningi, sicela uqinisekise ukuthi igama lakho lingaziwa futhi liyimfihlo.

Imiphumela: Okutholakele ocwaningweni kuzokwenziwa kutholakale kunoma yibaphi abathintekayo abanentshisekelo futhi kuzoshicilelwa njengendatshana yejenali.

Ukulimala Okuhlobene Nocwaningo: Ngeke kube khona ukulimala okuhlobene nocwaningo njengoba izinhlolokhono zizokwenziwa cishe.

Ukugcinwa kwawo wonke amakhophi e-elekthronikhi kanye namaphepha okuhlanganisa aqoshiwe: Ukuqinisekisa ubumfihlo bemininingwane ye-elekthronikhi eqoqwe kubasebenzi bakamasipala ngenhlolokhono izogcinwa iminyaka engu-5 kukhompyutha ephathekayo evikelwe ngephasiwedi, bese isuswa ngemva kwalokho.

Abantu ongabathinta uma kunezinkinga noma imibuzo: Umphathi wami, uDkt G Murwirapachena ku-031 373 5198 noma ku geniusm@dut.ac.za. Mina, uSinethemba B. Mpisane ku-060 876 3974 noma ku-snezzympisane18@gmail.com, noma ku-Institutional Research Ethics Administrator ku-031 373 2375. Izikhalazo zingabikwa

kuMqondisi: Wocwaningo Nokwesekwa Kwama-postgraduate uDkt L Linganiso ku-031 373 2577 noma ku-researchdirector @ dut.ac.za.

Appendix 3A: Informed consent (English version)

Statement of Agreement to Participate in the Research Study: Improving rural citizen satisfaction with water services: A case of the Umzumbe Local Municipality.

- I hereby confirm that I have been informed by the researcher, Sinethemba Mpisane (21502501), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number:
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant	**Date**	**Time**	**Signature**

I, Sinethemba B. Mpisane herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Sinethemba Mpisane	21 March 2023	
Full Name of Researcher	**Date**	**Signature**
Full Name of Witness (If applicable)	**Date**	**Signature**
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix 3B: Informed consent (isiZulu version)

Isitatimende Sesivumelwano Sokubamba iqhaza Esifundweni Socwaningo: Ukwenza ngcono ukwaneliseka kwezakhamizi zasemakhaya ngezinsizakalo zamanzi: Icala likaMasipala Wendawo yaseMzumbe

- Ngiyaqinisekisa ukuthi ngazisiwe ngumcwaningi, uSinethemba Mpisane (21502501), ngohlobo, ukuziphatha, izinzuzo nezingozi zalolu cwaningo - Inombolo Yokucaciswa Kwezimiso Zokuziphatha:
- Sengithole, ngafunda futhi ngaluqonda ulwazi olubhaliwe olungenhla (Incwadi Yomhlanganyeli Yemininingwane) mayelana nesifundo.
- Ngiyazi ukuthi imiphumela yocwaningo, kubandakanya imininingwane yomuntu mayelana nobulili bami, iminyaka, usuku lokuzalwa, ama-initials kanye nokuxilongwa kuzocutshungulwa kungaziwa kube wumbiko wocwaningo.
- Ngenxa yezidingo zocwaningo, ngiyavuma ukuthi idatha eqoqwe phakathi nalolu cwaningo ingacutshungulwa ngohlelo lwekhompyutha ngumcwaningi.
- Ngingahle, noma ngasiphi isigaba, ngaphandle kokubandlulula, ngihoxise imvume yami futhi ngibambe iqhaza ocwaningweni.
- Ngibe nethuba elanele lokubuza imibuzo futhi (ngentando yami) ngizibonakalise ngikulungele ukubamba iqhaza ocwaningweni.
- Ngiyakuqonda ukuthi okutholakele okusha okuphawulekayo okwenziwe phakathi nalolu cwaningo okungenzeka kuhambisane nokubamba kwami iqhaza kuzonikezwa kimi.

Amagama aphelele elungalocwaningo Usuku Isikhathi Isishicilelo/Sokudla isithupha

Mina, Sinethemba Mpisane ngiyavuma okungaphezulu ukuthi amalunga ocwaningo atsheliwe ngokugcwele ngokwemvelo, ngokwenziwa nangokuncikisela kocwaningo oluzokwenziwa.

Amagama aphelele omcwaningi	**Usuku**	**Isishicilelo**
_____	_____	_____
Amagama aphelele kafakazi (umakudingeka)	**Usuku**	**Isishicilelo**
_____	_____	_____

Appendix 4: Gatekeeper's letter for households' survey

UMZUMBE MUNICIPALITY
UMASIPALA WASEMZUMBE

Umzumbe MUNICIPALITY

C/o P.O. Box 561
HIBBERDENE
4220

Tel: c/o 039 972 0005
Fax: c/o 039 972 0099
E-mail: mm@umzumbe.gov.za

OFFICE OF THE MUNICIPAL MANAGER

12 January 2023

Attention: Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd floor Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology
Durban
4001

Dear Sir

Re: Permission to conduct a study within Umzumbe Local Municipality

This letter bears reference:

Umzumbe local Municipality has received a request to conduct a study on improving rural citizen satisfaction with water services: A case of the Umzumbe Local Municipality, South Africa.

It is in this context that this letter serves to authorize Ms. Sinethemba Mpisane to conduct the abovementioned study within Umzumbe Local Municipality.

Please be informed that after the conclusion of the study Umzumbe Local Municipality request to be apprised of the research report and recommendations.

I hope that this is in order.

T P Cele
Acting Municipal Manager
Umzumbe Local Municipality

Appendix 5: Gatekeeper's letter for the municipal employees' interviews

PO Box 33, Port Shepstone 4240
Kwa Zulu-Natal
South Africa

28 Connor Street
Tel: (039) 688 5807
Fax: (039) 682 3350

Ugu Distrik Munisipaliteit *Ugu District Municipality* *Ugu Umasipala Wesifunda*

CORPORATE SERVICES DEPARTMENT

Enquires: Mr VO Mazibuko
039 688 5758

31 August 2022

Attention: Ms Sinethemba Berly Mpisane

REQUEST TO CONDUCT A RESEARCH

It is a great pleasure to inform you that the request that was made for Ms Sinethemba Mpisane a Master's Degree Student in Public Management at the Durban University of Technology to conduct a research on Improving rural citizen satisfaction with water services at Ugu District Municipality has been granted.

It is hoped that the outcome of the research will benefit the Ugu District Municipality.

Yours sincerely

Vela Mazibuko
General Manager: Corporate Services

PARK RYNIE: (039) 976 1333 PORT SHEPSTONE: (039) 688 5700 OSLO BEACH: (039) 688 5830 HARDING: (039) 433 1563

24 HOUR CUSTOMER CARE CENTRE: (039) 688 5830
www.ugu.org.za

Appendix 6: Ethics clearance letter from DUT-IREC

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

16 January 2023

Ms S B Mpisane
Francis Braad Street
610 Veni Flats 302
Pretoria
00021

Dear Ms Mpisane

Improving rural citizen satisfaction with water services: A case of Umzumbe Local Municipality
Ethics Clearance Number: IREC 034/22

The DUT-Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

Yours Sincerely

Dr K Padayachy
Deputy Chairperson: DUT-IREC

Appendix 7A: Questionnaire (English version)

Rural citizen satisfaction with water services

My name is Sinethemba Mpisane, a postgraduate student registered for the degree of Master of Management Sciences in Public Administration at the Durban University of Technology. I am researching on the satisfaction of rural citizens with water service in the Umzumbe Local Municipality. This survey collects data that seek to improve water service provision in the municipality. The survey is divided into two sections. Section A collects some biographical information for statistical purposes, while section B contains questions on water service delivery. Kindly take some time to answer the questions as truthful as possible.

Date: ____/_____/2023 Village: _____

SECTION A: PERSONAL INFORMATION

1. What is your gender?

Male	
Female	

2. Which year were you born? *(Optional)*

3. Which racial group do you belong to?

African	
White	
Indian/ Asian	
Coloured	

4. How many people live in your household?

5. What is your highest education level?

Never attended school	
Primary school	
High school	
Diploma	
Degree	
Postgraduate	

6. What is your household's average monthly income?

SECTION B: WATER ACCESS, QUALITY, AND RELIABILITY

The following questions are on your access to water

7. What is the primary source of drinking water for your household?

Piped water in the house	
Piped water in the yard/plot	
Public tap	
Borehole	
Protected dug well	
Unprotected dug well	
Rainwater collection	
Surface water (river, dam, lake, pond, stream, canal, irrigation channels)	
Other *(Please specify):*	

8. Which of the following best describes the distance you travel to your nearest source of water?

Water is in the yard	
Less than 200 metres from the yard	
More than 200 metres from the yard	

9. On average, how many minutes does it take you travelling to and from the water source?

10. Who usually fetches water in your household from this source?

Adult woman	
Adult man	
Children	

11. How many times do you usually fetch water in a day?

12. What is the capacity of the container used to collect water each time?

10 litres	

20 litres	
25 litres	
Greater than 25 litres	

13. Do you experience long queues when collecting water?

Yes	
No	
N/A	

14. Would you say there are chances of some danger when collecting water?

Yes	
No	
N/A	

15. If YES to QUESTION 14, what are the possible dangers you are exposed to?

16. Generally, are you satisfied with how you access drinking water?

Yes	
No	

17. In your opinion, what do you think should be done to improve the way you access water in your community?

The following questions are on water quality

18. Describe the quality of the drinking water you receive from the main source. *(You may choose more than one option)*

	Agree	Neutral	Disagree
18.1 The water is not clear			
18.2The water has a bad taste			
18.3The water has a bad smell			
18.4 The water has colour			
18.5 All of the above			

19 Which of the following activities do you use to make your water safe to drink?

	Yes	No
Boil the water before consumption		
Add bleach/chlorine to kill germs		
Allow water to settle before consumption		
Other (Specify):		

20 What do you think about the following statements? (*Please select one suitable response per row)*

	Agree	Neutral	Disagree
20.1 Contaminated water is linked to the transmission of waterborne diseases like cholera, diarrhoea, and dysentery in my community.			
20.2 Boiling water, using a water filter, applying bleach or chlorine, or allowing the water to settle before drinking makes it safe.			
20.3 Rainwater collection is a safe option during the raining season.			
20.4 Water from the tap is generally safe to drink in my community.			

21 Generally, are you satisfied with the quality of the water you consume?

Yes	
No	

22 In your opinion, what do you think should be done to improve the quality of the water consumed in your community?

The following questions are on water supply reliability

23 Do you consider your water supply to be reliable in your community?

Yes	
No	

24 Is the amount of water you get from your primary source enough?

Yes	
No	

25 Is the water from your primary source accessible throughout the year?

Yes	
No	

26 Which seasons do you usually experience water shortages? *(You may select more than one response).*

Spring	
Summer	
Autumn	
Winter	

27 How do you get drinking water when there is no water at your primary source?

Store water for emergency	
Take from neighbouring villages	
Purchase bottled water from shops	
Other *(Specify):*	

28 Have you ever complained about water supply to the municipality?

Yes	
No	

29 If YES to QUESTION 28, how long did it take the municipality to address your complain?

30 Does the municipality communicate when water interruptions are expected?

Yes	
No	

31 If your answer to QUESTION 30 is YES, how does the municipality usually communicate with you? (*You may choose more than one option)*

Radio	
Local newspaper	
Social media	
Street pole advertising board	
The Councillor	
Municipal employees	
Other *(Specify):*	

32. What do you think about the following statements?

	Agree	Neutral	Disagree
32.1 People spend too much time travelling to fetch water.			
32.2 Many households do not have backup in cases of water interruptions.			
32.3 Households without piped water fetch water from rivers, dams, wells, and springs.			
32.4 Piped water reliability is a major concern in this community.			

33. In general, are you satisfied with the reliability of water supply in your community?

Yes	
No	

34. In your opinion, what do you think should be done to improve water supply reliability in your community?

Thank you for taking your time to participate in this survey.

Appendix 7A: Questionnaire (isiZulu version)

DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

Ukwaneliseka kwezakhamizi zasemakhaya ngezinsiza zamanzi

Igama lami ngingu-Sinethemba Mpisane, umfundi obhalisele iziqu ze-Master of Management Sciences in Public Administration e-Durban University of Technology. Ngicwaninga ngokugculiseka kwezakhamizi zasemakhaya ngosizo lwamanzi kuMasipala waseMzumbe. Lolu cwaningo luqoqa imininingwane efuna ukwenza ngcono ukuhlinzekwa kwezinsiza zamanzi kumasipala. Ucwaningo luhlukaniswe izigaba ezimbili. ISigaba A siqoqa ulwazi oluthile oluphathelene nokuphila komuntu ngezinjongo zezibalo, kuyilapho isigaba B siqukethe imibuzo ngokuhlinzekwa kwenkonzo yamanzi. Sicela uzinike isikhathi sokuphendula imibuzo ngeqiniso ngangokunokwenzeka.

Usuku: ____/_____/2023 Idolobhana: _____

ISIQEPHU A: ULWAZI LOMUNTU

1. Buyini ubulili bakho?

Owesilisa	
Owesifazane	

2. Wazalwa ngamuphi unyaka? *(Ongakukhetha)*

3. Ungowaluphi uhlanga?

UmAfrika	
Emhlophe	
AmaNdiya / ama-Asia	
Onombala	

4. Bangaki abantu abahlala emzini wakho?

5. Yiliphi izinga eliphezulu lemfundo yakho?

Angikaze ngiye esikoleni	
Isikole sebanga eliphansi	
Isikolo sebanga eliphezulu	
Idiploma	
Iziqu	
Iziqu zeziqu	

6. Ingakanani imali oyithola ekhaya ngenyanga?

ISIQEPHU B: UKUFINYELELA KWAMANZI, IKHWALITHI, NOKUTHEMBEKA

Imibuzo elandelayo imayelana nokufinyelela kwakho emanzini

7. Imuphi umthombo wokuqala wamanzi okuphuza ekhaya lakho?

Amanzi epayipi endlini	
Amanzi afakwe ngamapayipi egcekeni/esizalweni	
Thepha esidlangalaleni	
Umgodi wamanzi	
Kuvikelwe kwambiwa kahle	
KUGujwe kahle okungavikelekile	
Iqoqo lamanzi emvula	
Amanzi angaphezulu (umfula, idamu, ichibi, ichibi, umfudlana, umsele, imigudu yokunisela)	
Okunye *(Sicela ucacise):*	

8. Yikuphi kokulandelayo okuchaza kahle ibanga olihambayo ukuya emthonjeni wamanzi oseduze nawe?

Amanzi asegcekeni	
Ngaphansi kwamamitha angu-200 ukusuka egcekeni	
Ngaphezu kwamamitha angu-200 ukusuka egcekeni	

9. Ngokwesilinganiso, kukuthatha imizuzu emingaki ukuya nokubuya emthonjeni wamanzi?

10. Ubani ojwayele ukukha amanzi endlini yakho kulo mthombo?

Owesifazane omdala	
Umuntu omdala	
Izingane	

11. Uvamise ukukha amanzi kangaki ngosuku?

12. Ingakanani umthamo wesitsha esisetshenziswa ukukha amanzi isikhathi ngasinye?

10 amalitha	
20 amalitha	
25 amalitha	
Ingaphezu kuka-25 litres	

13. Ingabe uba nolayini abade lapho ukha amanzi?

Yebo	
Cha	
N/A	

14. Ungasho yini ukuthi kunamathuba engozi ethile lapho ukha amanzi?

Yebo	
Cha	
N/A	

15. Uma uthi YEBO kuMBUZO 14, yiziphi izingozi ongase ubhekane nazo?

16. Ngokuvamile, wenelisekile ngendlela othola ngayo amanzi okuphuza?

Yebo	
Cha	

17. Ngokubona kwakho, yini ocabanga ukuthi kufanele yenziwe ukuthuthukisa indlela othola ngayo amanzi endaweni yangakini?

Imibuzo elandelayo imayelana nekhwalithi yamanzi

18. Chaza izinga lamanzi okuphuza owathola emthonjeni omkhulu. *(Ungakhetha inketho engaphezu kweyodwa)*

	Vuma	Ukungathathi hlangothi	Angivumi
18.1 Amanzi awacacile			
18.2 Amanzi anokunambitheka okubi			
18.3 Amanzi anephunga elibi			
18.4 Amanzi anombala			
18.5 Konke okungenhla			

19. Ingabe wenza lokhu okulandelayo ukuze amanzi akho aphephe ukuze uwaphuze?

	Yebo	Cha
Bilisa amanzi ngaphambi kokuthi uwasebenzise		
Faka i-bleach/chlorine ukubulala amagciwane		
Vumela amanzi ukuthi azinze ngaphambi kokusetshenziswa		
Okunye (Cacisa):		

20. Ucabangani ngalezi zitatimende ezilandelayo? (Sicela ukhethe impendulo eyodwa efanele umugqa ngamunye)

	Vumelana	Ngokuphakathi	Ukungavumelani
20.1 Amanzi angcolile ahlobene nokudluliswa kwezifo ezitholakala emanzini njengekholera, isifo sohudo kanye nesifo sohudo emphakathini wakithi.			
20.2 Amanzi abilayo, kusetshenziswa isisefo samanzi, ukufaka i-bleach noma i-chlorine, noma ukuvumela amanzi azinze ngaphambi kokuphuza kwenza aphephe.			
20.3 Ukuqoqwa kwamanzi emvula kuyindlela ephephile ngenkathi yezimvula.			
20.4 Amanzi aphuma empompini ngokuvamile aphephile ukuwaphuza endaweni yangakithi.			

21. Ngokuvamile, ingabe wenelisekile ngezinga lamanzi owasebenzisayo?

Yebo	
Cha	

22. Ngokubona kwakho, ucabanga ukuthi yini okufanele yenziwe ukuthuthukisa izinga lamanzi asetshenziswayo endaweni yangakini?

Imibuzo elandelayo imayelana nokuthembeka kokuhlinzekwa kwamanzi

23. Ngabe ucabanga ukuthi amanzi akho athembekile?

Yebo	
Cha	

24. Ingabe umthamo wamanzi owathola emthonjeni wakho wokuqala wenele?

Yebo	
Cha	

25. Ingabe amanzi aphuma emthonjeni wakho wokuqala ayatholakala unyaka wonke?

Yebo	
Cha	

26. Yiziphi izinyanga obhekana nazo ukushoda? *(Ungakhetha impendulo engaphezu kweyodwa).*

Intwasahlobo	
Ihlobo	
Ikwindla	
Ubusika	

27. Uwathola kanjani amanzi okuphuza lapho amanzi engekho emthonjeni wakho wokuqala?

Gcina amanzi ngesikhathi esiphuthumayo	
Thatha kwamakhelwane	
Phuza amanzi atholakala noma yikuphi	
Thenga amanzi asemabhodleleni ezitolo	
Okunye *(Cacisa):*	

28. Wake wakhononda ngokuhlinzekwa kwamanzi kumasipala?

Yebo	
Cha	

29. Uma uthi YEBO kuMBUZO 28, kumthathe isikhathi esingakanani umasipala ukubhekana nesikhalazo sakho?

30. Ingabe umasipala uyaxhumana uma kulindelekile ukuphazamiseka kwamanzi?

Yebo	
Cha	

31. Uma impendulo yakho ku-UMBUZO 30 ithi YEBO, uvamise ukuxhumana kanjani nomasipala? *(Ungakhetha inketho engaphezu kweyodwa)*

Umsakazo	
Iphephandaba lendawo	
Izinkundla zokuxhumana	
Ibhodi lokukhangisa lomgwaqo	
Ikhansela	
Abasebenzi bakamasipala	
Okunye *(Cacisa):*	

32. Ucabangani ngalezi zitatimende ezilandelayo?

	Vumelana	Ngokuphakathi	Ukungavumelani
32.1 Abantu bachitha isikhathi esiningi behamba beyokha amanzi.			
32.2 Imizi eminingi ayinaso isipele ezimeni zokuphazamiseka kwamanzi.			
32.3 Imizi engenawo amanzi amponjwana ikha amanzi emifuleni, emadamini, emithonjeni nasemithonjeni.			
32.4 Ukuthembeka kwamanzi ahamba ngamapayipi kuyinkinga enkulu kulo mphakathi.			

33. Ngokuvamile, wenelisekile ngokwethembeka kokunikezwa kwamanzi emphakathini wakini?

Yebo	
Cha	

34. Ngokubona kwakho, ucabanga ukuthi yini okumele yenziwe ukuze kuthuthukiswe ukuthembeka kokuhlinzekwa kwamanzi emphakathini wakini?

Siyabonga ngokuthatha isikhathi sakho ukuze ubambe iqhaza kulolu cwaningo.

Appendix 8A: Interview guide (English version)

DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

Rural citizen satisfaction with water services

My name is Sinethemba Mpisane, a postgraduate student registered for the degree of Master of Management Sciences in Public Administration at the Durban University of Technology. I am researching on the satisfaction of rural citizens with water service in the Umzumbe Local Municipality. This interview collects data that seek to improve water service provision in the municipality. Kindly take some time to answer the questions as truthful as possible.

1. **Please tell me more about yourself.**

   Probes:

   a) Your age;
   b) Your education level;
   c) The position you currently hold;
   d) Years of experience in the Water Services Department.

2. **Please explain your responsibilities in the Water Services Department**

   Probes:

   a) What are your daily activities in the Department?
   b) Who do you report to and how many people report to you?

3. **From your experience, what are the common water supply challenges in the municipalities?**

   Probes:

   a) Is access to water a problem in rural areas?
   b) What about reliability?
   c) What about water quality?

4. **What do you think are the common drivers of these water supply challenges?**

   Probes:

   a) What are the drivers of water supply interruptions?

   b) What drives the quality of water in the municipality?

   c) What drives the way people currently access water?

5. **Please take me through the effects of current water supply levels?**

   Probes:

   a) What are the effects of the unreliability in water supply?

   b) What are the commonly reported effects of water quality?

6. **Does the municipality communicate with rural communities regarding water service challenges?**

   Probes:

   a) What are the communication channels used?

   b) Are they effective?

   c) What are the barriers to effective communication?

7. **What are the current municipal efforts to address the challenges common in the provision of water to rural citizens?**

   Probes:

   a) Are there any current programmes to address water challenges?

   b) Are these efforts reviewed regularly?

   c) Are communities involved in formulating water service plans?

Thank you for your time.

Appendix 8B: Interview guide (isiZulu version)

DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

Ukwaneliseka kwezakhamizi zasemakhaya ngezinsiza zamanzi

Igama lami ngingu-Sinethemba Mpisane, umfundi obhalisele iziqu ze-Master of Management Sciences in Public Administration e-Durban University of Technology. Ngicwaninga ngokugculiseka kwezakhamizi zasemakhaya ngosizo lwamanzi kuMasipala waseMzumbe. Le nhlolokhono iqoqa imininingwane efuna ukuthuthukisa ukuhlinzekwa kwezinsiza zamanzi kumasipala. Sicela uzinike isikhathi sokuphendula imibuzo ngeqiniso ngangokunokwenzeka.

1. Ngicela ungitshele okwengeziwe ngawe.

Uphenyo:

a) Iminyaka yakho;

b) Izinga lakho lemfundo;

c) Isikhundla osiphethe njengamanje;

d) Iminyaka yolwazi eMnyangweni Wezinsiza Zamanzi.

2. Ngicela ukuchaza ngezibopho zakho eMnyangweni Wezinsiza Zamanzi.

Uphenyo:

a) Yiziphi izinto ozenzayo nsuku zonke eMnyangweni?

b) Ubika kubani futhi bangaki abantu ababika kuwe?

3. Ngokuhlangenwe nakho kwakho, yiziphi izinselelo ezivamile zokuhlinzekwa kwamanzi komasipala?

Uphenyo:

a) Ingabe ukutholakala kwamanzi kuyinkinga ezindaweni zasemakhaya?

b) Kuthiwani ngokwethembeka?

c) Kuthiwani ngekhwalithi yamanzi?

4. Ucabanga ukuthi yiziphi izingqinamba ezivamile zalezi zinselelo zokuhlinzekwa kwamanzi?

Uphenyo:

a) Yiziphi izishayeli zokuphazamiseka kokuhlinzekwa kwamanzi?

b) Yini eqhuba izinga lamanzi kumasipala?

c) Yini eqhuba indlela abantu abathola ngayo amanzi njengamanje?

5. Ngicela ungidlulise ngemiphumela yamazinga amanje okuphakelwa kwamanzi?

Uphenyo:

a) Iyini imiphumela yokungathembeki ekuhlinzekeni kwamanzi?

b) Yimiphi imiphumela evame ukubikwa ngezinga lamanzi?

6. Ngabe umasipala uyaxhumana nemiphakathi yasemakhaya mayelana nezinselelo zokuhlinzekwa kwamanzi?

Uphenyo:

a) Yiziphi iziteshi zokuxhumana ezisetshenziswayo?

b) Ingabe ziyasebenza?

c) Yiziphi izithiyo ezivimbela ukuxhumana okuphumelelayo?

7. Yimiphi imizamo kamasipala ekhona njengamanje yokubhekana nezinselelo ezikhona ekuhlinzekeni abantu basemakhaya ngamanzi?

Uphenyo:

a) Ingabe zikhona izinhlelo ezikhona zokubhekana nezinselelo zamanzi?

b) Ingabe le mizamo ibuyekezwa njalo?

c) Ingabe imiphakathi iyabandakanyeka ekwakheni izinhlelo zokuhlinzeka ngamanzi?

Siyabonga ngesikhathi sakho

Appendix 9: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
Access		
TravelTime	1.70	0.586
Piped	1.54	0.647
LongQ	1.49	0.669
Distance	1.43	0.700
Age	1.41	0.708
MoreEdu	1.39	0.719
Dangers	1.28	0.782
Hhsize	1.24	0.805
Frequency	1.19	0.838
Female	1.14	0.880
Income	1.08	0.927
Mean VIF	1.35	
Quality		
Bleach	2.15	0.466
Boil	1.92	0.521
Age	1.48	0.674
BadSmell	1.48	0.676
BadTaste	1.44	0.695
MoreEdu	1.39	0.718
Piped	1.30	0.767
Hhsize	1.25	0.800
Settle	1.14	0.879
HasColour	1.13	0.886
Female	1.08	0.924
Income	1.06	0.942
Not clear	1.05	0.955
Mean VIF	1.35	
Supply reliability		
Age	1.41	0.707
MoreEdu	1.36	0.734
Hhsize	1.17	0.853
Female	1.09	0.916
OpenSource	1.09	0.921
Income	1.08	0.924
NoComplain	1.08	0.926
TravelTime	1.07	0.935
Insufficient	1.06	0.943
NotAnnual	1.04	0.957
Store	1.04	0.958
Mean VIF	1.14	

Appendix 10: Proof of editing

Sury Bisetty Academic Editing Services

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The pen is mightier than the sword

To whom it may concern

I edited the thesis titled: Improving rural citizen satisfaction with water services: A case of the Umzumbe Local Municipality, by Sinethemba Beryl Mpisane, student number: 21502501 submitted in fulfilment of the requirements of the degree of Master of Management Sciences in Public Administration in the Faculty of Management Sciences at the Durban University of Technology

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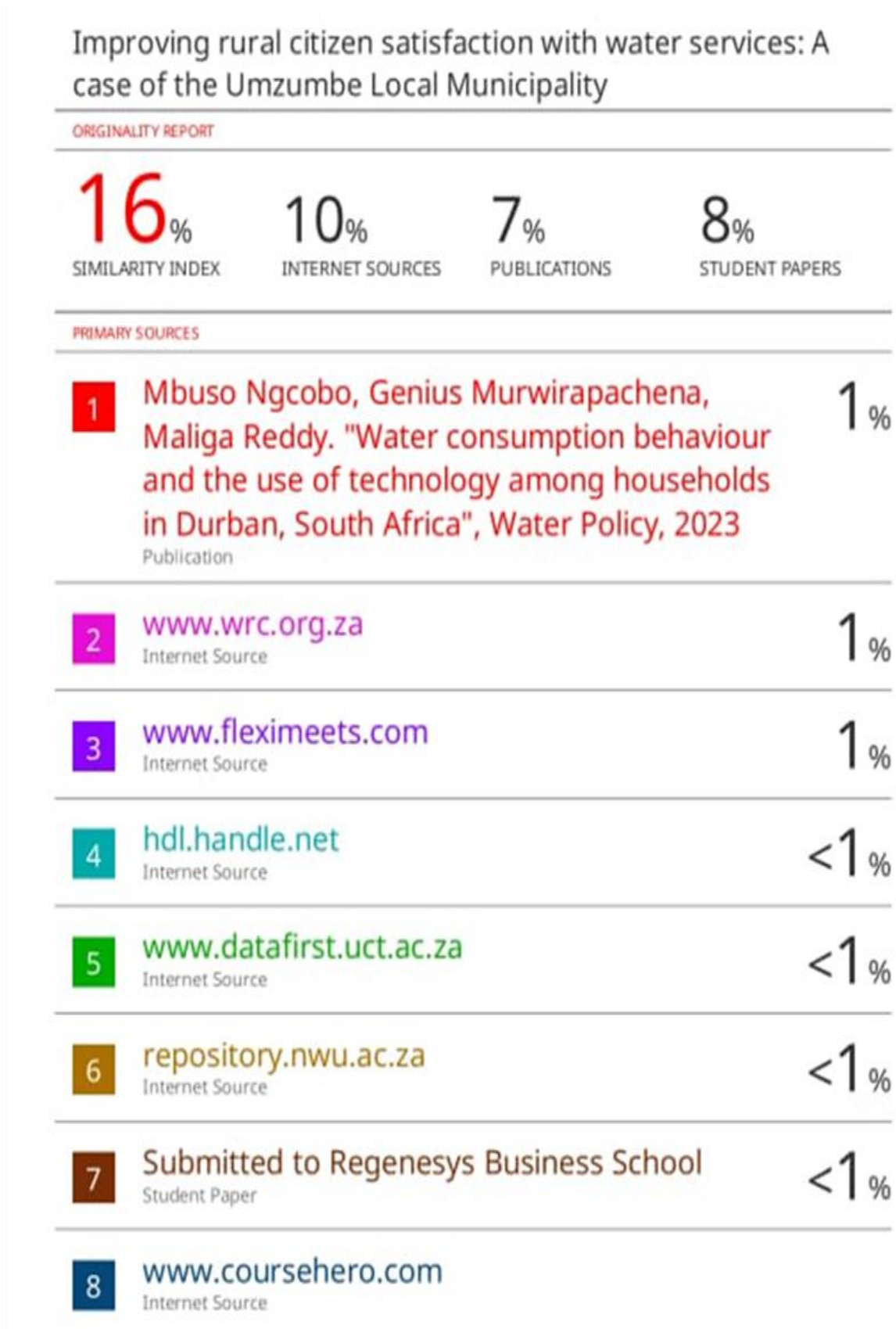
Appendix 11: Turnitin report cover page



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