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Municipal Strategic Self-Assessment status and financial performance of water- boards

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Municipal Strategic Self-Assessment status and financial performance of water-boards

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A research article submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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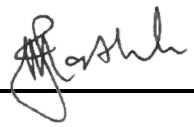
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DECLARATION

I, **Moloko Matlala**, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.



Signed at **PRETORIA** On the **2nd** day of **June** 2023

DEDICATION

This research is dedicated to my mother, Kwena Melita Matlala, who introduced me to the world of business at a very tender age. She taught me that keeping customers happy safeguards any enterprise's ability to sustain its revenue stream. Her small business of selling vegetables was the reason we had a meal every day before going to sleep. During the school holidays I used to accompany her to the construction site where she was selling cooked food. As a young kid I had to effortlessly imbibe business management skills provided by these opportunities my mother created.

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I would like to thank my supervisor Dr Len Konar for the guidance and support he provided during this research journey. Without him, this research would not have been possible to be completed. My sincere thanks to my mentee, Dr MM Photolo for assisting me during the collection of data, document editing, and for all the discussions we had regarding my research. My work colleagues at the units: institutional oversight, and water services management were very helpful to provide this study with annual reports of water-boards and MuSSA reports for municipalities. I am grateful to Mr Sipho Mosai, CEO of Randwater, for those telephone calls that I had to make to confirm information in their annual reports.

Many thanks to my family for the love, moral support, motivation, and financial help. Special thanks to my children for understanding and giving me the opportunity to study for the MBA degree.

SUPPLEMENTARY INFORMATION

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Summary

The provision of water and sanitation services in South Africa has for years been on the radar of citizens, non-government organisations, politicians, and bureaucrats from all three spheres of government. This is because the United Nations (UN) reported that approximately 1.1 billion people globally do not have a reliable access to water and sanitation services despite the UN setting the developmental goals under the previous Millennium Development Goals (MDGs) and more recently, Sustainable Development Goals (SDGs). For South Africa to achieve these aspirational goals set under the SDG programme and in the National Development Plan (NDP), the country must decisively deal with the backlog on water and sanitation services provision and a staggering R14 billion debt the municipalities are owing the water-boards presently. The current study used the Municipal Strategic Self-Assessment (MuSSA) reports and financial health check-up tools to determine if there is a relationship between vulnerability index of municipalities and financial viability of water-boards. Financial data covering a period from 2018 to 2022 were collected from six water-boards namely: Rand Water, Magalies Water, Umgeni Water, Amatola Water, Bloem Water and Lepelle Northern Water. A total of six key financial indicators, which are, operating ratio (including depreciation), operating ratio (not including depreciation), debt service coverage ratio, quick ratio, days cash on hand, and percent of capital assets depreciated, were used to assess the overall financial health of the water-boards. The financial health of the water-boards amongst others included an assessment of whether the water-boards generated the revenue needed to pay for operations and maintenance, and whether the water-boards did have enough liquidity to pay current liabilities.

The vulnerability index data of the municipalities were collected from the MuSSA reports for the period from 2018 to 2022. A linear regression was computed to assess the relationship between the financial health check-up of the water-boards (dependent variable) and vulnerability index of the municipalities (independent variable). The study concluded that there is a negative correlation between the vulnerability index of the municipalities and the financial health check-up of water-boards. A high vulnerability index was mostly found in rural municipalities rather than in urban municipalities, suggesting a need to develop a differentiated financial model to cater for these unique environments.

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1. Introduction and research rationale

Municipal debt poses a high risk to the functioning of water-boards in South Africa (DWS, 2022; Tony, 2021, p. 1). This precarious situation has impacted negatively on the financial health of water-boards, and if the situation is left unabated, the entire water and sanitation value chain is prone to collapse resulting in crises of unprecedented proportions. It was reported in recent times that municipalities owed water-boards R14 billion for the 2021 fiscal year (DWS, 2022) and this staggering amount accumulated over a short period of time. The Department of Water and Sanitation (DWS), as a regulator of the water and sanitation sector, developed tools to monitor performance of its entities and role-players in water and sanitation value chain. One such a tool is the municipal strategic self-assessment (MuSSA) (DWS, 2018; DWS, 2019; DWS, 2020; DWS, 2021; DWS, 2022), which is used to monitor vulnerability of municipalities using a composite vulnerability index computed from 16 business health attributes related to the provision of water and sanitation services as shown in Figure 1 (DWS, 2019). Municipalities accumulated debt over a period (Stats-SA, 2016) even though their vulnerability was regularly assessed using MuSSA and associated municipal priority action plans (MPAP) were recommended to affected municipalities to swiftly implement with the view to curb the challenges associated with vulnerability from surging. However, not all municipalities seem to have implemented recommendations from MuSSA reports and this has resulted in one of the water-boards, Sedibeng Water, whose customers are mostly extremely vulnerable municipalities (those that are not financially viable), losing revenue and leaving the DWS with no option but to disestablish the organisation (DWS, 2022). This situation calls for urgent attention from policy makers to review the current business model as most water-boards (Rand Water, 2018 – 2022; Magalies Water, 2018 – 2022; Umgeni Water, 2018 – 2022; Amatola Water, 2018 – 2022; Bloem Water, 2018 – 2022; Lepelle Northern Water, 2028 - 2012) that sell bulk water to vulnerable municipalities are likely going to be forced to apply for bailouts from national treasury due to escalating municipal debt.

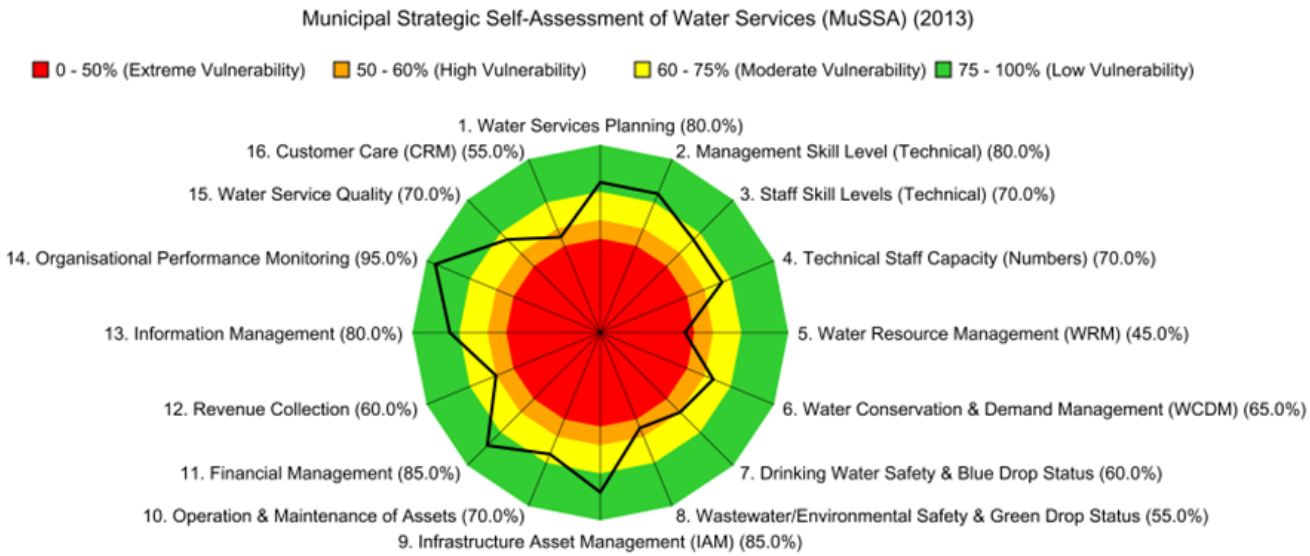


Figure 1. The MuSSA Spider Diagram indicating 16 key business attributes that measure the municipal's vulnerability levels associated with water services and sanitation delivery (source: DWS, 2013).

Mulenga (2017, p. 131) reported that failure of municipalities to collect revenue is one of the major threats to service delivery in the local government environment. This was later supported by the research conducted by Kleynhans and Coetzee (2019, p. 23), which demonstrated that the ratio of people of non-working age to the total population is mostly affecting financial position of municipalities in the province of KwaZulu Natal. Holmes at al. (2015, p. 3) provided evidence on how high unemployment and social grant-dependency, coupled with financial mismanagement in the Sundays River Valley municipality in the Eastern Cape, caused failure of the municipality to provide water and sanitation services. According to Shava (2020, p. 397), when households fail to pay municipal rates, it affects the municipalities' capacity to ensure the reliable provision of water and sanitation services, especially in rural municipalities where households constitute the bulk of the clientele. These authors focussed on how municipalities are made to fail because of non-payment of services by their customers and did not investigate how the non-payment has a domino effect on water-boards which are owed by the municipalities. This is a vicious cycle because failure of municipalities to collect revenue is impacting negatively on the financial viability of water-boards. However, failure to collect revenue by municipalities is not unique to South Africa; other developing countries such as Brazil and India had their fair share of challenges of not being able to collect revenue from rural households (Gomes *et al*, 2013; Machado *et al*.,

2019). Sahasranaman (2012, p. 2) recommended municipal finance reform for India, which drew from past experiences from municipal environments in Brazil, South Africa, and India. These developing countries were faced with challenges of water and sanitation services backlog in rural areas, which require a different revenue management model to those applied in urban based municipalities where households can pay for the services.

The World Bank (2017, p. 40) recommended that countries must have a flexible approach which considers different economic classes of households and that would lead to a differentiated approach regarding community contribution towards payment of water and sanitation services. This approach should be aligned with affordability levels of households in both rural and urban areas, and cross-subsidisation, where applicable. This is an attempt to reduce the backlog on provision of water and sanitation services to rural communities while ensuring that urban communities do not feel the brunt of paying exorbitant rates to keep the national fiscus viable. According to Gomes *et al*. (2013, p. 715) larger municipalities in Brazil are likely to manage revenue better than smaller municipalities. Smaller municipalities often have fewer households that are fragmented to benefit from economies of scale and as such they do not generate sufficient income to attract the best skills available in the market. Machado *et al*. (2019, p. 10) reported that the establishment of adequate tariff schemes in Brazil is one of the essential aspects required to ensure sustainability of rural water supply services. Loubser *et al*., (2021) reported that assurance of water supply in South African rural communities is less than in urban communities.

It is a norm globally that water utilities must ensure that they sustainably provide the reliable water services to customers at affordable prices while maintaining sound financial management (Kane, 2016, p. 1; Serafein and Trinh, 2021, p. 10). South African water utilities are no exception; households expect high quality water services second to none and non-government organisations play a watchdog role while authorities regulate and monitor compliance with standards. Loubser *et al*. (2021) reported that it is a norm to have a continuous water supply in most developed countries while most people in South Africa experience intermittent water supply. According to Toxopeüs (2019, p. 1) failing governance, financial mismanagement and municipal debt negatively affect water boards' ability to carry out their mandate of bulk water supply. In recent times, water boards in South Africa, which are established in terms of section 28 of Water Services Act, 1997, have drawn so much

attention from media because of their role in selling of bulk water to the municipalities that are struggling financially (Ngobeni & Breitenbach, 2020, p. 1) and the situation has prompted calls to re-configure water-boards into regional water utilities (Odendaal, 2022). It was reported that municipalities in South Africa have total debt of R14 billion for the fiscal year that ended on 30 June 2022 (DWS, 2022) and this precarious situation if unabated threatens water security in the country (Enwereji and Uwizeyi, 2020; Lubbe and Rossouw, 2008, p. 19; AG South Africa, 2020). The question which is often raised by analysts is how these municipalities have performed over the years when they were assessed using the MuSSA tool and how is their MuSSA status linked to the level of debt to water-boards. The answer to this question is key to assist the Department of Water Sanitation (DWS) when embarking on reconfiguration of water-boards into regional water utilities.

Since these indebted municipalities were assessed regularly for vulnerability using the MuSSA tool, there are data available to establish if there is a relationship with the financial health check-up of the waterboards that supply them with bulk water. However, the relationship between MuSSA status and financial health check-up of water-boards has not been scientifically explored or published. The current study aims to investigate the relationship focussing on six water-boards and municipalities whose bulk water is supplied by the six water-boards in question. The current study therefore seeks to investigate the extent of the relationship between the vulnerability state of municipalities and financial health check-up of water boards. The hypothesis to be tested is "*The vulnerability status of municipalities has an impact on the financial health of water-boards*".

2. Literature Review

2.1 Legal framework around provision of water and sanitation services

The Constitution of the Republic of South Africa stipulates in section 27(1)(b) of the bill of rights that "everyone has a right to have access to sufficient food and water". Koumpli and Kanakoudis (2022, p. 1) referred to water as a fundamental human right, which was put in the global arena in 1977 at the United Nations Conference on Water held in Mar del Plata, Argentina and subsequently given a ratification in 2010 by resolution 64/292 of the United Nations General Assembly. The Parliament of the Republic of South Africa through the Water Services Act (WSA) 108 of 1997 and the National Water Act (NWA) 36 of 1998 gave effect to this fundamental right. Responsibility for the actual provision of water and sanitation services rests with those municipalities that have been designated as Water Services Authorities (WSAs).

Globally, a resolution of 30th September 2010 adopted by the United Nations Human Rights Council affirms that water and sanitation are human rights. The human right to safe drinking water is derived from the right to an adequate standard of living. It is also inextricably related to the right to the highest attainable standard of physical and mental health, as well as the right to life and human dignity. The statutory legislative framework for effective management of local government consists of the Municipal Structures Act 117 of 1998, Municipal Systems Act 32 of 2000 and Municipal Finance Management Act 56 of 2003. However, implementation of these statutes requires coordination of stakeholders in the water and sanitation sector to ensure that each sector partner focuses on their respective elements of the value chain. It is the responsibility of national government to ensure that there is a golden thread putting every role-player in a "systems management theory" arrangement. The Department of Water and Sanitation as a sector leader and regulator acts on behalf of the national government to play such a role. Various components of the value chain must harmoniously work together so that the entire chain delivers services and products expected by the citizenry as beneficiaries of water and sanitation services.

2.2 Water and sanitation services landscape in South Africa

It has been a battle to ensure that various role-players execute their mandates, especially municipalities whose constitutional mandate is to provide water and sanitation services to communities (Mulenga, 2017; Kleynhans and Coetzee, 2019). This is against global norm that says every city needs to do everything in their power to ensure households get access to water for public health, productive economy, and environmental sustainability (Beard and Mitlin, 2021). When municipalities fail to pay water-boards, that situation can lead to the collapse of the water boards and Sedibeng Water, which was disestablished in 2022, serves as a good example (DWS, 2022). It is the responsibility of the sector leader and regulator, which is precisely the Department of Water and Sanitation, to identify a weak link in the water and sanitation value chain so that appropriate interventions are swiftly put in place to avoid further breakages in the water and sanitation value chain. There are several factors that can cause one or more components of the water and sanitation value chain to stop working. According to Barnes (2009, p. 4) failure of households to pay for the water and sanitation services received, directly affects government's capacity to provide water and sanitation services to the citizenry in a sustainable manner. This can have a ripple effect on other components of the value chain, for instance, indebted municipalities are at high risk of failing to pay waterboards and the latter might be forced to default on payment of water abstracted from the water resource owned by the national government.

South Africa previously had a growing developmental economy after 1994, but of late the annual growth rate has slowed from 3.5% in 2011 to 2% in 2013 and gross domestic product (GDP) is projected to average at 1.4% from 2023 to 2025 (National Treasury, 2023). Inflation is currently at above the targeted 6% and unemployment has increased to more than 30%. The South African Water and Energy Forum has previously stated that water, and not necessarily energy, will be the limiting factor to the country's future economic growth. According to Mabhaudhi *et al*. (2016), sustainable energy and access to clean water requires a paradigm shift from seeing the two as separate elements to recognising and appreciating their association through the water-energy nexus. Adequate water provision is thus crucial to South Africa's economy and that of the Southern African Development Community (SADC) region. Current population is estimated at more than 60 million people. Over 62% live in urban areas, and there is a significant migration from rural to urban areas. The number of

households is growing faster than the population, due to an influx of illegal immigrants, as well as migrants who continue to maintain homes in their rural villages. This has significant service delivery implications whilst continually changing water and sanitation backlog targets.

South Africa's water resource yield is about 15 billion m^3/annum, comprising 68% surface water, 13% groundwater, 13% return flows and 6% from other sources (DWS, 2018). Current use is estimated at between 15 and 16 billion m^3/annum. This is roughly split between agriculture 62%, domestic 27%, mining 3%, industry 3%, energy 2% and forestation 3% (DWAF, 2004). The Department's water resource assessments in 13 key areas and in 905 towns found that 28% of the towns have inadequate water resources and need urgent attention, yet 50% of towns do not implement any water conservation measures (DWS, 2018). Climate change is predicted to impact negatively on the country's water resource adequacy, both in terms of availability and storage requirements. The average water consumption is ±225 litres per person per day, very high by most standards globally (DWS, 2018). Municipal water losses are estimated to be about 36%. Water is vital to food production. Although agriculture uses over 60% of the water, only 12% of South Africa's landmass is considered arable and just 3% "truly fertile" (DWA, 2013). Only 1.5% of the land is under irrigation, producing 30% of the country's crops, whilst 69% is given over to grazing and livestock farming (DWA, 2013).

An assessment of 1689 water and sanitation schemes found that 10% of infrastructure was dysfunctional, (lying mainly within 27 District Municipalities identified as a priority for government interventions), a further 24% were experiencing serious problems and 48% needed urgent refurbishment (DWS, 2018). Functionality issues can be ascribed to several factors, all related to poor management of water and sanitation services infrastructure. Provision of effective asset management through Asset Management Plans, sufficient finance, resources, and implementation thereof will address this problem. Actual investment in water and sanitation falls far short of requirements. Compounding this situation, many municipalities under-spend due to lack of capacity at both technical and financial levels (DWS, 2019). On average municipal revenue consists of about 68% own income and 32% grants/subsidies, (but varies tremendously between the different municipal categories). National Treasury has introduced the Municipal Standard Chart of Accounts, which ensures that there is consistent municipal financial reporting and less irregular expenditure. In most

municipalities, water and sanitation tariffs are not cost reflective and water services providers run at a loss (DWS, 2018). Household payment for water has dropped from 67% in 2004 to 44% in 2013 and the downward trend continues as evidenced from recent community protests. Most of the Water Services Authorities (WSA) do not have a Revenue Management System and therefore rely completely on grants / subsidies to operate, with cost recovery contributing almost nothing to their revenue stream (DWS, 2021). With an effective Revenue Management System in place, WSAs can work towards 100% cost recovery for water and sanitation services provided to households. This will in turn provide the additional income necessary to develop the resources and infrastructure needed to sustain water and sanitation services provision. The ultimate will be a low level of vulnerability index for municipalities in South Africa, leading to no debt to water-boards.

2.3 International benchmarking regarding provision of water and sanitation services

The importance of water as a catalyst to socio-economic development was also implied in goal 7 of the United Nations' millennium development goals (MDGs), which was aptly titled "ensuring environmental sustainability" (GWOPA, 2009). With the advent of UN's sustainable development goals (SDGs) in 2016, the centrality of water was made more visible with SDG6 dedicated to only water and sanitation and SDG6 is recognised as an enabler for other sustainable development goals. There are also initiatives globally that support countries to assess performance of water utilities (GWOPA 2012, p. 156). However, there is a need to tailor-make them to suit unique situations of countries. For instance, if the SDGs are not domesticated, then it will be very difficult for the developing countries to achieve the goals as countries have diverse hydrological regimes and socio-economic challenges that do not require the "one-size-fits-all" approach. Howard and Han (2020) reported that there is little progress made by African governments in terms of achieving the United Nations SDG6 and this paints a bad picture for the rural residents as their water and sanitation services challenges go beyond just access and supply of water. Beard and Mitlin (2021) argued that water access is associated with well-being and without access to water educational opportunities can be missed, especially in developing countries where young girls must still travel long distances to fetch water before going to school.

South African government reached universal access regarding provision of water services in urban areas as reported in the 2011 census conducted by Statistics South Africa whilst in rural areas there is still water services backlog of the households un-served with piped water (StatsSA, 2011, p. 59). The current situation has worsened over the years in the rural areas because of poor operation and maintenance of water infrastructure (Hofstetter *et al*., 2020, p. 851). According to the results of a survey study conducted by Howard and Han (2020) in 34 African countries, South Africa is ranked number 11 when considering the percentage of households that often had to go without enough clean water for home use in the year 2018. The same survey reported that Mauritius was ranked number one whereas Gabon occupied position number 34. It was also noted the percentage of rural households that have access to piped water and sewage system is lower than their urban counterparts (Howard and Han, 2020, p. 9). Nnadozie (2011, p. 341) reported that backlog ratio on the provision of piped water in South Africa has remained static for a period of at least 10 years. Hofstetter *et al*. (2020, p. 843) reported that South Africa is still experiencing problems of poor water and sanitation service delivery especially in low-income rural provinces. These sentiments were echoed by Lebek *et al*. (2021, p. 271), who mentioned that target 6.1 of SDG 6 on access to safe drinking water must be inclusive. The same authors reported that the SDG 6.1 target "calls for a particular focus on disadvantaged and indigent rural households and on redressing inequalities in water services". It remains to be investigated as to why the backlog is not significantly reduced over a period when there are programmes such as regional bulk infrastructure grant (RBIG), municipal infrastructure grant (MIG), and water services infrastructure grant (WSIG). The question to be asked is whether poor operation and maintenance, and poor financial management contribute to the backlog on water sanitation and services provision. It must be established whether high to extreme vulnerability of municipalities as assessed using the MuSSA tool is contributing to reported R14 billion debt owed to water-boards in South Africa.

2.4 Tools to monitor provision of water and sanitations services

Brettenny and Sharp (2017, p. 37) reported that the South African government must develop monitoring tools to assess the performance of municipalities, and this is because water is a catalyst to socio-economic development in the country. The National Department of Water and Sanitation (DWS) as a sector leader has developed a tool called MuSSA (Municipal

Strategic Self-Assessment) to assess the overall vulnerability of a municipality in terms of provision of water and sanitation services. Municipal Strategic Self-Assessment is used to assess municipalities on key business attributes, which amongst others include financial asset management, revenue collection and financial management. The tool also highlights gaps identified by the assessment, are summarised as vulnerability index of the municipality on a scale that categorises municipalities in terms of low, medium, high, and extreme vulnerabilities. The assessment is also accompanied by the development of municipality priority action plan (MPAP), which provides a list of actions to be taken by the respective municipality to address the gaps identified. This process of assessing the overall vulnerabilities of municipalities has been in existence for more than 15 years; however, its impact on the financial health of water-boards has not been scientifically investigated in South Africa.

The MuSSA programme is also important for overall water conservation and water demand management programme. Without better water use efficiency, there will be inadequate water and water restrictions will increasingly become the order of the day. Water will become scarcer, particularly with negative impacts of climate change on water resources. There are limited dam sites and opportunities for further water transfer schemes (DWA, 2013). Poorly maintained wastewater treatment plants pollute the resources. High unemployment and low economic growth rate indicate an increased potential for social unrest, which could affect service delivery and increase protests for lack of service delivery. Job creation is thus important to safe-guard water and sanitation services infrastructure from a potential collapse. Lack of municipal capacity, especially technical, will reduce their capacity to provide sustainable services. All these challenges are part of the municipal priority action plan (MPAP), which is provided to municipalities as feedback from the MuSSA programme.

2.5 Management theories underpinning the proposed study's approach

Following a systems management theory approach (Mele *et al*., 2010; Lai and Lin, 2017), the weakest link of the water and sanitation value chain must be identified and resolved for the entire water sector to function as one large system. There are also elements of agency theory implied in the reporting approach used by water-boards as financial information submitted as part of shareholder compact differs from water-board to water-board. The agency theory is manifested as water-boards strive to maximise profits while the shareholder (the

Department of Water and Sanitation) emphasises the urgent need to increase coverage in the provision of water and sanitation services irrespective of the households or municipalities' affordability (Wright *et al*., 2001; Bendickson *et al*., 2016). The agency theory is further compounded by the innate information asymmetry (Bergh *et al*., 2019), which exists between the shareholder and the water-boards leading to one party to have more and better information than the other. The situation of information asymmetry is often because of under-reporting or gaps in performance monitoring and evaluation by the shareholder. The MuSSA tool provides one of the diagnostic tools to be used to assess the financial asset management, revenue collection and financial management capacity of the municipalities. If water boards generate revenue from sales of bulk water supplied to municipalities, then municipalities with weak financial position pose high risk to water-boards. An assumption is that information on transactions between and among water-boards, municipalities and national government as shareholder is the same and the capacity to comprehend such information is the same across the board. However, that assumption does not seem to hold, and the situation therefore often leads to information asymmetry and complexities associated with agency theory. The study of impacts of MuSSA status on financial viability of water-boards becomes relevant to understand how municipalities and water-boards influence the water and sanitation value chain as a system.

3. Methodology

3.1 Research philosophy and design

A pragmatist research philosophy was chosen for this study as it allowed the researcher to be independent of the organisations under investigation and more importantly provided an opportunity to incorporate operational decisions based on what will work best in answering the research question. The goal was to measure causal relationships between municipal vulnerabilities and financial health of water-boards using regression analysis. Using the pragmatist philosophy, as a researcher, one was able to use financial data from annual reports of water-boards to generate six key financial indicators whose graphs were converted into financial health check-up figures that can be placed on a financial health check-up scale of 1 to 10. The research philosophy also allowed the financial health check-up figure to be computed from only five key financial indicators after realising that not all water-boards

participate in the bond-markets to raise capital. It would therefore be irrational to use debt service coverage ratio as one of the six key financial indicators because half of the water-boards did not have any figure to make a fair comparison between and among the water-boards (Appendix, Table 6).

The vulnerability indices of municipalities were clear as the MuSSA programme was in operation for more than 15 years and no extrapolation was required before regression analysis was performed. Since the study used secondary data, the data collection design was such that the researcher did not have to interact with research participants. There was therefore no room for research participants to be biased when they generated the annual reports with the view to influence the outcome of this study to be in favour of their respective organisations.

3.2 Data collection

As this study followed a quantitative approach, secondary data was collected from the websites of water-boards, municipalities and the Department of Water and Sanitation. Where there were gaps identified in the websites regarding data, the relevant units of the government department were engaged to confirm and/or solicit more data. Collection of data from water-boards was mainly from the annual reports that were presented to the Department of Water and Sanitation as part of the shareholder compact. The study targeted six water-boards (i.e., Randwater, Magalies Water, Umgeni Water, Lepelle Northern Water, Amatola Water and Bloem Water) and 53 municipalities whose bulk water is supplied by the six water-boards. Financial data from audited financial statements of six water-boards were collected as reflected in Appendix, Table 6.

Since municipalities are not entities of the Department of Water and Sanitation but entities of the Department of Cooperative Governance and Traditional Affairs, a MuSSA programme of the Department of Water and Sanitation was used to collect data for this study. Water is a national government's competency; it is therefore managed under the legal framework of Water Services Act and National Water Act. It is the Department of Water and Sanitation that must develop tools to regulate the entire water and sanitation sector including the monitoring of vulnerability index of municipalities. The study used worksheets that the Department of Water and Sanitation uses to collect data required to assess vulnerability of municipalities

related to the water and sanitation services. This is part of the MuSSA programme that has been in operation for more than 15 years.

A total of nine key financial data points in the annual financial statements of water-boards were collected for a period from 2018 to 2022, namely: total operating revenues, total operating expenses, depreciation and amortisation expenses, debt principal payments, debt interest payments, current assets (excluding inventories, restricted cash and prepaids), current liabilities (excluding deposits and bond anticipation), unrestricted cash and investments, total accumulated depreciation, total depreciable capital assets. The vulnerability indices as captured in the MuSSA reports of 53 municipalities (Appendix, Table 7) whose bulk water supply is provided by the six water-boards were collected for the period from 2018 to 2022.

3.3 Data analysis

The six financial indicators were developed to examine how the water-boards performed financially for five fiscal years (Environmental Finance Centre, 2016). The six key financial indicators are: operating ratio (including depreciation), operating ratio (not including depreciation), debt service coverage ratio, quick ratio, days cash on hand, and percent of capital assets depreciated (Figure 2.1 and Figure 2.2). It was not possible to compute debt service coverage ratio for all six water-boards and it was therefore not going to make scientific sense to use this financial key indicator for comparison between and among the water-boards. The financial health check-up for each waterboard was assessed against the set target for 5 key financial indicators per financial year and an average financial health check-up for each water-board was computed (Table 1). In addition to the recommended financial indicators by Environmental Finance Centre, the equity-to-assets and debt-to-equity ratios were computed in this study to assess how vulnerable are the water-boards to financial shocks (Figure 3 and Figure 4). An average vulnerability index for each municipality was computed over a period of 5 years to determine vulnerability trends temporally within and among municipalities.

Financial health check-up figure for the six water-boards were matched against the vulnerability index of the corresponding municipalities. The resultant spreadsheet with both financial health check-up composite figures from water-boards and vulnerability index of

municipalities (independent variable) was uploaded on the SPSS program. The SPSS program was set to compute linear regression analysis and the following outputs were amongst others generated: descriptive statistics, correlations, model summary, ANOVA, and Coefficients.

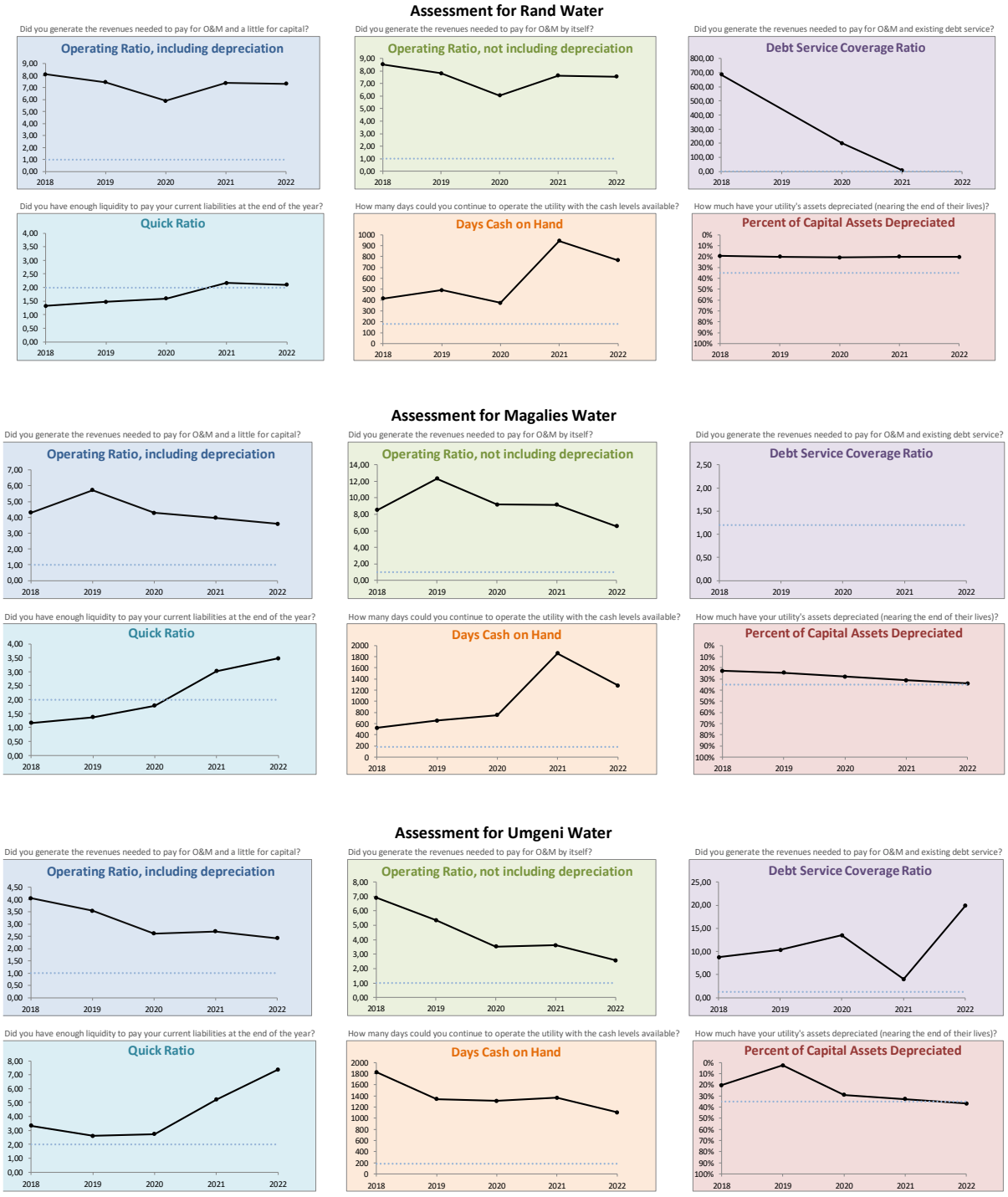


Figure 2. 1. Performance measured against six key financial indicators of three water-boards that performed above the mean health check-up value of 7.364

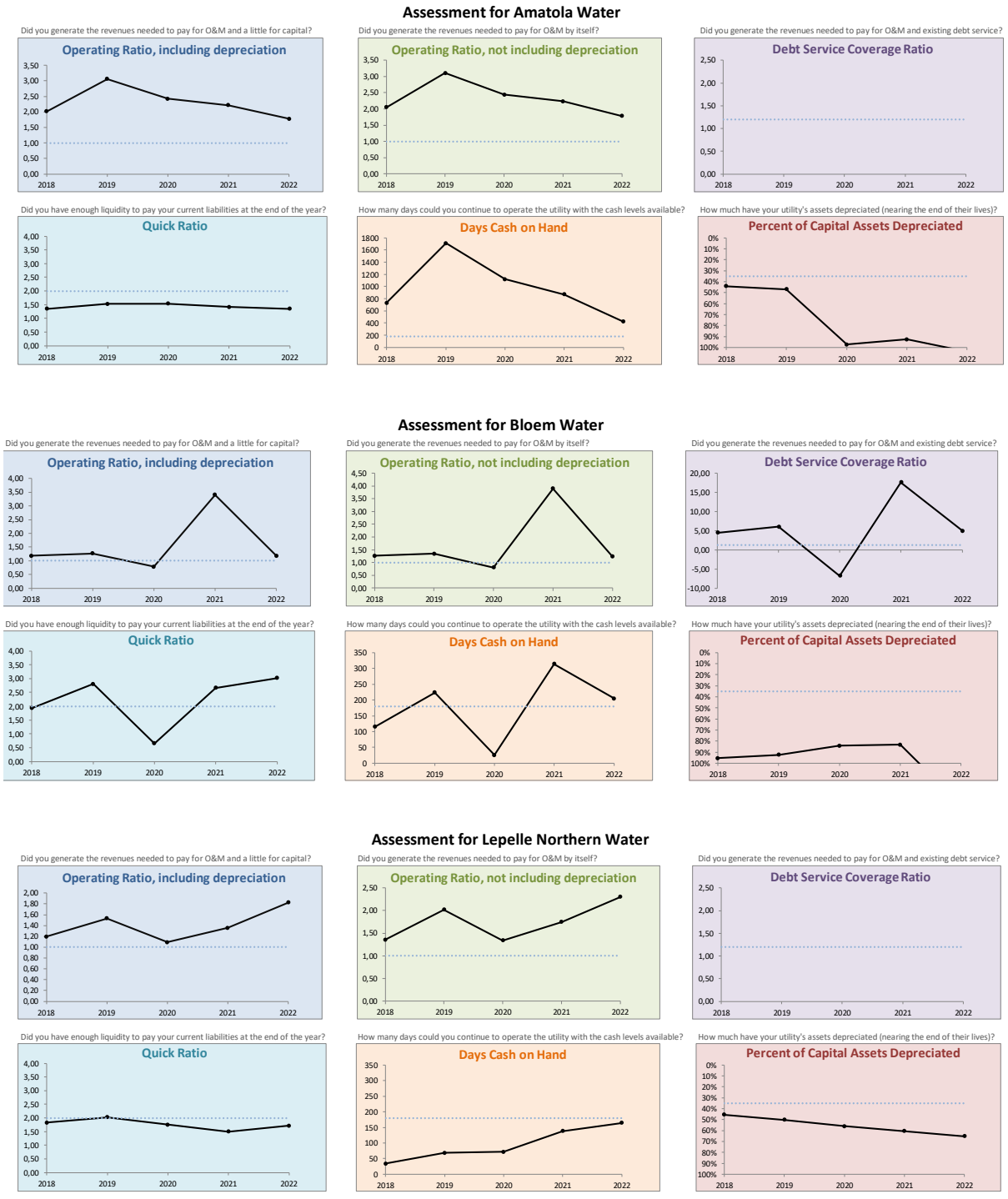


Figure 2. 2. Performance measured against six key financial indicators of three water-boards that performed below the mean health check-up value of 7.364

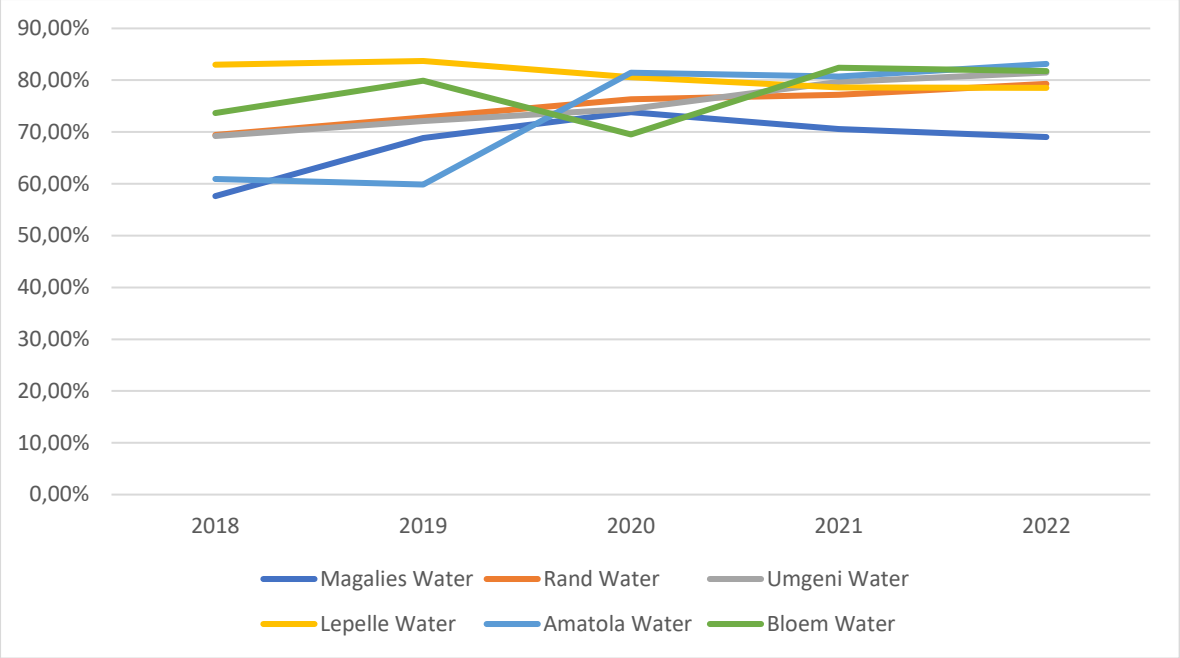


Figure 3. The equity-to-asset ratios for six water-boards indicating that all water-boards have more than 60% of their total assets owned by the government.

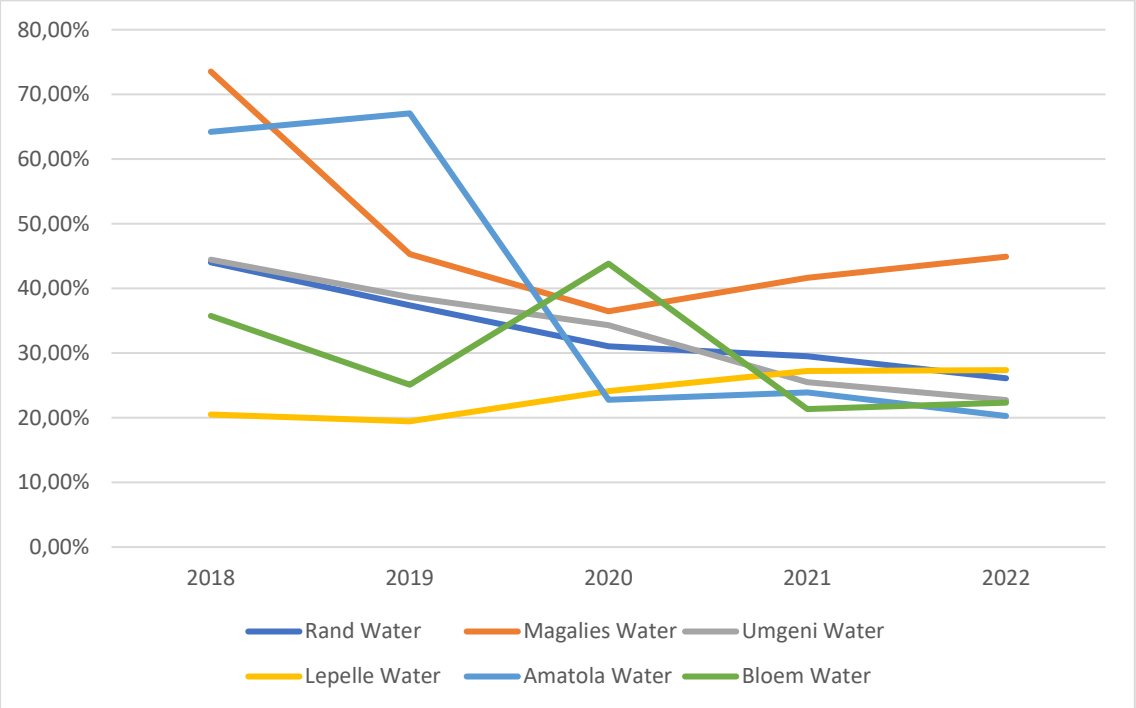


Figure 4. Debt-to-equity ratios for six water-boards. There seems to be a downward trend on debt financing by the water-boards.

Table 1. Financial health check-up for water-boards (very good ≥ 8.5, good ≥ 7.5, moderate ≥ 6.5, and weak < 6.5)

Water-boards	2018	2019	2020	2021	2022	Average
Randwater	8.0	8.0	8.0	10.0	10.0	8.8
Magalies Water	8.0	8.0	8.0	10.0	8.0	8.4
Umgeni Water	10.0	10.0	10.0	10.0	8.0	9.6
Amatola Water	6.0	6.0	6.0	6.0	6.0	6.0
Bloem Water	4.0	8.0	0.0	8.0	8.0	5.6
Lepelle Northern Water	4.0	4.0	4.0	4.0	4.0	4.0

A linear regression analysis method using SPSS (IBM*SPSS* version 28) was employed to perform data analysis, wherein vulnerability index of municipality was used as the independent variable (X) while financial health check-up of water-boards is the dependent variable (Y). Using a linear regression method, the equation was expressed as follows:

$$Y = \mathbf{a} + \mathbf{b}X, \text{ where } \mathbf{a} \text{ is the intercept and } \mathbf{b} \text{ is the slope of the line}$$

4. Findings

4.1 Descriptive statistics

The study analysed financial data from six water-boards that represented both rural and urban based state-owned enterprises and composite vulnerability indices derived from 16 business health attributes related to the provision of water and sanitation services from 53 municipalities. The results in Table 2 shows that a financial health check-up mean value of 7.36 for all waterboards and vulnerability index mean value of 0.59 for all municipalities.

Table 2. Summary statistics

Variable	Measure	Statistic	Bias	Std. Error	95% Confidence interval	
					Lower	Upper
Financial health check-up	Mean	7.3643	- 0.0014	0.2689	6.8214	7.8784
	Std Dev	2.08	- 0.0226	0.1212	1.8052	2.2733
	N	56	0	0	56	56
Vulnerability index	Mean	0.5943	- 0.0004	0.0205	0.5529	0.6327
	Std Dev	0.1530	-0.0021	0.0136	0.1256	0.1776
	N	56	0	0	56	56

4.2 Evaluation of Pearson Correlation

The magnitude and significance of the Pearson correlation between financial health check-up of water-boards and vulnerability index of municipalities were examined and Table 3 shows medium correlation of negative 0.361 and p value of 0.003, which indicates high significance.

Table 3. Pearson correlation between financial health check-up (FH) and vulnerability index (VI)

N	Independent variable	Dependent variable	Pearson correlation coefficient	p-value
56	VI	FH	-0.361	0.003

Coefficients table provides data to be used to predict financial health check-up of water-boards from vulnerability index of municipalities and this is also used to determine whether vulnerability index contributes statistically significantly to the model. The value in Table 4 below were used to derive the linear regression equation as:

Financial health of water-boards (FH) = 10.281 – 4.908 (vulnerability index (VI))

Collinearity tolerance value of 1.00 is above the minimum value of 0.40, which most researchers use as the lower limit beyond which multicollinearity levels become high to be considered a problem. The variance inflation factor (VIF) value of 1.000 shows that there are no issues with multicollinearity.

Table 4. Model summary with unstandardised coefficients

Model					95% Confidence		Collinearity Tolerance	Statistics VIF
		B	t	Sig	Lower Bound	Upper Bound		
1	Constant	10.281	9.708	<0.001	8.158	12.404		
	VI	-4.908	-2.842	0.006	-8.370	-1.446	1.000	1.000

4.3 Hypothesis testing

The study hypothesis was tested at a 95 percent confidence interval and there was only one hypothesised relationship, which says vulnerability index of municipalities as independent variable has a predicting effect on the financial health check-up of water-boards as dependent variable. The results from the current study as reflected in Table 5 show that there is a negative association between vulnerability index of municipalities and financial health check-up of water-boards that supply bulk water to the municipalities at a 5% level of significance. When Pearson correlation coefficient lies between ± 0.30 and ± 0.49, it is regarded as medium correlation. The current study has a Pearson correlation of – 0.361, which is within the medium correlation range. The researcher is therefore failing to reject the null hypothesis based on the results of the study, as summarised in Table 5 below.

Table 5. Summary of hypothesis testing

Independent variable	**Dependent variable**	**Null Hypothesis**	**Pearson correlation coefficient**	**p-value**	**Decision**
VI	FH	H_0	- 0.361**	0.006	Fail to reject H_0
Note: **p<0.05 VI = vulnerability index FH = financial health check-up					

4.4 Discussion of the results

The water and sanitation sector is complex, and to single out the relationship between water-boards and municipalities without considering the influence of the interplay among all three spheres of government (i.e., national, provincial, and local) might be an underestimation of the reality. The sector also has an element of international cooperation imbedded into the nexus because of indivisibility of the hydrological cycle and the mere fact that rivers straddle the riparian states creating opportunities for peace and conflicts among the nations. One of the water-boards in South Africa called Rand Water abstracts water from the Integrated Vaal River System (IVRS) which includes dams built in the Kingdom of Lesotho. The water used does not all return to IVRS, which lead to the Atlantic Ocean, some water is discharged into the Limpopo River system which ultimately joins the Indian Ocean. The current study did not consider the interconnectedness of the six water-boards in describing their operations and financial model. The question is "how does Lepelle Northern Water and Bloem Water's financial health benefit or incur loss from the upstream Rand Water's financial health"? The current study was not meant to provide answers to this question. However, this background is important to understand and interpret the results of the current study in terms of following areas:

4.4.1 Financial performance of water-boards

There are three water-boards that are financially performing well as shown in Figure 2.1, namely Rand Water, Magalies Water and Umgeni Water. These water-boards were able for the past five years to generate enough revenue from sales of bulk water to municipalities to cover the cost of operations and depreciation. It was also possible to establish that Rand Water was able to pay off operating and maintenance costs and still have sufficient funds left to pay existing debt service. It was also possible to establish for these three water-boards if they were able to pay bills with their unrestricted assets on the day the financial statements were recorded. These three water-boards were also in a better position to be able to weather a significant temporary reduction in revenue due to municipal debt and continue to pay for daily operations and maintenance. They seem to still have enough value that can be accrued from assets they currently own. The equity-to-asset ratios reflect businesses with high equity to assets and less reliance on debt financing and this situation if not carefully managed can

easily lead to inefficiencies. The water-boards might be missing out on opportunities to grow business when the cost of debt is lower than the rate of profits notwithstanding the fact that water is a human right and not a commodity. According to Paeleman *et al*. (2023) it is very important for companies to be familiar with the consequences of financial leverage so that associated financial risks are minimised. Piper and Weinhold (1982) warned of overstated tax advantage for debt financing which often leads to loss of value for investors.

Unfortunately, the same cannot be said about the other three water-boards shown in Figure 2.2, namely, Amatola Water, Bloem Water and Lepelle Northern Water. For these three water-boards to be assisted to be at the same level with Rand Water, Magalies Water, and Umgeni Water, the first port of call is to ensure that their reporting is standardised to show the gaps clearly. The issues of not reporting in a standardised format in line with generally accepted accounting principles (GAAP) were also highlighted by the auditor's report for 2020/21 fiscal year. It does seem that the current financial model is not suitable for these three water-boards, as it assumes that municipalities take accountability when it comes to payment of debt, which does not seem to be the norm, especially in rural municipalities.

4.4.2 South Africa's model of local government

Vulnerability index of most municipalities seems to be mostly high in rural areas than in urban areas as shown in Table 7. However, the situation is complex because all these rural areas supply skilled labour to the urban areas (Ramuhulu, 2021) and the same rural areas serve as retirement homes for most of South Africa's urban dwellers. This is a unique situation to South Africa as most professionals have both rural and urban homes and this becomes more apparent in Gauteng province during the festive season. It is unfortunate that the urban dwellers only pay tax and rates for their urban homes and not rural homes. It means most urban dwellers must be forced to pay tax and rates for their retirement homes in rural areas if the model of local government were to work.

South Africa has challenges regarding provision of water and sanitation services (Asoba *et al*., 2020) and provision of these services is a mandate of local government because it is closer to where the services are required by citizens. However, there are historical issues that need to be resolved. After the end of Apartheid, South Africa's newly elected government inherited huge services backlogs with respect to access to water and sanitation services. About 12

million people were without safe water supply and over 20 million without adequate sanitation services (Source: White Paper on water services, 2002). Despite these challenges, the government made a strong commitment to high service standards and to high levels of investment subsidies to achieve those standards. Local government was identified as a sphere where all those aspirational programmes were to be implemented. Since then, the country has made some snail-paced progress about improving access to water supply and sanitation services. Since 1994, South Africa is reported to have reached universal access to an improved water supply in urban areas, whilst in rural areas, access increased to slightly above 60% (StatsSA, 2011). However, the progress made had some associated complexities to deal with at all three spheres of government. Firstly, significant problems were encountered regarding the technical and financial sustainability of infrastructure, because of insufficient or no asset management practices, including financial planning, maintenance, refurbishment, and ineffective operation of infrastructure. This deficiency contributes significantly towards water leakage and unaccounted for water, and it was one of the earlier triggers of non-payment for water services by households. Secondly, there has been influx of people into the cities to look for economic opportunities in tandem with mushrooming of informal settlements in the outskirt of most towns (Asoba *et al*., 2020). These challenges put a strain on allocation of resources, access to basic water and sanitation services and the life span and capacity of the infrastructure provided (DWS, 2018). South Africa has adopted the National Development Plan (NDP) in September 2013 to ensure that all plans in government are part of the comprehensive NDP, which stipulates that there should be full access to affordable and reliable water and sanitation before 2030. The issues of water and sanitation services are therefore a priority to the South African government.

The Department of Water and Sanitation (as a sector leader, supporter, and regulator) therefore has a role to play in ensuring development and implementation of a service delivery business model that aligns role players and spheres of government to operate in a manner that ensures achievement of universal access of water and basic sanitation services both in urban and rural environments. The model should be guided by the NDP and the Medium-Term Strategic Framework (MTSF), the latter stipulated that access to both water services and sanitation, should have been 90% by 2019 and this target has not been achieved. The model should also ensure harmonisation between the goal to achieve cost recovery enshrined

in the 1997 Water Services Act, and the constitutional right to access to water introduced in 1996 and the policy of free basic water introduced in 2001. All these challenges are overwhelming to local government as municipalities' vulnerability index goes high year in and year out. This precarious situation calls for review of South Africa's model of local government.

4.4.3 Relationship between financial viability of water-boards and MuSSA status of municipalities

There is a causal relationship between financial viability of water-boards and MuSSA status of municipalities. MuSSA status of municipalities is expressed as vulnerability index. The results of the current study show a negative correlation between the two variables. If vulnerability index of municipalities goes high, it affects the financial viability of the water-boards to be low. The opposite happens when the vulnerability index of municipalities goes down, the financial viability of the water-boards goes high. The relationship is also expressed in a regression equation given below:

$$\text{Financial health of water-boards (FH)} = 10.281 - 4.908\ (\text{vulnerability index (VI)})$$

5. Conclusion and recommendations

The current study exhibited the dire situation that most water-boards in South Africa currently face. These water-boards are owed by municipalities more than R14 billion and unless business model changes this debt is likely to increase in the long run. It does not come as a surprise that one of the water boards, Sedibeng Water had to be disestablished by the Department of Water and Sanitation. When there is high unemployment, most citizens are on social grants, and there is high proportion of indigent households, it is going to be difficult for the municipalities to collect tax and rates from the households. Any business requires to generate revenue and make profits to survive in a competitive environment (Farida and Setiawan, 2022). However, just generation of revenue is not enough for an enterprise that wants to sustain its competitive advantage in the competitive environment or expand into the new markets in other geographies. Factors such as operational efficiency, good

governance, a good strategy, business management acumen, etc. are critical in every organisation. This is supposed to apply to water-boards as business entities but the operating environment in South Africa is complex due to developmental state that the country is in.

First, there is still a debate as to whether water is a basic human right or a commodity (Thompson Jr, 2011; Gies, 2020). South Africa's constitution recognises water in the bill of rights as a basic human right; Chapter 2 of the constitution states, "everyone has right to have access to sufficient food and water". This is also supported by resolution on the right to development issued by the General Assembly of the United Nations in 1999 (Dash, 2006). Most economists hold the view that water is a commodity which can be traded for economic gains. From an economic point of view, households, as customers, must therefore pay for the economic cost of producing the product called water. Proponents of the economic view of treating water as a commodity are regarded as insensitive by the water activists who support the view that water is a basic human right. Gies (2009) reported how residents of Cochabamba in Bolivia protested the immediate increase of water rates, which were estimated to be 200 percent. Factors such as cash-strapped local governments and the need for better water and sanitation infrastructure are some of the compelling reasons why some scholars see privatisation of water as the panacea of the wicked problems of poor water and sanitation services.

Second, there is still a backlog on the provision of water and sanitation services to all citizens, especially the previously marginalised black Africans under the former apartheid government (DWS, 2018). It is unfortunate that most of indigent households are coming from previously un-served communities, making it difficult for municipalities serving these communities to collect rates and taxes as part of revenue. As a result of the situation, water-boards are supplying the municipalities with bulk water and the same municipalities end up not paying the waterboards (Tony, 2021, p. 1). This vicious cycle has a bearing on operation and maintenance of water and sanitation infrastructure by water-boards as their budget becomes insufficient due to less revenue collection.

Third, South Africa is a semi-arid country and as a result, the country receives less than average global annual rainfall (DWS, 2018) and this is further compounded by the impacts of climate change on water resources. Just to bring water from catchments that have surplus

water to catchments that are in deficit often requires huge capital investment by both private and public sectors. The funding model for water resource development projects often requires foreign direct investment. However, high number of indigent households in the country due to stubbornly high unemployment rate renders the water projects not bankable. The hydrological extremes seem to be more frequent due to impacts of climate change on water resource and therefore there is a high risk to damage the already strained water and sanitation infrastructure.

The current study's unravelling of causal relationship between financial viability of water-boards and vulnerability index of municipalities was only successful in scratching the top surface of the underlying problem of water and sanitation services. More work must be done to deal with the systemic problem, which threatens the country's priorities, and achievement of goals and targets set in the National Development Plan of the country and United Nations' Sustainable Development Goal6. The researcher recommends the following actions, which are of a medium to long term nature:

- It must be compulsory for all municipalities to take part in the municipal strategic self-assessment (MuSSA) programme. If less than 75% of actions stipulated in the municipality priority action plan (MPAP) were implemented, then such municipalities must be placed under administration, or alternatively their grants from the national treasury should be put on hold until they have participated in the MuSSA programme.
- All water-boards must perform a compulsory financial health check-up and use the outcome of the assessment to set new targets that lead to attainment of financial health check-up of more than 8.5. The process of recruiting for the executives to run water-boards must be revamped to ensure that the chief executives have requisite technical skills, such as engineering and science over and above advanced financial management. The incentive system of water-boards at executive level should be aligned with the target of water-boards' financial health check-up whose target must be set above the 8.5 target.

6. Managerial implications

The results of the current study equip both management of water-boards and municipalities with knowledge and easy-to-use tools to increase efficiency and productivity. Management needs these readily available tools to set them on track to increase revenue and profit margin for water-boards and to reduce the vulnerability of municipalities. The study also empowers the shareholder (the Department of Water and Sanitation) to monitor performance of water-boards and municipalities with the view to intervene promptly to ensure uninterrupted provision of water and sanitation services. This study identified water-boards that are associated with highly vulnerable municipalities and this information is important to guide the DWS during reconfiguration of water-boards into regional water utilities.

The ability of municipalities and water-boards to provide water and sanitation services to the citizens rests on execution of plans and strategies, which should be meshed with reality on the ground. This should be coupled with alignment of office bearers' vision with the overall goals of municipalities and water-boards (Bossidy and Charan, 2002). Managers of these organisations that are responsible for provision of water and services should understand the water business, its customers i.e., the public and the dynamic environment of operating environment of local government, as the first contact between government and its people (Bryan and Joyce, 2007 and Goleman, 2007). Designing functions of municipalities and water-boards in the 21st century requires understanding and appreciation of continuously changing expectations of the public, technological advancement, and litigious environment that modern society lives in (Bryan and Joyce, 2007; Ehlers and Lazenby, 2007 and Goleman, 2007).

7. Study limitations and future research

Studies of this nature require more time to look at other factors that might influence financial viability of water-boards, except vulnerability index of the municipalities. Due to time limitations, it was not possible to consider other factors in this current study. It is therefore important for further research to investigate other factors such as governance structure of water-boards at all levels including the environment where municipalities are operating in.

Water and sanitation services infrastructure asset management is without doubt one of the most critical issues in South Africa for future research – sustainability is being seriously

compromised as there is little or no asset management currently being practised by municipalities resulting in further dilapidation of water and sanitation infrastructure. The provision of Asset Management Plans (AMPs) is also a legal requirement. Municipalities are at the forefront of government's drive to eradicate all basic services backlogs and the initial focus has been on infrastructure backlogs, which remain a huge challenge. However, the challenge to effectively manage, repair, rehabilitate, replace, operate, and properly maintain water and sanitation services infrastructure is growing in magnitude and therefore is one of the areas where future research must focus on. Universities and other tertiary institutions must support local government institutions with development of skills and more importantly take the problems facing municipalities as case studies for postgraduate students.

Postgraduate students could do projects relating to the development and application of appropriate asset management systems in the water and sanitation services areas. The use of appropriate technology and solutions in water services and sanitation programmes in line with water use efficiency thrust is another important area for potential postgraduate students. Solutions to be researched can be developed in the form of best practice that would lessen a burden on national government providing social grants and those solutions may include rainwater harvesting, trickle feed system, etc. This will require partnerships with organisations such as Department of Science and Innovation, the Council for Scientific and Industrial Research and Water Research Commission. Further research may also look at creating platform to collate data for water and sanitation services planning purposes for new cities of the future.

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9. Appendix

Table 6. Financial data input worksheet for Water-boards

Water-board	Field in the financial statement	Fiscal years (R ,000)				
		2018	2019	2020	2021	2022
Rand Water	Operating Revenue	13 452 813	15 334 385	16 334 385	16 556 071	17 661 457
	Operating Expenses	1 661 070	2 058 708	2 776 201	2 242 129	2 413 177
	Depreciation & Amortisation expenses	83 851	96 188	74 759	74 568	77 360
	Debt Principal Payment	17 296	-	68 075	1 638 657	-
	Debt Interest Payments	-	-	-	-	-
	Current Assets	4 268 025	4 740 863	5 408 419	8 002 780	7 867 166
	Current Liabilities	3 227 990	3 225 024	3 390 904	3 699 584	3 748 400
	Unrestricted Cash	1 786 732	2 636 370	2 761 858	5 607 809	4 902 359
	Accumulated Depreciation	4 078 371	4 428 806	4 983 605	5 350 239	5 819 607
	Depreciable Capital Assets	20 920 836	21 926 704	23 780 304	26 602 366	28 342 495

Water-board	Field in the financial statement	Fiscal years (R ,000)				
		2018	**2019**	**2020**	**2021**	**2022**
Magalies Water	Operating Revenue	586 409	664 525	789 612	756 306	870 441
	Operating Expenses	123 250	184 080	170 904	190 327	242 949
	Depreciation Amortisation expenses	77 453	84 438	98 242	107 558	110 277
	Debt Principal Payment	-	-	-	-	-
	Debt Interest Payments	-	-	-	-	-
	Current Assets	414 234	476 523	540 258	817 422	1 032 701
	Current Liabilities	355 526	347 298	303 412	270 514	297 046
	Unrestricted Cash	117 592	142 321	177 247	421 324	465 206
	Accumulated Depreciation	634 770	727 085	825 129	924 346	1 029 371
	Depreciable Capital Assets	2 773 980	2 985 084	2 952 232	2 966 521	3 023 840

Water-board	Field in the financial statement	Fiscal years (R ,000)				
		2018	**2019**	**2020**	**2021**	**2022**
Umgeni Water	Operating Revenue	2 888 951	3 524 469	4 142 653	4 515 189	4 909 454
	Operating Expenses	713 578	996 429	1 580 715	1 672 522	2 022 769
	Depreciation & Amortisation expenses	296 056	338 337	404 770	422 433	113 783
	Debt Principal Payment	78 811	79 011	29 222	629 442	24 839
	Debt Interest Payments	204 877	198 355	190 493	186 245	126 320
	Current Assets	3 157 463	2 590 612	4 999 855	5 759 647	6 894 061
	Current Liabilities	947 249	997 082	1 827 700	1 102 787	935 009
	Unrestricted Cash	2 086 514	2 418 925	4 226 099	4 678 098	5 783 187
	Accumulated Depreciation	1 864 997	2 238 179	2 577 022	2 902 856	3 296 478
	Depreciable Capital Assets	9 180 251	88 070 694	8 870 566	8 838 146	8 970 671

Water-board	Field in the financial statement	Fiscal years (R ,000)				
		2018	2019	2020	2021	2022
Amatola Water	Operating Revenue	384 833	423 446	416 938	391 535	388 534
	Operating Expenses	190 658	138 268	172 282	176 827	219 008
	Depreciation Amortisation expenses	2 923	1 875	1 586	1 651	837
	Debt Principal Payment	-	-	-	-	-
	Debt Interest Payments	-	-	-	-	-
	Current Assets	612 563	858 877	760 562	702 160	504 306
	Current Liabilities	452 870	563 672	494 179	496 407	373 558
	Unrestricted Cash	376 331	639 955	523 951	417 510	252 445
	Accumulated Depreciation	239 073	253 835	1 853 303	1 730 470	1 770 143
	Depreciable Capital Asset	540 617	541 096	1 904 483	1 866 837	1 707 663

Water-board	Field in the financial statement	Fiscal years (R ,000)				
		2018	2019	2020	2021	2022
Bloem Water	Operating Revenue	911 266	956 824	1 038 972	993 928	1 000 645
	Operating Expenses	771 705	757 552	1 327 680	291 874	847 150
	Depreciation & Amortisation expenses	48 480	45 475	33 192	37 091	37 689
	Debt Principal Payment	42 161	40 461	37 881	41 886	38 686
	Debt Interest Payments	-	-	-	-	-
	Current Assets	424 863	551 590	214 836	796 454	865 943
	Current Liabilities	220 035	196 991	328 066	299 139	287 041
	Unrestricted Cash	228 118	436 627	91 071	218 853	453 565
	Accumulated Depreciation	868 614	913 110	944 917	981 431	1 014 079
	Depreciable Capital Assets	908 956	988 892	1 122 001	1 177 319	736 152

Water-board	Field in the financial statement	Fiscal years (R ,000)				
		2018	**2019**	**2020**	**2021**	**2022**
Lepelle Northern Water	Operating Revenue	541 943	561 140	599 579	598 616	689 655
	Operating Expenses	453 013	366 646	548 127	441 697	378 195
	Depreciation & Amortisation expenses	53 849	88 919	101 640	98 955	78 478
	Debt Principal Payment	-	-	-	-	-
	Debt Interest Payments	-	-	-	-	-
	Current Assets	990 204	1 046 065	1 089 215	1 008 175	1 232 673
	Current Liabilities	540 862	517 068	620 149	672 100	717 920
	Unrestricted Cash	37 090	52 230	88 000	129 953	134 876
	Accumulated Depreciation	1 203 355	1 312 710	1 458 073	1 582 519	1 696 928
	Depreciable Capital Assets	2 642 810	2 618 684	2 596 990	2 611 806	2 602 727

Table 7. MuSSA status of municipalities expressed as vulnerability index (extreme ≥ 0.75, high ≥ 0.50, moderate ≥ 0.25, and low < 0.25)

MuSSA Status (vulnerability index)						
Municipalities	**Average**	**2018**	**2019**	**2020**	**2021**	**2022**
City of Johannesburg	0.15	0.13	0.13	0.13	0.13	0.25
Ekurhuleni	0.23	0.25	0.25	0.25	0.25	0.13
Tshwane	0.40	0.25	0.25	0.50	0.50	0.50
Emfuleni	0.75	0.75	0.75	0.75	0.75	0.75
Mogale	0.55	0.50	0.50	0.50	0.50	0.75
Metsimaholo	0.65	0.50	0.50	0.75	0.75	0.75
Rustenburg	0.35	0.50	0.50	0.25	0.25	0.25
Govan Mbeki	0.65	0.50	0.50	0.75	0.75	0.75
Midvaal	0.55	0.25	0.25	0.75	0.75	0.75
Merafong	0.75	0.75	0.75	0.75	0.75	0.75
Randwest	0.40	0.50	0.50	0.25	0.25	0.50
Lesedi	0.65	0.50	0.50	0.75	0.75	0.75
Ngwathe	0.75	0.75	0.75	0.75	0.75	0.75
Victor Khanye	0.70	0.75	0.75	0.75	0.75	0.50
Royal Bafokeng	0.50	0.50	0.50	0.50	0.50	0.50
Madibeng	0.75	0.75	0.75	0.75	0.75	0.75
Thembisile	0.75	0.75	0.75	0.75	0.75	0.75
Bushbuckridge	0.35	0.50	0.50	0.25	0.25	0.25
Rustenburg	0.35	0.50	0.50	0.25	0.25	0.25
Thabazimbi	0.75	0.75	0.75	0.75	0.75	0.75
Moses Kotane	0.75	0.75	0.75	0.75	0.75	0.75
City of Tshwane	0.40	0.25	0.25	0.50	0.50	0.50
Modimolle	0.75	0.75	0.75	0.75	0.75	0.75
Bela Bela	0.65	0.50	0.50	0.75	0.75	0.75
Moretele	0.55	0.75	0.75	0.25	0.25	0.75
Ethekwini	0.40	0.25	0.25	0.50	0.50	0.50
Msunduzi	0.50	0.50	0.50	0.50	0.50	0.50
Umgungundlovu	0.60	0.50	0.50	0.75	0.75	0.50
Ugu	0.50	0.50	0.50	0.50	0.50	0.50
Ilembe	0.50	0.50	0.50	0.50	0.50	0.50
Harry Gwala	0.60	0.75	0.75	0.50	0.50	0.50
Siza	0.60	0.75	0.75	0.50	0.50	0.50
Uthukela	0.75	0.75	0.75	0.75	0.75	0.75
King Cetshwayo	0.50	0.50	0.50	0.50	0.50	0.50
Buffalo City	0.50	0.50	0.50	0.50	0.50	0.50
Amathole	0.60	0.75	0.75	0.50	0.50	0.50
Ndlambe	0.50	0.50	0.50	0.50	0.50	0.50
Joe Gqabi	0.50	0.50	0.50	0.50	0.50	0.50

MuSSA Status (vulnerability index)						
Municipalities	**Average**	**2018**	**2019**	**2020**	**2021**	**2022**
OR Tambo	0.50	0.50	0.50	0.50	0.50	0.50
Makana	0.75	0.75	0.75	0.75	0.75	0.75
Dr Beyers Naude	0.40	0.25	0.25	0.50	0.50	0.50
Koukama	0.70	0.75	0.75	0.75	0.75	0.50
Mangaung	0.65	0.50	0.50	0.75	0.75	0.75
Kopanong	0.75	0.75	0.75	0.75	0.75	0.75
Mantsopa	0.55	0.50	0.50	0.50	0.50	0.75
Ba-Phalaborwa	0.75	0.75	0.75	0.75	0.75	0.75
Capricorn	0.60	0.75	0.75	0.50	0.50	0.50
Greater Letaba	0.75	0.75	0.75	0.75	0.75	0.75
Greater Tzaneen	0.75	0.75	0.75	0.75	0.75	0.75
Fetakgomo	0.75	0.75	0.75	0.75	0.75	0.75
Makhuduthamaga	0.75	0.75	0.75	0.75	0.75	0.75
Marble Hall	0.75	0.75	0.75	0.75	0.75	0.75
Mogalakwena	0.65	0.50	0.50	0.75	0.75	0.75
Mopani	0.75	0.75	0.75	0.75	0.75	0.75
Polokwane	0.60	0.75	0.75	0.50	0.50	0.50
Greater Tubatse	0.75	0.75	0.75	0.75	0.75	0.75