

Water Availability Challenges in Low-Income Area of Caledonia Community, Goromonzi District, Zimbabwe

John Bowora¹, Kowanai Mhlanga¹, Deogracious Tanaka Muzota¹, Billy Ndimu¹, John Makambanga¹, Brain Kusotera²

1. Sustainable Development Department, Bindura University of Science Education P Bag 1020 Bindura-Zimbabwe

2. Maths and Statistics Department, Bindura University of Science Education P Bag 1020 Bindura-Zimbabwe

*jb.jbowora@gmail.com

Abstract

Sources, availability and challenges of potable water were studied in low-income area of Caledonia, Goromonzi District, Zimbabwe. A total of 450 pretested and randomly distributed questionnaires were used on adult respondents in the study area. Qualitative techniques used in data collection include Key Informant Interviews, Focus Group discussions, and Participant Observation. Statistical Package for Social Scientists and thematic analysis were used to analyze quantitative and qualitative data respectively. Findings indicate that water supply remains inadequate in the study area and residents resort to use hand dug surface wells as the major source of drinking water and hand dug deep well had 27% of the respondents. These water sources were located less than 50 meters from their houses and about half the respondents visit water bodies daily. The highest total rating of supply of water by the respondents was on “poor” supply (97%). Findings indicate that access to safe and reliable water is limited and unevenly distributed in Caledonia. Environmental pollution, water quality issues, hydrological failures, and unstable government policies were among the major problems to water provision and sanitation in the study area. Caledonia suburb is known for its poor socio-economic status and deplorable living conditions. This study enhances the understanding of useful contribution to the literature about improved methods for solving water and sanitation accessibility problems. The study strongly recommends effective strategies to curb the potential spreading of typhoid and cholera, as many water bodies in the area are contaminated by raw sewage.

Keywords: Access of Water; Sanitation; low-income; Caledonia; Goromonzi

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1. Introduction

There is a very close link between sustainable water supply, improved sanitation and positive hygiene outcomes, improved livelihoods, and high standard of living of the community (Bowora and Tagutanazvo, 2019). The vital role of water and related initiatives in fostering development and alleviating poverty has been supported by the United Nations (WWAP, 2019). However, although remarkable improvements have been made world-wide to improve safe portable drinking water and adequate sanitation (Zerbra et al. 2021). In Zimbabwe, approximately 12 million people are prone to diseases related to inadequate water provision and poor sanitation (Musemwa, 2021). In 2023, UNICEF pointed out that in Zimbabwe, diseases caused by water-related illnesses contributed to 80% of child mortality (UNICEF, 2023). Access to a clean water supply by UN standards must be available within 200 meters of households to meet essential needs (Yasmin et al., 2023). However, a substantial shortage of portable drinking water remains particularly in urban low-income communities. Some debates on the drivers contributing to inadequate provision of water and sanitation in urban areas have been discussed and such issues as settlement patterns, high population density, and challenging geographic or environmental conditions, lack of infrastructure including waste management systems, storm water drainage have been raised (Musemwa, 2021). It has been noted that in most low and middle-income countries, there is virtually no reliable information on who has safe drinking water; there are merely estimates of the percentage of the population (Mafuka, 2019). In urban areas of Zimbabwe, rapid population growth and migrations motivated by cultural, economic, political and environmental factors strain existing water infrastructures and create enormous problems in planning and construction new water infrastructure (Bowora and Siziba, 2020). Residents of many of the low-income cities and towns enjoy intermittent access to piped water of dubious quality and only from public taps at substantial distances from their homes. Others depend on water vendors from small volumes of costly water of unsure quality. Where providers cannot guarantee water quality at the point of supply, or where it cannot be guarantee at

the point of use, because of contamination during collection, transport, and storage, consumers face significant health risks (Bowora and Siziba, 2020).

Against the backdrop that the provision of water and sanitation is essential for meeting the sustainable development goals, Zimbabwe also embraced in 2030, (Bowora and Tagutanazvo 2019), this study assessed water availability and challenges in low-income area of Caledonia suburb located in the Goromonzi District, Zimbabwe. Although significant research has been conducted on global water and sanitation challenges, the specific conditions in the Caledonia suburb remain under-documented and poorly understood. This knowledge gap has prompted the current research, which aims to enhance better understanding on the underlying drivers contributing to water shortages in this low-income community. The outcomes of this study will inform improved strategies or solutions for tackling water accessibility challenges.

This paper is structured as follows; introduction, followed by statement of the problem, then aims and objectives, description of the study area, methodology, data analysis, results and discussions, conclusions and finally recommendations.

1.2. Statement of the problem

Although significant research has been conducted on global water and sanitation challenges, the specific conditions in the Caledonia suburb remain under-documented and poorly understood. This knowledge gap has prompted the current research, which aims to enhance better understanding on the underlying drivers contributing to water shortages in this low-income community.

1.3. Aims and objectives

The aim of the study was to assess water availability and challenges faced by residents in low-income area of Caledonia suburb located in the Gromonzi District, Zimbabwe as a case study. Specific objectives for this study are as follows:

- a. To determine the status of water availability in Caledonia community.
- b. To examine survival strategies during water scarcity.
- c. To identify sources of pollution and intervention efforts aimed at improving water access.
- d. To recommend based on findings.

2. Review of Literature: Insights derived and gaps identified

Water is key to urban life. Water availability, challenges and contaminated drinking water supply continues to cause a big problem for most urban residents all over the world (Bishoge, 2021). The current rise in population growth, urbanization and increasing demand in urban areas exceeding the water supply result in major problems to vulnerable people such as children, the elderly and the pregnant women who are susceptible to water borne diseases (Musemwa, 2021). This problem has been attributed to one of five leading causes of death among children under five years old (UNICEF, 2023).

The provision of adequate, clean and safe domestic water supply is one of the fundamental basic needs for human survival. Water availability challenges trigger some water borne diseases (Zinszer and Abuzerr, 2024). Access to adequate water supply means having enough water for personal and domestic uses of at least 50 to 100 liters of water/person/day from a safe source that is acceptable and affordable (i.e. cost of water should not exceed 3% of household income), and physically accessible (i.e. the water source should be within 1km of the home and collection time should not be exceed 30 minutes) (UN, 2012). The global response to the challenge of sustainable access to safe drinking water and basic sanitation has been included in specific water-related targets in the Sustainable Development Goals (SDG) number six. The goal aimed at reducing the number of people without sustainable access to safe drinking water and basic sanitation by 2030 for improved human health, development and well-being.

The global trend in access to improved water supply points out that in 2010, an estimated 89% of the world's population representing 6, 1 billion people had access to improved drinking water sources. The result of this is that, 11% of the world population representing 783 million people remains without access to an improved source of drinking water (UN, 2012). Literature have shown that, water supply coverage continue to be very low in Oceania and sub-Saharan Africa. This clearly indicates that these regions are far away to meet the SDG drinking

water target by 2030. Forty percent of the population in sub-Saharan Africa lack access to improved drinking water (Zebra, et al., 2021).

Reports have indicated that the gap between the urban and rural areas is growing big, with a number of rural communities' lacking access to improved water is five times greater than urban areas (UN, 2012). The problems of increasing coverage of piped water connection in urban areas are driven by demand, and supply factors. When considering the demand side, high connection fees are required amounting to about USD \$1 500-3 000, and buying of required items such as water meters and pipes add to some of the problems of household's inability to gain access to piped water connections. On the supply side, inadequate manufacturing capacity and lack of knowledge and experience of service providers hinders household access to safe water supply (Banerjee and Morella, 2011).

Water provision encompasses the supply of an adequate quantity while ensuring that good quality of vital resource for various use that include drinking and the municipal, the industrial, the agriculture and that of ecosystem, among others. Hence, its importance to supporting is very profound. Of all the sources of water, majority of the people living in cities and towns rely mostly on the ground water type because of its vast availability and affordability when compared to other sources (Bowora, 2019). While access to water supply improves health, it also has implications for a number of other development goals. According to Tazvinga (2020) problems of poverty are inextricably linked with those of water, - its availability, proximity, quality and quantity- and as such improving access to water could make a major contribution towards achieving the eradication of extreme poverty and hunger. Moreover, improved access to adequate clean water supply directly affects sanitation and hygiene and indirectly reduces mortality rate amongst the under-fives. Adequate clean water supply and good sanitation are essential ingredients to sustenance and development of human life (WHO, 2025). This is recognized globally as reflected in the recent adopted sustainable development goals in which 'goal six', SDG 6 calls for ensuring the availability and sustainable management of water for all by 2030, but water's significance goes further. In spite of that, however, the availability of adequate clean water and improved sanitation remains a big challenge facing the ever-increasing human population, especially in cities and towns (Tazvinga, 2020). In fact, lack of proper water supply and sanitation conditions results in an annual diarrheal death rate of almost one million people globally. Also, it hinders efforts towards the effective prevention and management of other diseases including malnutrition and cholera (WHO, 2025). As a measure that is undertaken to protect the environment and public health, sanitation encompasses solid and liquid waste management as well as other vector control undertakings. Therefore, progress in sanitation and hygiene greatly improves public health. It is well documented that many people still lack access to adequate means of disposing wastes (UNICEF/WHO, 2014). This is a call for concern, especially in many populated areas or less developed areas such as Caledonia Community Suburb, by increasing the risks of infectious diseases and other public health hazards to the most vulnerable groups of people like children, the elderly and people with low immune systems (Bowora and Siziba, 2020).

In Zimbabwe, local authorities are key players in planning and implementing general urban activities including water supply (Tazvinga, 2020). City councils buy raw water from the Zimbabwe National Water Authority (ZINWA) (GCC, 2019). They are mandated to treat the water and supply it to residents in potable form, mainly for domestic purposes without considering other activities such as agriculture (Bowora and Siziba, 2020). Despite numerous efforts and strategies taken by many governments, and the local councils to improve on the provision of portable water supply the majority of the population continue to lack access to improved water sources. The current condition is more problematic and worse in urban areas (WHO/UNICEF, 2023).

Zimbabwe, for example, is far away to achieve the SDG targets of coverage for safe drinking water by the year 2030. Various researchers have carried out studies on water across the globe. For instance, Chimezia et al (2020), examined the water sources, availability and accessibility of Portable Water in Imo State in Nigeria. Ohwo and Abotatu (2014) looked at access to Portable Water Supply in Nigerian Cities. Iduseri et al (2021), examined the access to safe drinking Water in Developing Countries and Adetunji and Onyenje (2022), looked at the accessibility to Portable Water Supply and Satisfaction of Urban Residents in Lokoja in Nigeria. Bowora and Siziba (2020) investigated some alternative water supply in peri-urban localities in Harare Eastern District suburbs in Zimbabwe and Brook and Fenner (2019) examined ways of improving urban water management and building water resilience in Harare city, Zimbabwe.

However, despite the vast literature on access to water supply, there is very little on the knowledge of water availability challenges, status of water sources and sanitation in most urban areas in Zimbabwe. Urbanites in low

income towns and cities usually rely on wells for water to cater for drinking and other domestic chores such as bathing and laundry. Despite investments undertaken by private players and non-governmental organization to ease the situation, water availability and accessibility remains a challenge (Kosoe and Osumanu, 2015). Hence the need to investigate water availability and challenges faced by residents in low-income area in the case of Caledonia high density suburb in Gromonzi District of Zimbabwe.

2.1. Conceptual framework

Water concept

Water is essential for human existence. It is used for varying degree of purposes including drinking, cooking and washing (Bowora and Siziba, 2020). Water is one of the most essential ingredients that we cannot do without. It is essential for plants and animals as well as cultivation of crops (Zinszer and Abuzerr, 2024)

Water is fundamentally linked to human health and is widely considered a more basic necessity than other essentials of life (Ahmed et al., 2022). A consistent and available supply is critical, as it is a primary constituent of protoplasm and is indispensable for key physiological and biochemical functions within the body (Akoteyon, 2019). This is underscored by the fact that while humans can survive without food for approximately 28 days, they can survive for only about three days without water (Bishoge, 2021), beyond which, survival is complicated. To meet basic needs, excluding external uses like garden watering, it has been suggested that households require a minimum of 50 liters per person per day (Brooke, 2023). The water we consume is vital for cellular function and volume regulation, and a reduction in daily intake can impair cellular efficiency and broader bodily processes (Budhathoki, 2019). Consequently, access to water for drinking and sanitation is of significant social and economic importance, as public health directly influences all other societal activities (Danila et al., 2020).

Beyond its life-sustaining role, water is linked to issues of sanitation (Zerbra et al., 2021). Sanitation deals with public health-related. It is a condition that is closely linked with clean water meant for drinking and other industrial and domestic purposes (Oxford Dictionary, 2017). Sanitation can also be seen as a process of preventing human contact with feces. Therefore, water also poses a substantial risk for disease transmission when contaminated (Fotio, 2022). Adequate provision for clean water and safe environment helps in the reduction of disease transmission, particularly through the fecal-oral route (Oxford Dictionary, 2017). Sanitation and cleanness go hand in hand for the good health of all and socio-economic development (Mafuka, 2019). The availability of facilities and services for proper disposal of human urine and excreta is simply linked to environmental hygiene, but areas filled with human excreta need to be kept clean at all times in order to keep flies and vectors away (UNICEF, 2025). Apparently, improper disposal of waste on land has been reported to have severely polluted water sources (Bowora and Siziba, 2020). Toxic chemicals can leach through the soil and contaminate groundwater, creating a serious public health hazard (McMichael, 2019). Chirisa et al (2019) lament that in Zimbabwe, improper disposal of hazardous industrial and domestic waste has had dire consequences not only for human populations, but also for aquatic ecosystems. This shows how human populations make water a primary medium for spreading enteric diseases.

2.2. Theoretical framework

The study's theoretical framework is grounded in the Sustainable Livelihoods Framework, an analytical structure originally formulated by the UK's Department for International Development (DFID) in 2001. This framework enables communities to assess themselves by looking at how members within the community have the ability to mobilize assets to mitigate disasters such as shortage of water supply and draught to improve their livelihoods (Natarajan et al., 2022; Ndimo et al., 2025). Major inputs of the SLF, such as human, physical, social, natural and financial capital, (DFID, 2001) are essential to comprehend how water and sanitation issues affect the lives of the people. For example, inadequate water supply affects human capital through diseases, resulting in health decline for the members of the community and this reduces physical capital by negatively impacting already on fragile infrastructure. Using this framework enhances the understanding of coping strategies or possible pathways for improving adaptation methods at the household level. Therefore, this framework is essential for enhancing an understanding about analytical foundation for formulating effective policies aimed at reducing poverty and sustainable development projects and programs in emerging economies.

3. Methodology

3.1. Description of the study area

The study site was conducted in Caledonia community, a low-income suburb situated in Goromonzi Rural District, Zimbabwe. Caledonia suburb has four wards, namely, ward 9, 14, 21 and 23 (Bowora and Siziba, 2020). Fig 1 shows the location of these wards.

Caledonia is 20 km eastwards from Harare City, on the eastern border of Mabvuku and Tafara suburbs. The settlement comprises of formal and informal settlement (Mafuka, 2019). The first people to settle there were relocated from other areas in Harare, following a large-scale displacement orchestrated by ‘Operation Murambatsvina’ in 2005, which led to the displacement of thousands of people (Bowora, 2016). As the settlement grew, it developed informally with residents building makeshift homes or shacks with limited access to amenities, such as clean water, sanitation and electricity (Bowora and Siziba, 2020).

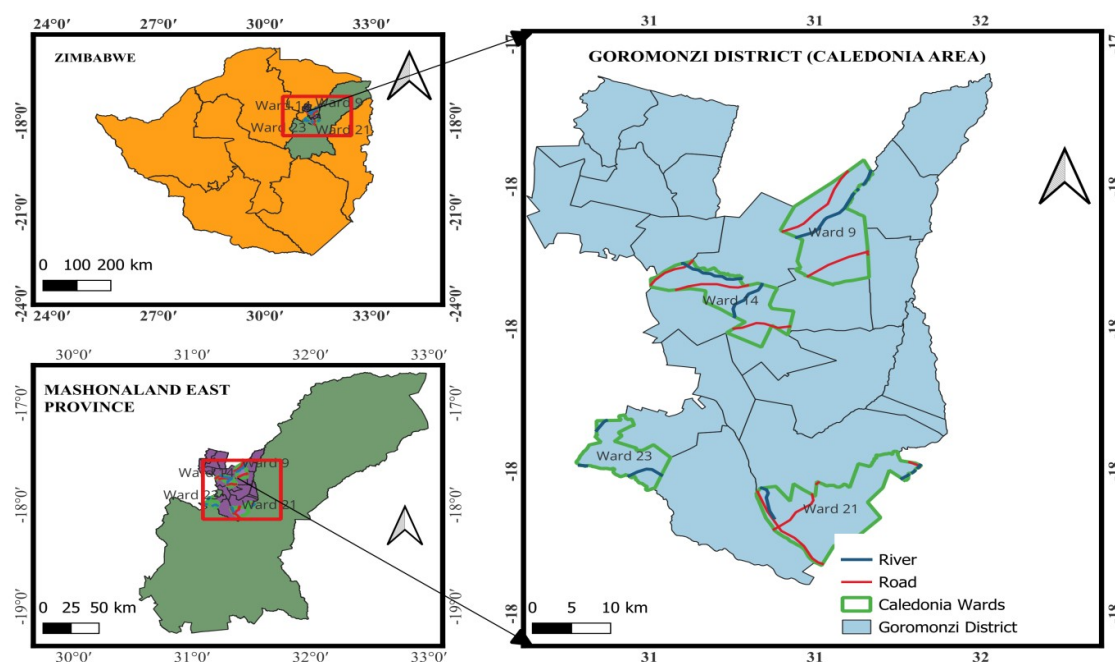


Figure 11: Study Area (Source: Researchers 2025)

Caledonia suburb is under the jurisdiction of the Goromonzi Rural District Council which is responsible for providing municipal services such as water, sanitation, roads, and waste management to the residents (Mafuka, 2019). The area is expansive, as it incorporates suburbs such as Eastview and is densely populated and lacks adequate water supply and sanitation infrastructure (Bowora and Siziba, 2020). The community is characterized by high levels of unemployment, poor living conditions, limited access to adequate and affordable safe water supply, basic sanitation services and economic poverty (Mafuka, 2019). The people live in hostile conditions engaging in environmentally degradation, livelihoods such as digging deep and shallow wells for water supply, as well as stream bank cultivation has been a common feature of life in Caledonia in recent years (Bowora and Siziba, 2020).

3.2. Methods of research design and sampling

The research employed a mixed-methods design, combining the collection and analysis of both qualitative and quantitative data. A purposive sampling method was used. Four hundred and fifty households were selected, with sampling in areas experiencing severe water supply challenges. Two individuals aged 18 or older were randomly selected from these households in order to provide data on primary water sources, water collection time, and water treatment methods. Purposive sampling method was also done to pick up influential people. For

example, two officials from the Goromonzi Rural District Council, 3 officials from Local Community Groups representing each suburb, 3 Voluntary and Community Sector Organizations (VCS), 3 Secretaries from Women’s Groups, and 3 Community Leaders participated in the study. The interview sought to extract more information on the work of voluntary groups and women’s groups regarding status of water availability, quantity and quality of water and treatment of water. To assess the validity and reliability of the research instruments, 10% of participants from the Epworth area, a nearby suburb were included in a preliminary analysis.

3.3. Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistical techniques were applied to the collected data, including the calculation of frequencies, percentages, and the creation of tabular and graphical summaries. Measures of central tendency and dispersion such as means, standard deviations, and skewness were computed for relevant variables. Additionally, the Pearson’s Product Moment Correlation analysis was used to evaluate the strength and direction of relationships between key factors.

3.4. Ethical considerations

Certain ethical issues were considered in this study. Firstly, the respondents in the survey were voluntary respondents, there was no use of force or threats to get information. The questions were designed in such a way that a letter of introduction of the study and researcher preceded the questions. The letter showed the identity of the researchers, as well as the intendment of the research, leaving the participants with the choice to either answer the questions or decline. In order to guarantee confidentiality, the questionnaires were designed in such a way that the respondents did not indicate their names and specific addresses but community names were used. The questionnaires were designed in such a way that options or possible answers were presented to the respondents to choose from and tick as appropriate.

4. Results and Discussion

Socio-Demographic Characteristics of informants

Table 1: Socio-demographic distribution of respondents

Gender	Frequency	Percentage
Male	228	48%
Female	252	52%
Total	450	
Marital Status of Respondents		
Single	242	54%
Married	160	35%
Divorced	48	11%
Total	450	
Level of Education		
Primary Education	310	69%
Secondary Education	110	24%
Tertiary Education	30	7%
Total	450	
Employment Status		
Yes	120	27%

No	330	73%
Total	450	
House Types		
Single room	320	71%
Room and parlor	130	29%
Total	450	
House Ownership		
Self	325	72%
Rented	125	28%
Total	450	

Source: Researchers Field Data (2025)

The case study sample as illustrated in Table 1 shows that in total 52% were female-headed households and 48 % were male-headed households. Gender distribution indicated fair representation from both males and females. On marital status 54% of respondents were married, 35% were single and 11% were divorced. The finding that the majority of the respondents were married is crucial in providing insights into the social, economic, and cultural fabric of the society.

In terms of education, the study found that most of the respondents (69%), have completed secondary education. This may mean that there is a positive relationship between high levels of literacy and propensity to modernize. This also means that respondents gave crucial feedback on the water challenge phenomena.

Table 2. Household size, age of respondents and monthly income

Domain	Minimum	Maximum	Mean	Standard Deviation
Age of Respondent	20	56	33	10
No of children per household	2	10	5	3
No of adults per household	5	20	9	4
Monthly Income (\$USD)	50	100	66	33
No of individuals per household	11	30	16	5

Source: Researchers Field Data (2025)

As detailed in Table 2, the average monthly income stood at \$66, while the mean number of residents per household was 16. Clearly, there is a mismatch between income and the number of occupants per household. The food poverty line as for the first quarter stands at \$29 in Zimbabwe (ZIMSTATS, 2025). This puts a lot of strain on government subsidized amenities as residents do not have enough income to seek for alternative water solutions.

Status of Water Availability in Caledonia Communities

Table 3. Status of Water Availability

Variable	Domain	Frequency	Percentage
Resides in Caledonia	Yes	32	7%
	No	402	89%
	Cannot say	16	4%
Total		450	100%
Household Access to Water Rating	Fair	15	3%
	Poor	435	97%
Total		450	100%
Factors Responsible for Scarcity	Dry Season	252	56%
	High Population	95	21%
	Lack of finance	59	13%
	No nearby source	44	10%
Total		450	100%
Regular Water Supply Source	Shallow Well	291	65%
	Deep Well	123	27%
	Borehole	36	8%
Total		450	100%
Dryness of Water Sources	Yes	422	94%
	No	20	4%
	Cannot say	8	2%
Total		450	100%
Duration of Dryness	Never	8	2%
	1 Week	10	2%
	A Fortnight	32	7%
	2 Months	98	22%
	4 Months	302	67%
Total		450	100%

Source: Researchers Field Data (2025)

Survey findings revealed a significant lack of adequate water for the community in the study area. In Caledonia suburb, 89% of respondents indicated they had insufficient water, and 97% reported very low household-level water availability (Table 3). Survey results highlighted that water scarcity was a major problem, 56% of the

respondents said that it was caused by seasonal drought, while 34% generally agreed that due to high population pressure and low income as contributing factors. Data from Focus Group Discussions and interviews it emerged that households alternatively rely mostly on hand-dug wells located within their plots. Reliance on these sources of water which often dry up during the winter dry season was not a permanent solution. The period of water shortages experienced by the residents was not the same but differ widely, as from as little as one week to four months, a point expressed by 67% of respondents.

Survival Strategies during Scarcity and Quality of Available Water

Table 4. Survival strategies and quality of water

Alternate Option During Dryness		
Domain	Frequency	Percent
Trek long distances	35	8%
Beg for water	8	2%
Buy borehole water	10	2%
Drill the well again	264	58%
Fetch from a nearby house	86	19%
Take tap water from the community center/church	52	11%
Total	450	100%
Suitability of Drinking		
Yes	22	5%
No	428	95%
Total	450	100%
Alternate options for getting drinkable Water		
Buy from vendors	125	28%
Buy Borehole Water	325	72%
Total	450	100%
Water Treatment Methods		
Boiling	329	73%
Using Tablets	121	27%

Total	450	100%
Frequency of treatment of Water		
Not treated	372	83%
Once in a month	11	2%
Twice a month	15	3%
Once in 2 months	20	4%
Twice a year	32	8%
Total	450	100%

Source: Researchers Field Data (2025)

Interviews and discussions revealed a consensus that residents seek alternative sources to manage water shortages. From the study, 58% of respondents indicated that they deepen their existing wells to reach deeper aquifers, and 30% indicated that they source water from nearby residences or churches (Table 4). The coping mechanism is captured by one of the residents who said: *When wells dry, we extend the depth to reach where there is water.*

Findings also indicate that 95% of the area's water is unsafe for human consumption. This necessitates dependence on purchased water, with 28% of the community buying sachet water and 72% purchasing borehole water for drinking. Interviewed Community Leaders and Voluntary Community Sector Organization officials revealed that households rely on boiling method for water treatment for drinking and household use untreated water for cooking. 27% of the respondents cited that they use tablets to treat water indicating just a fraction of the community.

Environmental Challenges, Contamination of Water Sources and Intervention Efforts

Survey results indicated that inadequate waste disposal practices are the predominant source of water pollution in the suburb, a view held by 75% of respondents. Among the specific contaminants, human waste was cited by 15% of participants (Table 5). From focus group discussion and key informant interviews it emerged that Community Leaders and Voluntary Community Sector Organizations are trying their best to bring sanity in the area, however the Goromonzi Rural District Council is doing little or nothing to improve the area with regards to improving water management and building water supply resilience to urban communities.

Table 5. Sources of pollution and intervention effort aimed at improving water access

Source of Contamination	Frequency	Percent
Waste disposal	336	75%
Near-by drainage	47	10%
Human waste	67	15%
Total	450	100%
Efforts of Community Leaders		

Yes	252	56%
No	198	44%
Total	450	100%
Efforts by City of Harare/Government		
Yes	152	34%
No	298	66%
Total	450	100%

Source: Researchers Field Data (2025)

Quantity of Water needed and Obtainable in Caledonia suburb

Table 6. Household demand and quality obtainable

	Minimum	Maximum	Mean	Std. Deviation	Skewness Percentage
	(Liters)	(Liters)	(Liters)	(Liters)	
Eastview					
Household demand per day	80	200	152.24	42.95	0.85
Quantity obtainable per day	50	160	105.75	33.94	-3.03
% obtainable per day					69

Source: Researchers Field Data (2025)

Table 7. Showing the Pearson Correlation Coefficient, r , between household's water demand per day and quantity available

	House water demand per day	Quantity obtainable per day
House water demand per day	1	
Quantity obtainable per day	-0.948***	1

*** Significance at 1%

Source: Researchers Field Data (2025)

According to key informants, the volume of water acquired by households fell considerably short of demand and failed to meet user expectations. Service levels were reported to be poor across residential areas, with peri-urban and low-income communities having minimal access to formal municipal water. Data shows that only 69% of the total water needs is currently being satisfied, based on a comparison of average daily household needs against the average daily quantity actually obtained (Table 6).

A Pearson correlation coefficient statistical examination was performed to assess the association between daily household water needs and actual water acquisition. The analysis produced a correlation coefficient of -0.948,

significant at the 1% level. This strong negative correlation confirms a close relationship between the two variables (Table 7). It means the variables are moving in opposite directions, thus water supply is getting less whilst the demand is increasing. These findings are further buttressed by results in table 6. The mean household demand is 152.24 litres and the skewness for the variable is 0.85. A combination of positive mean and positive skewness indicate that the variable is increasing per day. The average quantity obtainable per day is 105.75 litres and the skewness is -3.03. A combination of positive mean and negative skewness indicate that the variable is decreasing per day.

Discussions of findings

The researchers were motivated by the need to investigate issues of water availability in Caledonia, a low-income suburb in Goromonzi District. The study sought to find out the gap between the community's water demands with the actual water supply. The study area has a long history of water shortage. This is supported by survey results which indicate that residents have insufficient access to water, with only 69% of the demand being met. Residents relied on primary water sources such as surface and deep wells, which dry up regularly for periods as long as four months. Residents also track long distances to source water. Water scarcity was as a result of seasonal variations (56%) and overcrowding (21%). The community showed typical low-income status, including slum high household density, low earning potential (with many living on less than \$4 USD per day), low job security, and frequent job changes. Of concerning was that very few (28%) can afford to purchase water. These showed that they rely on sachet water, while others purchased borehole water for consumption. Unfortunately, their primary source of water is unsafe for drinking because it is contaminated. Domestic waste disposal was identified as the major cause of water pollution (75%), followed by human waste (15%). Despite efforts from community leadership, 66% of respondents indicated that the suburb continues to face significant challenges rooted in poverty, limited access to basic services, and inadequate water infrastructure. This finding resonates with those of Bute et al. (2023) who have attributed the declining availability of safe drinking water to rising global temperatures caused by climate change, an issue that adversely affects nations across multiple dimensions.

However, the challenge of water extends beyond quantity caused by dry spells to include quality. Furthermore, heavy rains cause wastewater and surface runoff to contaminate these wells, degrading water quality and facilitating the spread of water-borne diseases. Similarly, Ahmed et al. (2022) note that climate-induced floods and droughts increase communities' vulnerability to contamination of water infrastructure.

Conclusions

Prevailing social-economic conditions across the study area and the growing population exacerbates the water shortage underscores the need for urgent solutions. Effective strategy requires addressing both water scarcity and quality simultaneously. To attain clean safe drinking water the World Health Organization (2022) and UNICEF (2023) posit that providing piped water, protecting wells, and springs can address the challenges of water. The research also highlights the critical need to mitigate pollution from domestic and human waste. The reuse of water offers a practical approach to mitigate scarcity, as supported by evidence from the World Water Assessment Programme (WWAP, 2019). Treated, non-potable reclaimed water, for instance, can be repurposed for agricultural irrigation, industrial applications, toilet flushing, and vehicle washing.

Recommendations

1. This study recommends the adoption of water reuse practices in the region.
2. Furthermore, it is essential to manage uncontrolled urban expansion and promote water conservation awareness and behavior among consumers.
3. There is a clear need for the Goromonzi Rural District Council, Ruwa Local Board, national government, and water agencies to implement efficient policies and provide universal, safe, affordable water to improve these figures sustainably.
4. To address scarcity, the research prioritizes the improvement of water infrastructure.
5. It also recommends integrating water conservation and efficient usage as fundamental components of sustainable water resource management.

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