



# Implications of the Urban Water and Food Systems Governance Nexus for Household Food Security in the City of Gweru, Zimbabwe

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## Abstract

Innovative water governance practices are essential to achieve sustainable cities through robust public policies and stakeholder engagement. This study assessed the dynamics of water service delivery in Gweru and its impact on household food security. The study focused on the city's food sources, water service pricing, power struggles in decision-making, and the implications for household food security. A household survey was conducted with 489 respondents selected by stratified random sampling. Interviews with purposively enrolled key informants and observations were also used. Findings revealed a multi-faceted scenario of water governance challenges that crippled household food security. Food purchases and farming, the primary household food streams for the city, were under threat due to water shortages and high monthly water bills. More than 90% of household incomes were below the Poverty Datum Line and the Total Consumption Poverty Line; water bills accounted for a significant portion, ultimately causing food insecurity. The grant-aided municipality emphasized revenue collection to mitigate the central government's 2013 debt cancellation. Gweru had no useful alternative sources of water for agriculture. The existing water governance failed to capture the complex symbiotic relationship between the city's water and food availability. While we advocate minimal central government interference, the municipality must introduce an efficient dual-purpose water system to protect residents, the natural environment, and the local authority's finances.

**Keywords** Water governance · Food security · Water bills · Political interference · Sustainable cities · Gweru

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## Introduction

Most water crises are governance-related, and thus efforts have been made to understand the multisector uses, improving capacity, transparency, and integrity of its management. Water is essential for food security, defined as regular access to enough high-quality food to lead active, healthy lives. As water is a key aspect of food security, a lack can be a significant cause of famine, undernourishment and poverty in the Global South. Therefore, it is essential to manage it wisely to achieve food security and reduce poverty. Water governance means the administrative, political, and economic systems that influence water and its management; essentially, who gets how much water, when and how, at what cost, and who has the right to water and related services and their benefits.

Gweru's vision is to become a sustainable, prosperous city of choice by 2030. The city pledges to provide quality services to its residents through all the fundamental attributes of good governance. The city's resolution resonates with the scheduled Sustainable Development Goals, which include zero poverty (SDG 1), ending hunger and food insecurity (SDG 2), and ensuring water security (SDG 6). These goals are closely interlinked, and achieving them depends on governing processes that are participatory, transparent and innovative (United Nations, 2018). Water and food issues are not only interdependent; they also affect people's livelihoods (Gebre & Gebremedhin, 2019). The interrelatedness and interdependencies between water, food and sustainability call for a nexus approach. A famous example is the 2011 Bonn nexus conference on water, energy, and food. However, due to the small-scale nature of food production in Gweru, this study narrowed the nexus scope and focused on water and food only.

In assessing the level at which current water service delivery acknowledges and fosters the cross-sectoral relationship between water and food in Gweru, the question is how well the city's water governance practices have incorporated social changes, including the economic situation. Therefore, this study focused on the city water supply capacity; the billing and cost recovery system; the political environment that influences decision-making and policymaking in the nexus; and the implications of these factors for household food security in terms of buying power and direct food production at the household level in Gweru.

## Literature Review

Dominant approaches, such as integrated water management, were seen as too narrow and inadequate to respond to emerging global economic and food crises (Weitz et al., 2017). In response, the 2011 Bonn conference emphasized the nexus between water and food (United Nations, 2014; Endo et al., 2017). Although the relationship between water and food is more evident in rural settings (Olschewski, 2013; Malinga et al., 2017), urban environments in the Global South rely increasingly on available water for household food security through farming

(Battersby & Haysom, 2020; Mbiba, 2014). The strong emerging relationship between urban water and household food security can affect urban water service resilience, and sustainability requires sound governance acumen (Niasse & Varis, 2020). As defined at the World Food Summit of , 1996 and still the working definition, food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Ingram, 2020). At the household level, food security is the ability to secure (by either production or purchase) adequate food to meet the dietary needs of all members of the household (Ham, 2020; FAO, 2015). However, the vulnerability of urban populations to food insecurity is growing (Battersby & Haysom, 2020; Niasse & Varis, 2020).

In Zimbabwe, local authorities are the key players in planning and implementing general urban activities including water supply (Tazyivinga, 2020; Zhanda, 2018; Wekwete, 1988). City councils buy bulk 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 (Mapfumo & Madesha, 2014). On the other hand, ZINWA takes care of water supply in rural areas. This arrangement creates a gap in the supply of agricultural water in cities.

The bond between urban food production and urban planning was previously devalued (FAO, 2020; Binns & Nel, 2020). The assumption is that food is always available in cities and is easily accessible at markets. However, the available evidence is that a significant part of Zimbabwe's urban population is currently food insecure because of soaring food prices (Mangwanya & Manyeruke, 2019; Tawodzera & Chigumira, 2019). Incomes have reached unprecedented levels of unreliability, with paydays and the value of salaries changing every month, particularly in civil service departments (Kusena & Beckedahl, 2016; LEDRIZ, 2016). Zimbabwe's economic crisis since 2000 has resulted in high unemployment, causing poverty that manifests itself in household food shortages due to lack of buying power even when food is available in supermarkets (Ndlovu et al., 2020; ZimStat, 2015; Mudzengerere, 2012). The situation was exacerbated by the COVID-19 pandemic, which halted or slowed several informal economic activities that most households depend on for their livelihood (FAO, 2020). Therefore, efforts to provide food for families have given momentum to historically shunned urban farming activities (Chandran, 2020; Chihambakwe et al., 2018).

Urban agriculture relies on resources located within and around the city (Binns & Nel, 2020). Farming for subsistence falls under primary water use (Government of Zimbabwe, 1998), which is permissible depending on a city's bylaws. It must be noted that, while urban agriculture is widespread in Zimbabwe, it is largely rain-fed and dominated by the production of maize as the staple crop (Lunduka et al., 2019; Dube et al., 2021). Urban residents use water to grow vegetables throughout the year, which is why the urban water supply is critical during the intervening dry periods. However, in Gweru the city council regularly imposes severe water rationing during droughts (Kusena & Beckedahl, 2016). This is in line with the Urban Councils Act (Chapter 29:15) (Government of Zimbabwe, 1984), which allows for emergency water rationing. Providing water for a growing urban population is a

problem experienced by many water supply utilities in different parts of the world (Akhmouch et al., 2018). However, the effects are more severe in developing countries where social security is limited (Nhapi, 2009).

Water is regarded as an economic good even in impoverished societies. Beard and Mitlin (2021) suggest striking a balance revenue generation and affordability, because treating water as an economic good would exclude others from this vital resource. It is argued that water must be provided as both a financial and a social imperative (United Nations, 2016). SDG 6 calls for ensuring the availability and sustainable management of water for all by 2030, but water's significance goes further. The United Nations World Water Development Report of 2016 demonstrates that water is related to several other SDGs (United Nations, 2016), and neglecting the water and food nexus can have a catastrophic impact on livelihoods.

Acknowledging the water and food nexus in emerging cities and the related environmental realities, Namibia's government embraced a dual water system that considers citizens' financial and social vulnerabilities. Windhoek installed a dual-pipe system in the early 1990s to irrigate sports fields and public facilities with lower-quality treated water instead of potable water (Van Rensburg, 2016), in the process protecting citizens' disposable incomes and the cost of water production. Although the water supply in Windhoek remains uncertain, reusing non-potable water has saved the day in previous years. Several other dual water reticulation systems have been implemented in response to increasing water demands and decreasing fresh-water availability in many settlements across the world, such as in Japan, Australia, China and South Africa (Ilemobade et al., 2009). The Namibian example stands out in terms of the time of inception and consistency of implementation. During the Municipal Development Programme, the central government of Zimbabwe and local authorities admitted a crisis in urban food security (MDP, 2002).

Nonetheless, there is no proper national policy and legislative framework governing urban farming (MDP, 2002), particularly water provision. Water supply for urban agriculture remains in the pipeline; several recommendations have been made without adequate evidence of sustainable implementation on the ground (RUAF, 2010). However, there is a growing trend of food production on allotments due to Zimbabwe's national economic crisis (Ndlovu et al., 2020; Mudzengerere, 2012). Given this background, local authorities have reluctantly allowed urban agriculture without revising the restrictive bylaws. Cities sometimes embark on water management measures, including water cuts, disconnections for non-payment or demand management. However, there is limited information on the effects of the city's existing water governance on the struggling residents' food supply system (Tawodzera et al., 2016).

The symbiotic relationship between city water and food (FAO, 2015; Toriro, 2009) can create environmental vulnerabilities and household insecurities if not managed well. Although urban agriculture is not new (RUAF, 2006), its practice within the confines of cities that do not acknowledge the bond between city water and food production is problematic and may affect livelihoods. Emphasis in urban agriculture has been on legitimising cities' practice, with a right to use the available land equitably (Ngoga & Delbridge, 2020; Pham Thi et al., 2021). Most local authorities have bylaws concerning land distribution for formal activities but remain

vague on water supply. The role of socio-economic factors in city water consumption and food production is under-researched (Gondo et al., 2020). Rainfed agriculture has been severely affected by climate change (Frischen et al., 2020); rainfall cannot sustain all-year-round food production in cities. This implies that any form of local government planning and facilitation of urban agriculture for household food security should seriously consider water supply sources.

## **Administrative Structure and Water Supply Governance in Urban Zimbabwe**

Zimbabwean local authorities have operated with delegated powers over water governance since independence (Wekwete, 1992; Kusena & Beckedahl, 2016). The Ministry of Local Government, Public Works and National Housing is responsible for the decentralization of designated powers and responsibilities from central government to lower-tier structures. As the central government retains broad powers of control over local authorities, the operations of local governments are expressly delegated by the central government. Although the day-to-day operations are run by council staff, they are headed by a town clerk whose employer is the Ministry of Local Government. All urban council departments are supervised by directors who assist the town clerk to run the council (Mapuva & Takabika, 2020).

On the other hand, councils have ceremonial mayors who head council policy. However, the mayor (one of the elected councillors to represent residents) is part-time and is only responsible for chairing meetings of the full council, which sits at the invitation of the town clerk. The mayor is ceremonial and has no powers to suspend directors or town clerks for misconduct except with the approval of the minister. Councillors are elected and sit on various committees to receive reports and recommendations from council management. The Minister of Local Government has the final authority to review and fix rates for many types of revenue, including public utility tariffs and council housing rents. The council budget is not valid unless approved by the minister. As such, the ministry screens all the major projects conducted by urban local councils. The powers of the minister are justified as an attempt to protect the interests of poorer residents. Residents also mobilize themselves into different civil society groups that lobby for efficient and affordable urban services (Kusena et al., 2017).

However, regardless of the designated powers, there is a history of the central government's pervasive politicization of most decisions affecting the municipal provision of water and sanitation in the country's cities and towns (Musemwa, 2008). Although the urban local governments have various streams of revenue, grants are usually the major source, provided by the central government and disbursed through the ministry. A substantial portion of these funds is disbursed as loans rather than grants. All significant capital expenditure projects such as water and housing schemes involve the central government. Acknowledging the availability of information on the existence of urban agriculture and water supply challenges in Zimbabwe, this study addresses a gap in the existing literature concerning household food security implications of the relationship between urban water and food, using the city of Gweru as a case study.

## Study Area

The study was carried out in the city of Gweru, Zimbabwe, the country's fourth-largest city. It is located south of the capital, Harare (Fig. 1). The city lies on Zimbabwe's central watershed, which stretches from Rusape through Harare to Bulawayo, and lies at about 1 422 m above sea level. Gweru has a total population of 158 233 (ZimStat, 2012).

Most Gweru residents are involved in informal activities that include vending, running flea markets and tuck shops, cross-border trading, foreign currency exchange, and urban agriculture to improve household income (Matsa, 2012). Almost every household in the city has a small allotment for food production to enhance nutrition and general food security. Most youths are not employed, although several have tertiary education qualifications.

The city of Gweru sufficed as an area of study for purposes of describing and explaining the dynamics of water governance in relation to household food security for the benefit of other Zimbabwean cities. Research on household food security in Zimbabwe relied on findings from assessments of Harare, the largest city (combined with Bulawayo, the second largest (ENDA-Zimbabwe, 1996; Mougeot, 2005) and Chitungwiza, now the third-largest) (Hungwe, 2006). This study involves a new dimension that correlates urban water governance with household food security. The poverty rate for the city of Gweru was 46% (ZimStat, 2015), and has been deteriorating to levels that require further assessment.

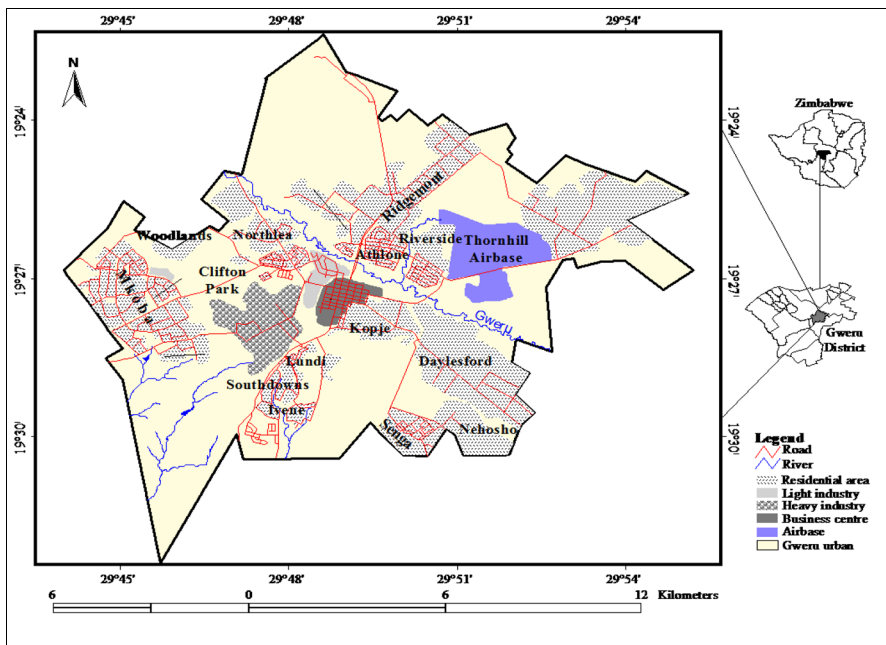


Fig. 1 Location of the study area

The poverty rate prompted the investigation into the contribution of water governance dynamics to the struggling household food security system.

## Methodology

Researchers surveyed key informants from the local authority departments using questionnaires and interviews. The respondents were selected using a stratified sampling technique and purposive sampling. Gweru has 49 residential suburbs with 29,973 housing units, classified as high-, medium-, and low-density suburbs (GCC, 2019) (Table 1). Twenty percent of each residential suburb category was proportionately randomly selected as a primary sampling unit (PSU). A sample of 489 housing units (representing 10% of the PSU population) was randomly chosen proportionally across the residential areas. Questionnaires were administered to heads of households using a drop and pick method to allow consenting participants enough time to fill out the instrument. The survey gathered data on household food sources and how food systems were affected by the city's water governance, such as water supply capacity, water bills, and decisions by the local and central governments. However, an acknowledged weakness of the study is that the researchers did not consider the gender dimension of water and food access.

Purposively selected key informants from the city council and Gweru Ratepayers and Residents Association (GRRRA) also revealed the effects of the water supply, the billing system and the city's water and food decisions on household food security. Purposive sampling is a deliberate selection method that enrolls respondents who have the required information (Levine, 2014). In this study, the criterion was expert sampling and it used experts and custodians of the data sought, including the Director of the Housing Department who was the key informant on the allocation of land for small-scale agriculture. Data on bills and revenue generation was obtained from the GCC Finance Director. The water capacity was recorded by the city engineer. The GRRRA is Gweru's main service delivery civil society group and was represented by the president, whose responses were collected using the GRRRA WhatsApp platform.

Issues of citizen access to water and local authorities' autonomy are enshrined in Zimbabwe's Constitution, and the provisions are guidelines for city water governance (Government of Zimbabwe, 2013). The Constitution was thus consulted as a secondary data source to understand the relationship between the existing legal provisions and decisions about water governance in the current political environment, and how it affected city water and household food security. Household food security was measured using the ZimStat (2016) Total Consumption Poverty Line (TCPL). TCPL stood at US\$95.93 per person in July 2016. This means that an individual who did not have that much to purchase both non-food and food items was deemed poor (ZimStat, 2016). The TCPL measure was appropriate for an urban study, where non-food items such as rental have a bearing on household food security. Therefore, for an average family of five, US\$480 would suffice as a minimum monthly income.

**Table 1** Survey sampling protocol

Classes of residential areas	Names and number of suburbs in each class	Number of housing units per selected PSU	Sample size of households (10% of the total population in each suburb)
High-density suburbs	<b>32</b> (Mkoba 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20; Senga; Mutasa/Clifton Park; Mambou; Ascot; Nehosho; Woodlands; Mutapa, Garikai, Shamrock; Montrose)	<b>6</b> (Mkoba 1–347 Mkoba 12–405 Mkoba 19–755 Senga–1540 Shamrock–25 Mutapa 3 and 7–489) = <b>3561</b>	<b>6</b> (Mkoba 1–35 Mkoba 12–41 Mkoba 19–76 Senga–154 Shamrock–3 Mutapa–49) = <b>358</b>
Medium-density suburbs	<b>3</b> (Ivene; Nashville; Northlea)	<b>1</b> (Ivene–370) = <b>370</b>	<b>1</b> (Ivene–37) = <b>37</b>
Low-density suburbs	<b>14</b> (Kopje; Athlone; Clonsilla; Harben Park; Dalysford; Windsor Park; Ridgemont; Riverside; Kingstone Park; Mimosas; City center; Lundi Park; South-downs/Extension; Christmas Gift)	<b>3</b> (Harben Park–79 Southdowns/extension–737 Dalysford–124 = <b>940</b> )	(Harben Park–8 Southdowns/extension–74 Dalysford–12) = <b>94</b>
<b>Total</b>	<b>49</b>	<b>4871</b>	<b>489</b>



## Data Analysis

Survey data were coded in SPSS Statistics 20 for analysis at a 95% confidence interval. Analysis of variance was used across residential suburbs to test two variables for differences in patterns. The tested variables were household incomes across suburbs and differences in proceeds from food production across suburbs. The analyses enhanced the discussion on how water service transactions affected household food security in different residential suburbs regarding food-buying power. A post hoc analysis ascertained where the differences existed among the three types of residential suburb (high-, medium-, and low-density). The study's hypothesis was that there are differences in income because of the presumed socio-economic metric differences of residents in low-, medium-, and high-density areas, leading to different vulnerabilities in the city. Content analysis was used on responses from interviews and questionnaires to report and discuss the results using descriptive statistics. The TCPL was compared to monthly incomes for the city of Gweru to assess vulnerability to food insecurity.

## Results

### Socio-Demographic Characteristics

Four hundred and eleven respondents out of 489 completed and returned the questionnaires. This response rate is more than half of the total questionnaires, a percentage that is acceptable for analysis and reporting (Babbie & Mouton, 2001). Women made up 55% and men 45%. Most respondents' incomes (70%) ranged from as low as US\$25 to US\$500, and the figures fluctuated depending on the daily local currency (the Zimbabwean dollar, or ZWL) rate against the dollar. The 70% included government-supported educators (26%), nurses (9%), security forces (7%), secretaries (4%), pensioners (5%), and the self-employed (19%). Only 3% of the respondents earned more than US\$500 per month, and these were mostly mining sector employees whose salaries were still in US dollars or equivalent. The remaining 27% (111) were unemployed.

ANOVA results show no significant differences ( $p = 0.231$ ) in monthly incomes across residential suburbs. ZimStat (2016) indicates that the Poverty Datum Line (PDL) for Midlands in July 2015 was US\$510.42 for an average family of five. The 2016 TCPL measure was used because it was pegged at a 1:1 rate with the dollar. However, TCPL figures were unstable due to local currency inflation. ZimStat reported annual inflation for March 2020 at over 675%, up from 540% in February. Independent analysts estimate that inflation is almost double those rates (Food Security Outlook, 2020), leading to a call for the government to peg salaries in dollars or keep up with the fluctuating PDL. The TCPL of US\$480 shows that most Gweru residents lived in poverty, apart from the 3% who earned a formal monthly income above US\$500. This finding indicates a spatial and temporal change in incomes from the 2011 situation, where several high-income households were found

in low-density suburbs and among the educated population (Madebwe & Madebwe, 2011; Stoeffler et al., 2016).

In terms of the level of education, 81% of respondents had a tertiary education and the sample had a relatively high literacy rate. Desai (2012) states that generally, higher levels of literacy reduce economic disparities and increase income. However, this study found a high literacy rate accompanied by incomes (97%) below the Food PDL across all the residential suburbs. The education level had no positive effect on the incomes because of the country's economic situation, which eroded the value of salaries. Ironically, the anomaly was glaring in the civil service, where the highest education level existed (LEDPRI, 2016). Civil servants and several other employees of the city of Gweru were paid in the inflationary local currency.

The questionnaire and interviews revealed serious unemployment challenges. The interview with the GRRRA respondent and the household survey showed that crimes such as pickpocketing, shoplifting, and theft of motor vehicles and accessories are common in the city. Conning is also on the rise due to economic hardship. Very few Gweru residents still enjoy weekend recreational activities because of financial incapacity. The desperate population is found in charismatic churches, especially on Sundays, pursuing miraculous financial breakthroughs through different spiritual leaders they refer to as prophets or *papas* (meaning fathers). Questionnaire responses showed that Gweru residents sometimes embark on seasonal informal mining activities in the country's Great Dyke. Dominant in the mining activities is artisanal gold mining, which offers temporary financial relief.

Contrary to the formal employment outlook, the study found that a significant number of Gweru residents, even the formally employed, are engaged in some form of informal activity that they refer to as a 'side hustle' to supplement their meagre incomes. Network marketing is popular, in which earnings are tied to recruiting more members to the team. The network marketing side hustle is dominant in the health and beauty products industry.

## Household Food Sources and Security

Direct food production (61%) and purchasing (84%) were the city's two primary food sources. However, 45% of respondents indicated they used both options. Respondents' shopping lists contained essential commodities such as mealie-meal, sugar, and flour. Forty-eight percent of respondents purchased flour since bread was beyond the reach of many. These respondents resorted to baking, using homemade recipes that included a combination of mealie-meal, mainly obtained from farming, and flour to make a type of bread called *chimodho* or *chimupotahaya*. However, due to continuous income erosion, 14% even removed flour from their shopping lists and relied on mealie-meal to make a type of bread called *chimiranebhodho/amathebelengwane*. The recipe was previously rarely used in cities but is now familiar due to eroded buying power. The average number of meals per day in the city was two, as a result of farming that enhanced food security.

Crops grown included leafy vegetables, tomatoes, potatoes, green mealies, and beans (Table 2). Maize cobs/green mealies fetched an average of US\$1 for four

**Table 2** Annual household plot produce income

Crop grown	Annual income (US\$)		
	HD	MD	LD
Leafy vegetables	41	144	192
Green mealies	21	154	189
Potatoes	49	143	174
Tomatoes	53	157	165
Annual average income	41	150	180

*HD* high density, *MD* medium density, *LD* low density

depending on the season, and respondents indicated that they were getting a reasonable amount of money from their sales (annual averages of US\$41, US\$150 and US\$180 for high-, medium-, and low-density, respectively) to supplement incomes meant for subsistence. Backyard gardening is a lucrative option for household food security practised by more than half of the population. However, it is affected by unreliable rainfall and erratic municipal water supply.

Thirty-six per cent of the respondents indicated that all-year-round on-site plot farming (an average of three harvests of green mealies, depending on the variety used) had become common due to economic hardship. High-density areas had the lowest income contribution from agriculture. The incomes from food production across residential suburbs were significantly different ( $p = 0.011$ ). However, post hoc analysis showed that the significant difference was between high density and low density ( $p = 0.000$ ). This could be because of the size of residential stands (a high-density average of 200 m<sup>2</sup>). Low- and medium-density stands (an average of 800 m<sup>2</sup> to 1500 m<sup>2</sup>) are much bigger and provide more farming space. However, besides backyard gardens, most open spaces across all residential areas were being turned into farming plots. Spaces traditionally reserved for their ornamental value, such as parks and play centers, especially those adjacent to houses, were converted into allotments for food production.

The initial household income before food production placed poor residents at a disadvantage. Regardless of efforts to augment food security, Gweru residents remained food insecure. The initial majority household income (range US\$25–500) combined with proceeds (annual average of US\$41–180) from plot produce still left a food deficit. The annual income from food production works out at about US\$4–15 monthly per household, which is very low. This may explain why only 5% of the respondents sold their produce. Although this study did not measure the quantity and quality of the food items produced, the majority of respondents (95%) indicated that not even home-grown food was enough to ensure household food security. The few who sold produce did so not because of surplus but because they desperately needed cash for non-food items such as bus fare to the city center for other informal economic activities, referred to as 'hustling'. Based on the ZimStat (2016) TCPL of US\$480, using the parallel market rate, a family of five needed ZWL61 200 in March 2021 to have access to a sufficient quantity and quality of food and non-food items. Therefore, the incomes for the city of Gweru across residential areas indicate

a food crisis in terms of physical availability and access, as most residents have less than US\$500. USAID (2020) indicates that transactions are increasingly occurring in dollars. Therefore, households that earn in ZWL cannot afford to buy food, as confirmed by the household survey responses.

### **City Water and Food Nexus: a Failure to Capture the Intricacy of the City's Water Governance**

The study found that the two available food streams were affected by the city's water management and decisions in two ways. First, water shortages in the city had a direct impact on food production. Water governance interfered with the amount of water that reached consumers and thus affected gardens. Second, food purchases were compromised by high water bills. Sixty-one percent of the residents indicated that they supplemented their food sources with backyard farming and relied on municipal water. However, the city engineer revealed that the municipality had limited financial resources to improve water-pumping capacity and carry out maintenance. Therefore, the water supply was not reliable even for other domestic purposes. The most affected crops were leafy vegetables and mealies. Maize was primarily rain-fed, but during dry seasons, residents resorted to municipal water for irrigation; but there is a bylaw prohibiting the use of hosepipes during times of drought.

However, high-density residents reported unfair water rationing, indicating that they experienced more water shortages because Gweru city management prioritized low- and medium-density water supply at the expense of the high-density areas. High-density respondents indicated that most city council management staff lived in medium and low-density suburbs, and their water was not rationed according to schedule.

Ironically, in an interview a city authority acknowledged urban agriculture's reliance on municipal water and the existence and importance of urban farming, but had no clearly stated policy or action to facilitate sustainable water supply and agriculture in the city. The city engineer also confirmed that access to clean municipal water for farming increased water production costs. The municipality's only sources were Ngamo dam, which supplied untreated water for urban greening in parks and roadsides, and a few boreholes with very low yield for the little community gardens introduced in partnership with NGOs. However, there was no attempt to provide sustainable urban agriculture options to protect the limited clean and expensive water while simultaneously taking care of household food security. In fact, the authority revealed that the more water a household used, the higher the revenue generated through billing. However, the sustainability of using the limited clean water for farming, compounded with the unhonoured bills, remains a paradox.

### **Water Bills and Food Security**

Residents identified high monthly water charges as a threat to their household food security. The results show that only 3% of Gweru residents across all suburbs had a regular income above the TCPL. Therefore, the food-buying power of the majority

(97%) was threatened by the high monthly water charges. The average household income for the population was US\$55 and water bills (Table 3) claimed a significant proportion.

All residents were affected by monthly charges because the overall monthly incomes were not significantly different ( $p = 0.231$ ) across all surveyed areas. The majority (70%) of residents indicated that their monthly water bills were too high considering their incomes. Unfortunately, due to the country's economic difficulties, the municipal grant allocation from the central government was not reliable. For this reason the local authority prioritized revenue collection regardless of the high tariffs. The situation increased the burden of payment on the already impoverished residents.

Incongruously, the Engineering Department of the City of Gweru doubted the accuracy and functionality of 70% of their water meters. The issue of data mishandling by the city records department was a challenge. Municipal officials insisted that they were not prejudicing residents financially, although they could not validate this claim. Residents felt short-changed by the system and their displeasure seemed justifiable, considering the local authority's admission that meters were faulty. As confirmation, 53% of respondents revealed that some water meters had not recorded any changes for several months but the municipality continued to send bills based on estimates to those housing units.

More than 98% of respondents also reported that water rates were changed without their knowledge, making it difficult for them to budget. The changes in water rates directly impact household income and should therefore be communicated to residents before implementation. Even during months where residents paid more than was reflected on their statements, the next water bills would still be very high. Residents who did not settle their bills faced disconnection, which would also negatively affect food production.

### Municipal Mandate and Political Interference in Water Management

In terms of Section 264 of Zimbabwe's 2013 Constitution, local authorities must run their affairs independent of the central government regardless of receiving a grant. The central government only plays an oversight role. Local authorities must ensure good governance showing efficiency, transparency, accountability, and institutional coherence. Section 265 (3) states that an Act of Parliament provides appropriate mechanisms and procedures to facilitate coordination between central and local authorities.

**Table 3** Average monthly water bills by suburb density

Residential area	Average household monthly water bill (US\$)
High density	29
Medium density	33
Low density	58

In terms of Section 276 of the Constitution, the local authority has the right to govern its local affairs. This provision includes powers to levy rates and taxes to raise enough funds and revenue to carry out the council's objectives and responsibilities. Funds from the treasury are supposed to be channelled through the local government minister to supplement local government revenue in grants and provide subsidized water to citizens. However, Gweru city received no such support from 2014 to 2019. Despite alleged corruption and misappropriation of funds in the municipality, the city struggled to pay salaries, let alone institute major water projects, because of a lack of funding. In the case of the city of Gweru only, the central government cancelled about US\$15 million debt owed by residents in 2013. However, the municipality owed Zimbabwe Electricity Supply Authority (ZESA) over US\$7 million, the Zimbabwe Manpower Development Fund (ZIMDEF) US\$2 million, and the National Social Security Authority (NSSA) US\$3 million.

Regardless of the provisions spelled out in the Constitution, water service delivery seldom ran as expected. The study revealed that there was no independence in the municipality's financial affairs. The central government's power to oversee would sometimes override the municipality's local decisions; the 2013 debt cancellation is a glaring example of such interference, which created unprecedented financial incapacity for the municipality. However, soon after the 2013 national elections, the financial deficit that was created by the debt cancellation was conveniently parcelled out to ratepayers. This scenario partly explains why the municipality charges high rates.

Although the Zimbabwean Constitution allows local authorities autonomy to run their affairs and raise funds, while the central government simply provides aid through grants, political interference took center stage in the day-to-day municipal decisions. The government had ceased to assist the local authority financially; instead, when it cancelled the debt it made no corresponding effort to ease the burden on municipalities. However, the municipality and residents are still expected to meet their obligations. The opposition-led city council is also under pressure to deliver services, even though it is in a way financially incapacitated. Citizens are the biggest losers, as they are expected to honor the unsubsidized bills.

## Discussion

Gweru residents' food security is dependent on the purchase and production of food. Some parts of the city known for their aesthetic and ornamental value have been turned into small allotments to improve household food security. The situation is similar in Masvingo and Mutare, where people ventured into urban farming to supplement their meagre incomes (Tshuma & Mashoko, 2010; Chadyiwanembwa, 2012). Poverty accounts for most urban agriculture at the household level (Mapira, 2011). Unlike the dual water system used in Windhoek (Van Rensburg, 2016), Gweru residents did not focus on ornamental urban greening across all residential suburbs. Interest was in what this study calls *operational greening*, defined as keeping spaces green with nutritious plants for immediate household food security. Traditional urban greening, including lawns, shrubs, and palm

trees, is not of much value to a starving population. Thus, ornamental greening ideas, irrespective of their worth, are seldom well received if they do not respond to urgent human needs.

According to Section 77 of the Constitution, water is a fundamental human right, regardless of income (Government of Zimbabwe, 2013). In Gweru, despite the changes in the Constitution, the city council continued to disconnect water in the event of non-payment. The exercise was undoubtedly *ultra vires* section 77 of the new constitutional law. Instead, most local authorities in Zimbabwe continue to follow the obsolete Section 8 on bylaws of 1913 (Mbiba, 2014; Nhapi, 2009).

Sections 24 to 29 of the Bill of Rights in the South African Constitution recognize citizens' socio-economic rights, including the right to social security. The South African government still assists vulnerable citizens (SASSA, 2014). However, Zimbabwe lags behind in providing social security, particularly in urban areas (Wekwete, 1998). Kaseke (1988) notes that governments assume that employment will enable individuals to meet their basic needs and contingencies. Unfortunately, the Zimbabwean economy is underperforming and not generating enough jobs for the urban population, and the available employment is not gainful, leading to meagre incomes even for highly educated residents (Takavarasha, 2003).

An equally problematic observation was the use of potable water for farming. The municipality allowed residents to use expensive clean water for agriculture and charged them high rates, further exposing them to poverty. Inversely, the municipality was also exposed to financial incapacity due to non-payment. Making potable water available to agriculture is not sustainable, ecologically and economically. The raw water sources are under threat due to climate change, and the conveyance system also experiences low pumping capacity. The available water was insufficient even for other primary uses (Matsa, 2012; Kusena & Beckedahl, 2016), and reluctantly allowing household agriculture without monitoring mechanisms was rather short-sighted. However, the challenge emanates from the fact that Zimbabwe does not clearly define 'primary' and 'commercial' water use (Manzungu & Machiridza, 2005). The use of municipal water to support food production at the household level may well qualify as primary/domestic use. The situation requires well-calculated decisions that balance both water and food needs.

The Ministry of Local Government cancelled the debt to cushion poor residents, and then later approved higher tariffs to close the fiscal deficit. Such abrupt decisions generate confusion, corruption, and inefficiency, creating a 'wicked problem' for which solutions are difficult to find (Ritchey, 2013). A top-down approach is a sign of bad governance. Political ecology highlights the numerous power struggles and ultimate social injustices associated with water governance issues that disadvantage ordinary citizens (Narsiah, 2007). Gweru residents now face high monthly bills because the local authority needs to fulfil a mandate that was adversely affected by the central government's decision. Beard and Mitlin (2021) believe that water must be supplied, while acknowledging its social and financial necessity for low-income groups. However, given the central government's meddling in urban local government issues, one wonders if privatization is not a better way to run water affairs.

## Conclusion and Recommendations

The study found a complex and volatile water and food situation in the city of Gweru, with several players with different motives. On the one hand, Gweru residents were in a difficult situation, needing to produce and sometimes sell food to enhance household income but depending on expensive potable water. The municipality had a mandate to provide water but struggled to do so because of financial incapacity. The process intensified water cuts and revenue collection to stay afloat while ignoring the city's food insecurity.

On the other hand, the central government which was supposed to aid the local authority to extend subsidized water services to fulfil the right of Gweru residents to both water and food has not done so for years. As if the incapacitated citizenry and municipality were not problems enough, the central government's 2013 debt cancellation worsened the situation.

For various reasons, including population growth, economic hardships, political interference and poverty, water governance is a challenge in Gweru. If left unchecked, the problem may worsen with time and hinder the city from achieving the SDGs. It is recommended that Gweru, together with other stakeholders, introduce the use of wastewater and non-potable water for food garden irrigation. There is potential for rainwater harvesting to improve food production and decrease monthly water bills. The city of Gweru should survey groundwater and set up productive community boreholes; it should also encourage efficient water use such as drip irrigation and hydroponic farming to achieve a more resilient city. Partnerships between GCC, the private sector, NGOs, and the government must be promoted to provide funding for water infrastructure and training that will see the city emerging as a haven of both water and food security. If the administrative structure remains the same, the central government must avoid arbitrary financial decisions with negative effects.

**Availability of Data and Materials** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Authors' Contributions** All authors substantially contributed to the study.

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## Declarations

**Ethics Approval** Permission to conduct the study in Gweru was sought and granted by the City of Gweru Town Clerk.

**Consent to Participate** All the participants had informed consent before enrollment into the study sample.

**Conflicts of Interest** The authors declare that they have no conflicts of interest.



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