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**International Journal of Environmental Sciences**  
(ISSN: 2277-1948) (Scientific Journal Impact Factor: 6.043)

UGC Approved-A Peer Reviewed Quarterly Journal



### Full Length Research Paper

## Exploring the Challenges Surrounding the Disposal and Management of Sewer and Waste in Chiredzi Urban -Zimbabwe

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### ARTICLE DETAILS

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### Key words:

Sewer and waste management, challenges, solutions, recommendations

### ABSTRACT

Waste and sewage management and disposal have become major problems in Chiredzi Urban, Zimbabwe due to increasing waste proliferation owing to rapid urbanization. A mixed-methods research design is utilized in this study, with ten households randomly selected from eight wards as units of inquiry to a representative of waste management practices. The research also included interviews with a range of local authorities to explore their views on existing policy. The study, through the use of official data, questionnaires, interviews and observation checklists seeks to evaluate local waste and sewer management policies and practices; assess current disposal methods and sites; determine factors affecting solid waste disposal in Chiredzi Urban municipalities; as well assess environmental & health effects of improper waste handling. Results showed that limited financial and material resources are common constraints, which obstruct efficient waste collection and transport; therefore, there is widespread dumping, burning, composting, and on-site burying of waste. It also points out the necessity for improved waste management, including factoring in recycling of biodegradable waste into compost and energy generation to reduce environmental impact and improve resilience of communities. Policy recommendations focus on the need to reinforce, renew, allocate relevant resources and raise awareness in communities for achieving sustainable waste management in Chiredzi Urban.

## 1. Introduction

### 1.1 Sewer and waste management

Sewage is liquid waste that is derived from domestic, industrial, commercial and institutional sources (Katyal and Satake, 2001). Within an urban setting, it also includes run-off from the streets. Although only a small fraction of sewage (0.05%) consists of waste material, the discharge of raw sewage into watercourses can lead to serious levels of pollution (Jackson and Jackson, 1998; Moyo, 1997). Waste is generally defined as refuse generated from homes, street sweeping, industries, institutions and commercial areas which needs to be collected by or on behalf of the local authority (Hester and Harrison, 2002). Solid waste comes in various forms such as garbage, rubbish and dirt that accumulate in residential, commercial, industrial and institutional areas of towns and cities (Botkin and Keller, 2000).

Therefore, solid waste is the unwanted, useless and discarded non-liquid waste materials arising from domestic, commercial, manufacturing and trade industries as well as public service. Waste management have emerged as one of the greatest challenges facing environmental protection agencies in developing countries (Ogwueleka, 2009). The increasing complexity of the composition of solid waste and the failure by city authorities to integrate the formal and informal sector among other issues in developing countries have brought complicated challenges in solid waste management (Practical

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Received: 01-Nov-2024; Sent for Review on: 05-Nov--2024; Draft sent to Author for corrections: 12-Nov -2024; Accepted on: 22-Nov--2024; Online Available from 27-Nov-2024

DOI: [10.13140/RG.2.2.21291.66081](https://doi.org/10.13140/RG.2.2.21291.66081)

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action Southern Africa, 2007). Therefore, waste management has emerged as one of the greatest challenges facing local authorities throughout Zimbabwe. Most urban agencies and local authorities in Zimbabwe have time and again identified solid waste as a major problem that has reached proportions requiring drastic measures, notably from the 1990s up to the present day. Chiredzi, among other towns is facing challenges of waste management. Following economic hardships and political instability in the country, there has been perpetual deterioration in the quality of services offered by city councils (Gukurume, 2011). Dilapidated social service infrastructure, lack of foreign currency and diversity in economic activities in Chiredzi has surpassed the ability of the town council to deal with waste management. The closure of existing open dumpsites and the introduction of sanitary landfill is an urgent priority everywhere in the developing world. Even where complementary disposal technologies, such as composting or incineration (waste to energy plants), are practiced, a landfill is still required and is the backbone of any sustainable disposal system. The reason simply being because waste in the landfills is not properly managed, this results to the impacts to the environment. .

## 2. Literature review

The past ten years in Zimbabwe have been challenging for local authorities' management systems, service delivery, primary social infrastructural development, planning and organization (Chikuruwo, 2006). Generation of waste needs to be minimized or prevented as well as reducing the extraction and consumption of virgin materials. This involves extension product lifetime by employing measures that promote recycling, reuse regeneration. Such a transition entails a significant shift in business models. It is one of the biggest 'turn-offs' in the development process, particularly in developing countries which lack technological and financial capabilities. Waste management has collapsed, and this has triggered chaotic and rampant waste dumping, putting the health of residents at great risk (Makwara and Magudu, 2013). According to Chidavaenzi (2006), the last forty five (45) years have witnessed a 50% decline in the density of waste being generated (460 to 230 kg/m<sup>3</sup>) while the volume of waste has increased two-fold and the trend is projected to continue rising.

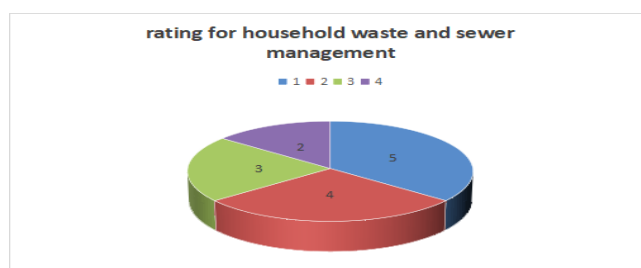
## 3. Methodology

The study focuses on Chiredzi town in the Masvingo province. The aspects to be examined include how waste is deposited and the locations where it is deposited, the environmental health impacts of various disposal methods, and strategies for improving waste management. Statistical records, which will be used as data for the study, were obtained from the Chiredzi Town Council, the Environmental Management Agency, local residents of Chiredzi, and previously conducted research. The target population for this research study includes residents of Chiredzi. These respondents were selected because they have witnessed events in their areas and have observed how waste is collected. Interviewees were also chosen from waste management offices, including the town council and the Environmental Management Agency (EMA). Geographically, the research boundaries encompass the Tshovani area and the town itself, including wards 1 through 8. Due to the impracticality of engaging with the entire population of Chiredzi, a sampling method was employed. A stratified random sampling technique was used, selecting 10 households from each ward as strata. Systematic sampling was then implemented to determine which households would receive copies of the questionnaire. The sampling interval (SI) was calculated by dividing the total population by the sample size (n), with  $SI = P/n$ . Every nth household unit from the sampling frame was selected for inclusion. The questionnaires were distributed using a give-and-return method. Interviews were conducted with the Environmental Health Officer, District Environmental Officer, and Town Secretary to discuss the challenges they face concerning waste management, the causes of these challenges, and potential solutions. Frequent visits were made to the study areas to directly observe the status of waste bins, illegal dumping sites, and composting activities. A digital camera was employed to photograph notable features, such as illegal dumpsites and overflowing bins. The dumpsite itself was also visited, and a checklist was used to ensure that important elements at the landfill site, such as safety equipment, compaction, daily cover, site staff, and waste reclamation activities, were accounted for. The data collected from the questionnaires were recorded in Microsoft Excel and later exported to SPSS for analysis. The data were analyzed using the Statistical Package to derive percentage values.

## 4. Results and Discussion

### 4.1 Sewage and waste by council and residents

The waste management system of Chiredzi involves generation, storage, collection and disposal. A total of 80 copies of the questionnaire were administered to 60 females and 20 males.



**Fig. 1** Rating of Household water and sewer management

The residents reported high level of dissatisfaction (4 poor and 5 very poor) with the council when it comes to waste collection and disposal with an 80% poor performance by the council in this regard.

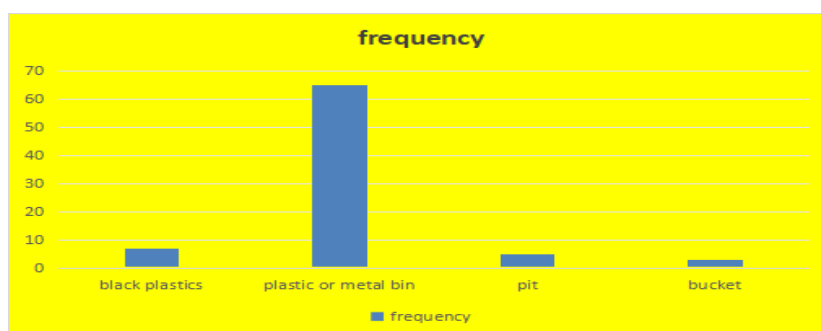
#### 4.2 Waste disposal methods and sites

The dumpsite site in Chiredzi is located near the graveyard in Chiredzi town. It is full of non-biodegradable waste collected from surrounding locations like plastic papers, metals, papers and rubber as shown by the picture below.



**Fig. 2.** dumpsite site in Chiredzi

From the information gathered it was established that 80% of the respondents use plastic bins which they buy, 5% use buckets, 10% use black plastic while 5% resort to buckets and dumping in open spaces and pits.



**Fig. 3.** Frequency

Waste is collected and compacted by a 18CBM waste compactor truck. It is collected once per week depending on ward. A landfill compactor vehicle is not available at the dumpsite for compaction but it is expensive for the Council to purchase. There is no daily cover of waste using earth to eliminate pests, birds and odour. In terms of collection of waste 25% is collected by council, 15% is burnt and 5% leave the waste to decompose (composting) and 5% of the waste are being deposited in pits. With sewer disposal 95% use basic toilet system in residential areas built decades earlier. Recently developing Melbourne Park uses septic tank system for sewer disposal accounting for the remaining 5%.

#### 4.3 Environmental and social implications of waste and sewer management

Open dumps of municipal solid waste and running sewers are creating serious negative impacts on environment in Chiredzi. Following negative impacts are being observed in due to open dumping of solid waste. Dust and filthy dirt, strong wind and storm are spreading dust and filth from the open dumps of solid waste to adjacent areas. Nearby areas to the open dump sites is being affected due to odor emitting from these dumps. Open dumps of communal solid waste are providing attractive habitat to rats and other vermin. Toxic gases are continuously exposed to the atmosphere. Percolating rainwater through the open dump contaminating ground water resources. Open dumps of solid waste are a serious threat to human health and sanitation.

### 5. Conclusion

Dilapidated social service infrastructure, rapid urban sprawl, water shortage, lack of foreign currency and diversity in economic activities in Chiredzi has surpassed the ability of the town council to deal with waste management. In Chiredzi, this has resulted in the creation of illegal dumpsites especially in stands that have not been developed and all open spaces.

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