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Public Health and Environmental Challenges in Zimbabwe: The Case of Solid Waste Generation and Disposal in the City of Masvingo

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Abstract

This paper is mainly an overview of the challenge of solid waste management in the city of Masvingo. The paper is based on experiential observation. The researchers are residents of the city of Masvingo. The paper established that Masvingo residents generate waste when they throw away weeds and garden debris, construction debris, food left-overs and packages, old tyres, metal scraps, among many others. Although there are regulations and by-laws on how to handle solid waste, it seems in practice these are not enforced. People discard solid waste by throwing bottles, fast food containers, and other items on the street or out of car windows. This results in a lot of litter in the city. Residents use metal and plastic medium sized bins, plastic paper, cardboard boxes and sacks for temporary waste storage, as determined by their ability to purchase the waste containers. Most high density residents do not afford bins, cardboard or any other temporary storage equipment. Hence they store their waste in open areas. The Masvingo city council does not take measures on residents who do not store their solid waste as per their regulations and by-laws. This encourages the people to continue littering their residential area. Among other things, this paper recommends a programme in which the municipality joins hands with other stakeholders (EMA, NGOs, residents' associations, government departments, the business community, and many others) in advocacy campaigns and training sessions to ensure that residents are aware of risks associated with mishandling of solid waste.

Keywords: Solid waste, Waste generation, Waste disposal, Waste management, Residents.

Contents

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1. Introduction

According to Boadi [1], waste is any moveable material that is perceived to be of no further use and that is permanently discarded. This study sought to investigate the state of solid waste generation and disposal in the city of Masvingo. The study sought to find out the collection equipment and frequency of transportation in residential areas, the central business district and Tanaiwa market.

Waste generated by municipalities includes waste by commerce, local authorities and domestic house-holds. Rodic [2] sees solid waste as comprising all the waste arising from human and animal activities that is normally solid that is discarded as useless or unwanted. Thomson [3] argues that there are many different types of waste, which are usually identified according to their source, for example house-hold waste, industrial waste and sewage sludge.

Zerbock [4] posits that during the industrial revolution, the volume of waste produced was relatively small, and the concept of dilute and disperse was adequate. With fewer factories and sparse population, dilute and disperse seemed to remove the waste from the environment. Mangwizvo [5] concurs that during the industrial revolution, people were few and nature could cope with the disposed waste. This was well before urbanisation. This, however, failed when the population started to increase and mankind started living in large numbers within an area. The use of rubbish pits became irrelevant.

According to Hardoy [6], in less developed countries, waste is collected by trucks, but most of it accumulate in streets and open spaces where it becomes a breeding ground for vermin, spreading diseases. This supports the formation of open pits that support large numbers of waste pickers who derive an income from the articles that have been discarded.

Mangwizvo [5] and Harden [7] concur that more developed countries manage their waste by collecting, incinerating low hazard solid waste and placing it in landfills allowing the site, once full to be built upon. In the United Kingdom, there is waste separation and recycling after collecting. Thus, as observed by Hardoy [6] waste recycling generally consumes fewer resources and produces less pollution.

Masvingo City Council began organised collection system of waste in around 1945. This was only done in the low density areas and within the Central Business District. Waste collection and transportation was done using a four wheeled cart drawn by donkeys. Dumping was done at a dumpsite in the industrial area. The high density areas (Mucheke) had no collection systems.

Urban areas in Zimbabwe manage waste by placing in dumpsites, compacting and landfilling. It is against this background that the study sought to find out the particular waste generation and disposal methods in the City of Masvingo. The research also sought to find out what collection equipment and transportation systems the Masvingo City Council uses in bid to keep its environment clean.

2. Statement of the Problem

Solid disposal in Masvingo is becoming a challenge as evidenced by huge stacks of uncollected garbage in the residential areas, Tanaiwa market, Mucheke bus terminus, the Railways open market and all shopping centres in high density residential areas. In the same vein the dumpsites are becoming an eye sore and also some solid waste are finding its way into the streets and residential homes.

3. Research Questions

This study is guided by the following research questions:

- What are the types of solid waste generated in Masvingo city?
- In what ways is solid waste disposed of in Masvingo city?

4. Definition of Key Terms

The following working definitions were used in the context of the study:

- **Composite:** Decomposed solid waste from food processing industries, and kitchens which can be used as a soil conditioner and fertilizer.
- **Generation:** Creation of waste or unwanted substances or materials.
- **Incineration:** The burning of combustible materials and melting of certain non-combustible materials in municipal incinerators.
- **Landfills:** Controlled land for disposing solid waste materials.
- **Leachate:** A poisonous liquid produced when rubbish or solid waste sit in water.
- **Solid waste:** All unwanted material that is not gas or liquid.

5. Research Methodology

This study is based on the case study approach. The research included an extensive review of theoretical literature as well as the use of experiential observation. The researchers are residents of the City of Masvingo. The scope of the empirical investigation was limited to the City of Masvingo. The study was largely based on qualitative design.

6. The Conceptual Framework of Solid Waste Management

After generation of solid waste, it must be stored, handled and separated. According to Hardoy [6], factors to consider when designing on-site waste storage and processing are: type of collection systems; the economic radius at operation; and the on-site processing method to recover material, reduce volume and treat waste.

However, solid waste-handling systems are often the most poorly planned feature of development. There cannot be on-site handling activities of solid waste management until they are placed in storage containers. Agunwamba [8] asserts that handling also encompasses the movement of loaded containers to the point of collection. Other activities

are separating solid waste materials for reuse and recycling. This is best done at the source of generation. Storage equipment includes plastic and metal bins. Berg [9] asserts that on-site storage is of primary importance because of public health concerns and aesthetic consideration. Unsightly make shift containers and even open ground storage, both of which are undesirable, are often seen at many residential and commercial sites. It can be deduced that home owners are becoming more aware of the importance of separating newspaper and cardboard boxes, bottles, yard waste, aluminium cans, and ferrous materials. Processing at the source involves activities such as compaction and yard solid waste compositing.

The collection of municipal solid waste can be through motorised vehicles. Usually dump trucks or animal and human traction vehicles are used. Boadi [1] argues that the collection of solid waste in some countries show a mixture of public and private systems. Ackchankeng [10] asserts that solid waste collection and transportation constitutes the most visible aspect to which the municipality gives more importance in solid waste management. As observed by Jerie [11], different types of vehicles are used for collection of waste. The collection frequency depends greatly on the demographic aspects of the zones where the collection takes place and the service demanded by the population, taking into consideration factors such as sanitary aspects, collection costs, use of fuel for collection vehicles.

Various collection and container systems are used that include door-to-door collection with containers/ communal bins placed near markets in apartment complexes, and in other appropriate locations and then hauled to disposal sites by vehicles. Manually loaded compactors are often used in markets and commercial establishments.

According to Zerbock [4] the planning of domestic waste collection has evolved along the development of modern infrastructure and includes the consideration of: collection vehicle systems, collection routines, public health by-laws and regulations. It can be deduced that solid waste collection transport has come out of a long way. For Rodic [2], although the motor truck has replaced the horse-drawn cart, the basic methods of solid waste collection remain the same; they continue to be labour intensive. He further explains the evolution of vehicles for the collection of solid waste as from the horse-drawn cart, circa 1900, solid tire motor truck, circa 1925 and modern collection vehicle equipment with containers-unloading mechanism. Thomson [3] mentioned the same evolution of solid waste collection transport. Modern transport reduces the volume of solid waste. Collection trucks compact the waste by squashing it before they take it to the dump-site. Masocha and Tevera [12] cite transport for collection of solid waste as skip loader; rear-end loader, side loaders and front end loader mobile compaction vehicles, tractor and trailer and the tip pack units' compaction.

For Henry [13], the collection of solid waste falls under the responsibility of the municipal environmental health department. He further asserts that the municipality provides re-usable plastic bags for solid waste storage at the waste generation sites and metal bins for business.

Zerbock [4] argues that inadequate solid waste collection has remained a problem in most developing countries. Matimiti [14] concurs when he says that southern African countries find it very expensive to dispose of and manage their solid waste. Types of solid waste material and receptacle should determine the type of vehicle and frequency of collection.

Zerbock [4] argues that lack of collection and proper disposal of solid waste provide a favourable habitat for diseases caused by vectors. In the lack of collection, solid waste is accumulated in empty lots and in local bodies of water, where it constitutes a health risk and a contamination source, besides being an environment conducive to delinquency. There are risk factors that endanger the exposed population, especially people that work in conduct with solid waste, and the population adjacent to the final disposal sites. Final disposal constitutes the most severe aspect of solid waste management, since the waste that cannot be collected is deposited without any control in the environment, either rivers, ravines, or in the streets of the cities. Households' solid wastes are not exempt from health risks, due to their heterogeneous composition that many times includes remains of pesticides, debris, expired medications, and chemical substances waste, among others.

Thomson [3] argues that solid waste corresponds to organic wastes that go through decomposition process. It constitutes an appropriate means for bacteria proliferation and preservation of parasite eggs that could be the origin of numerous infectious illnesses. Inadequate solid waste storage leads to reproduction of rodents, flies, roaches and other vectors in the transmission of diseases that affect human health. Rodic [2] argues that the inadequate management of solid wastes contributes to the increase of the incidence of gastrogen-testinal and respiratory infectious diseases and skin conditions, as well as the possibility of increasing the risk of cancer, neurotoxic disorders and congenital malformations due to the presence of hazardous solid waste in garbage. He further asserts that the threat to the public health due to inadequate solid waste disposal is more significant in tropical countries. Matimiti [14] says the main Nigerian impacts of solid waste to nature are air contamination, mainly due to dust from vehicles and machinery and the burning and incineration of solid waste and potential fires that generate particles emissions, contaminating gases and toxins and furans.

Hardoy [6] also argues that solid waste which is not properly managed, especially excreta and solid waste from households and the community are a serious health hazard. They lead to the spread of infectious diseases as unattended solid waste lying around attracts flies, rats, and other creatures that in turn spread disease. Normally it is the wet waste that decomposes and releases a bad odour. This leads to unhygienic conditions leading to a rise in the health problems. He further says that domestic solid waste poses threat since they ferment, creating conditions favourable to the survival and growth of microbial pathogens. Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and the rag pickers being the most vulnerable.

Exposure to hazardous solid waste affects human health, children being more vulnerable to these pollutants. For Henry [13], direct exposure can lead to diseases through chemical exposure as the environment leads to chemical poisoning. He argues that medical solid waste requires special attention since this can create major health hazards. Waste generated from hospitals, health care centres, medical laboratories, and research centres such as discarded syringes, needles, bandages, swabs, plasters and other types of infectious waste are often disposed with the regular non-infectious solid waste. According to Matimiti [14] improper disposal of solid waste contributes to several other

problems: It reduces the aesthetic appeal of the environment including public places, streets, parks, and waterways. Not only does it present a hazard to humans, but the cost of cleaning it up places an economic burden on society.

Zerbock [4] argues that solid waste management constitutes one of the most crucial health and environmental problems facing governments of African cities. The uncollected or illegally dumped solid wastes constitute a disaster for human health and the environmental degradation. Poor solid waste management practices, in particular, widespread dumping of waste in water bodies and uncontrolled dump sites, aggravates the problems of generally low sanitation levels across the African continent.

7. Types of Solid Waste Generated in Masvingo City

Findings in this section are from experiential observation. The researchers are residents of the city of Masvingo.

Like in any other urban setup, Masvingo residents generate waste when they throw away weeds and garden and plant debris. At their homes they throw away solid waste from the kitchens (food left-overs and packages). Residents also generate solid waste when they destroy houses for extension reasons.

The Masvingo city council has not yet educated residents on how and where to dump construction waste. Although there are regulations and by-laws on how to handle solid waste, it seems in practice these are not enforced.

Garden waste is sometimes made into composite which ends up into the decomposition of the biodegradable organic materials.

The central business area produces solid waste from old, unwanted tyres, metal scraps from garages, food waste from restaurants, hotels and supermarkets. There is also a lot of waste generation from packaging of all shops, bones from butcheries, medicine packages from pharmacies and litter from residents.

Waste generated at Mucheke bus terminus, Tanaiwa vegetable market and the Railway open market includes paper, plastic and organic vegetable waste. Though the waste is collected every day after storage in bins, not all is collected. Some is left to rot and produce noxious gases which cause air pollution. This contributes to global warning.

8. Disposal of Solid Waste in the City of Masvingo

Again this section is based on experiential observation.

In the city of Masvingo there are five main solid waste disposal systems: littering, open dumps, sanitary landfills, incineration and compositing.

People often casually discard solid waste by throwing bottles, fast food containers, and other items on the street or out of car windows. This results in a lot of litter in the city of Masvingo.

In Masvingo, the city council had an open dump in the Mucheke area. This open dump was subjected to littering and spontaneous burning. Rats and other rodents were observed. These also moved to adjacent plots and areas of residence. Their presence posed a threat to crops and residence as they carried disease causing vermin. The burning produces carbon dioxide and methane which cause air pollution, global warming and climatic change.

Residents use metal and plastic medium sized bins for temporary waste storage. This depends on their ability to buy the bins. Some use plastic paper, cardboard boxes and sacks. Some high density residents do not afford bins, cardboard or any other temporary storage equipment. Hence they store their waste in open areas.

For temporary storage of waste, the Railway open market has a skip lugger, the central business district has metal bins and the vegetable markets and bus termini have drums. The bus termini drums are too small for solid waste generated hence most end up on heaps around the vendors.

The Masvingo city council does not take measures on residents who do not store their solid waste as per their regulations and by-laws. This encourages the people to continue littering their residential area.

Zimbabwe's current policy as enshrined in the Environment Management Act (Chapter 20:27) states that "pollution is an offence that is punishable by the law". The penalty for the offence may be in the form of a fine, imprisonment or both. It also states that any individual or organisation wishing to dispose of solid waste into a public place should apply for a permit to the Land Pollution Control of Environmental Management Agency (EMA), which authorises or rejects such disposal. This is, however, not observed in the city of Masvingo.

In the low and high density residential areas, collection vehicles are used to collect solid waste to the dumpsite once a week. The same type of vehicles is used to transport solid waste from the central business district and vegetable markets at least once in a week at dawn. Solid waste collection from colleges and schools is done once after two weeks or so. This is evidenced by heaps of uncollected solid waste, for example at Great Zimbabwe University where bins went for months without being collected.

9. Conclusion and Recommendations

This paper established that Masvingo residents generate waste when they throw away weeds and garden debris, construction debris, food left-overs and packages, old tyres, metal scraps, among many others. People discard solid waste by throwing bottles, fast food containers, and other items on the street or out of car windows. This results in a lot of litter in the city. Residents use metal and plastic medium sized bins, plastic paper, cardboard boxes and sacks for temporary waste storage, as determined by their ability to purchase the waste containers. Most high density residents do not afford bins, cardboard or any other temporary storage equipment. Hence they store their waste in open areas. The Masvingo city council does not take measures on residents who do not store their solid waste as per their regulations and by-laws. This encourages the people to continue littering their residential area.

In light of the above findings the paper recommends that:

- the city fathers join hands other stakeholders (the Environmental Management Agency (EMA), non-governmental organisations (NGOs), residents' associations, government departments, the business community, and many others) in advocacy campaigns and training sessions to ensure that residents are aware of risks associated with mishandling of solid waste;

- EMA and the city council enforce regulations and by-laws on solid waste and environmental management;
- municipalities and other authorities should come up with some incentives in form of awards for best waste management and the like;
- waste management and environmental education should be made part of the education curricula up to tertiary level.

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