



Challenges of Sustainable Solid Waste Management in Developing Countries: A Case of Mzuzu City, Malawi.

Godfrey B. Msukwa¹, Liberty Mweemba², ³Lilian Chipatu

¹Ph. D Student, University of Zambia

²Ph.D, University of Zambia.

³Ph.D, University of Zambia

DOI: <https://doi.org/10.55248/gengpi.4.823.51637>

ABSTRACT

Rapid population growth and urbanisation have led to an increase in demand for different products in developing countries and this eventually has resulted into an increase in solid waste such as paper, plastics, bottles, glass and metals. Poor management of solid waste causes air pollution and health problems resulting into respiratory diseases such as asthma and pneumonia. Further, improper organic waste management risks being a breeding ground for disease causing organisms. This paper discusses challenges faced towards sustainable solid waste management practices in developing countries, Malawi in particular. The study used a qualitative approach and it employed a case study research design. The study was conducted in Mzuzu city and it targeted people involved in solid waste management. Expert purposive sampling procedure was applied to select participants and the sample size was eighteen. Data was generated through semi structured interviews, focus group discussions and observations, and data was analysed thematically. The study found that sustainable solid waste management practices in Mzuzu city face a number of challenges which include; shortage of staff, breakdown of transportation vehicles, inadequate waste bins, use of archaic laws and lack of recycling machinery. It was recommended that, Mzuzu city council should ensure that it provides adequate resources in order to achieve sustainable solid waste management in the city, so as to prevent harm to the environment and human beings.

Keywords: Municipal Solid Waste, Practice, Solid Waste Management, Sustainable, Mzuzu City Council (MCC)

1. Introduction

Globally, there is an increase in waste production due to an increase in population and urbanisation and this has led to poor waste management in cities and towns in developing countries (UNEP, 2015; Nwosu and Chukwueloka, 2020; US.EPA, 2020; Holm, Chunga, Mallory, Hutchings and Parker, 2021). It is projected that by 2025, 4.3 billion urban residents will generate about 1.42kg of waste per capita per day (Maskey, 2018). Wasteaid and ICCM (2020), predicts that global production of municipal solid waste will grow by an average of 70% by 2025, and this will have a great effect on the ecosystem and human health.

In 2015 the world produced about 2 billion metric tons of solid waste due to the exponential urban growth (US.EPA, 2020). It is estimated that from 2015 to 2040 the bulk of solid waste in urban Africa will increase from 124 million metric tons to 368 million metric tons per year, representing 200% increase (Holm *et al.*, 2021). To this effect, in order to prevent health risks, urban planning authorities need to develop proper infrastructure that would enable safe collection, processing and disposal of solid waste, particularly in developing countries (Nwosu and Chukwueloka, 2020; Cetrulo *et al.*, 2020).

Solid waste management poses a great challenge to the environment and human health due to an increase in waste generation worldwide. The problem of solid waste is much more complicated in urban areas than in the rural (Debra, Vidal and Dinis, 2021). In Africa, rapid population growth has increased the generation of solid waste and this poses environmental and health risks (Dri, Canfora, Antonopoulos and Gaudillat, 2018; Nwosu and Chukwueloka, 2020). A study by Chireshe (2020) in Zimbabwe found that some of the problems associated with poor solid waste management in Harare included diseases such as diarrhea, malaria, typhoid, dysentery, bad odours, distortion of aesthetic value of suburbs and floods.

Most cities and towns in sub-Saharan Africa, face severe environmental deterioration and health implications due to poor municipal SWM systems (Kubanza and Simatele, 2019). As a result, solid waste is found everywhere, and it is visible along the roads, rivers, open and public places. Such waste has the potential to generate bad smell, pollution, as well as to increase the proliferation of diseases and contamination of vectors in humans (Cetrulo, Cetrulo, Dias and Ramos, 2020). Some of the improper approaches of managing waste might include poor policies, lack of finance and poor infrastructure (Kubanza and Simatele, 2019). As such, the issue of solid waste management requires a multifaceted approach involving political, socioeconomic, institutional, governmental, non-governmental and environmental aspects. (Cetrulo, Cetrulo, Dias and Ramos, 2020).

Municipal solid waste management is a challenge in that it is a multidimensional concern which involves a number of processes, which include; generation, separation, storage, collection, transportation, processing, recovery and disposal. As a result, there is need for different stakeholders such as local authorities and residents, governmental and non-governmental organisations to work together in order to achieve sustainable ways of managing solid waste (Gonçalves, Moraes, Marques, Lima and Lima, 2018; Tausova, Mihalikova, Culkova, Stehlikova and Taus, 2020).

Like any other developing country, Malawi is trying to deal with the problem of solid waste by developing laws and policies that could help facilitate the management of waste. Some of the policies that have been formulated include: The Environmental Management Regulations; the National Environment Action Plan (NEAP) and the National Environmental Policy (NEP) (National Policy and Regulation Framework for Malawi, 2018). Further, the National Environmental Act (EMA) (2017) chapter 19, prohibits individuals from handling, transporting or storing waste without a license. As such, anyone who does not dispose of waste in accordance with the act is liable to a fine of 1,000,000 Malawi kwacha (about \$1000 US dollar). All these laws and regulations are established to ensure that waste is managed properly from the point of generation to disposal

One way of promoting solid waste management services in Mzuzu city, is by undertaking SWM processes on a daily basis. To that effect, the MCC collects, transports and dumps municipal solid waste daily, despite not undertaking any recycling, and re-using initiatives. Such being the case, the MCC could do much better if it could be carrying out, recycling processes, in order to enhance sustainable solid waste management practices.

Despite, the Government of Malawi's effort in coming up with laws and regulations of managing solid waste, the prevailing situation is that there is a lot of unmanaged solid waste in Mzuzu city, as evident from the heaps of solid waste observed in the town awaiting collection and disposal. This paper highlights challenges faced in managing solid waste in Mzuzu city, Malawi.

1.1 Theoretical Framework

This study is anchored by the Waste Management Theory. The theory was founded in 2004 by three scholars namely Eva Pongrácz, Paul Phillips and Riitta Keiski (Pongrácz, 2006). This theory was founded on the premise that waste management must be aimed at preventing waste from causing harm to human health and the environment by promoting resource use optimisation (Pongrácz, Phillips and Keiski, 2004). The Waste Management Theory was chosen to be applied in this study due to the fact that, the theory provides practical approaches to the problem of solid waste management.

The Waste Management Theory underscores that solid waste need to be managed in such a way that it prevents harm to both humans and the environment. As such, waste management practices should aim at reducing production of waste by creating useful products (non-wastes) and also turning waste into non-waste (Pongrácz, 2006; Beleya, Xin-Ci, Ling-Wen, 2019). It is also argued that if the waste disposal site is not carefully managed, it results into environmental and socio-economic problems (Asefa and Mindahun, 2019; Akmal and Jamil, 2021). Therefore, sustainable solid waste management practices need to lead to a safe human health and environment.

2. Research Methodology

This study applied a qualitative research approach and it employed a case study research design. The case study research design enables and in-depth exploration of a phenomenon in its natural environment (Ndengu, 2012; Crowe, Creswell, Robertson, Huby, Avery and Sheikh, 2011). As such, this design allowed the researcher to get in-depth data from the participants in their setting.

This study was conducted in Mzuzu city. The area was chosen due to its overwhelming availability of solid waste being generated daily. Mzuzu city is in the northern region of Malawi and it has a total population of about 240,000 people, and it covers an area of 146 square kilometres (NSO, 2020). The study targeted individuals that are involved in solid waste management in Mzuzu city.

The sample size was 18. The number 18 was determined after reaching a saturation point. The participants were selected using homogenous sampling. Homogenous sampling is a type of purposive sampling technique used to select participants that have same characteristics related to a research problem under investigation. This type of sampling allowed the researcher to select participants who had practical experience and were involved in solid waste management in Mzuzu city (Nikolopoulou, 2020).

Data was generated using semi-structured interviews, focus group discussion and observations, and it was analysed thematically. Thematic analysis involved coding of data, which means breaking down and re-assembling of data into small pieces in order to identify and allocate it into categories and themes in relation to research objectives (Braun and Clarke, 2006; Ndengu, 2012; Sharp, 2012). Trustworthiness of the findings was achieved through multiple data generation procedures.

3. Results and Discussion

Using thematic analysis, three themes were identified as challenges facing MCC in its quest towards sustainable solid waste management. The themes are; human resource, technical issues and legal issues.

3.1 Human Resource

The study revealed that shortage of staff is one of the challenges that affects the day-to-day solid waste management practices in Mzuzu city. The participants expressed that:

Work force is not enough, there are about 45 workers. Out of 45, you find that some are sick, or whatever reason, it means there will be few workers. This affects work performance (Participant 4, 19.01. 2023).

Another participant adds that;

Mostly the problem we face is that we are few workers. People are dying but no replacement (FGD, 18.02. 2023).

This finding corresponds to Nuskiya and Sahana (2021) assertion that lack of human resource affects SWM practices in municipalities. Chireshe (2020) also concurs that shortage of human resource is attributed to, due to lack of financial resources which prevent the recruitment of more human resource. As such, limited number of staff is recruited thereby affecting waste management practices in Mzuzu city. To this effect, it is important for MCC to ensure that they recruit enough human resource so that, there is sustainable solid waste management practices.

3.2 Technical Issues

Apart from human resource, MCC faces technical challenges which include; breakdown of vehicles, inadequate waste bins and lack of recycling machinery.

One of the technical challenges facing Mzuzu City Council is the breakdown of vehicles. Below is what the participants stated in their extracts:

There is a problem when a vehicle breaks down, and the service is not done quickly. For example, now it has taken 9 months, when the compactor broke down with fixing it (Participant 6, 16.02.2023).

They do breakdowns frequently every now and then it breaks down. Like now it broke down June last year it was maintained December. It has stayed 6 months without moving. But for the 6 months, waste was being generated daily (Participant 1, 19.01.2023).

Another technical issue was, inadequate waste bins. As a result, some areas which deserve to have bins do not have. Consequently, people throw away solid waste anywhere. Due to this challenge, one of the participants suggested that:

Normally bins must be placed at a distance of some metres. The best way initially is to put bins in places that have people. Bins are required within short distances (Participant 2, 19.01.2023).

The findings also revealed that the MCC does not have machinery that could be used to recycle organic waste. This finding is confirmed by the researcher's field observation that was done at the dumping site. However, MCC has plans of buying a recycling machine so that they should be recycling of waste. One of the participants expressed that:

We want machine for recycling the garbage, so that we should not be dumping, but we should manage them by recycling to some other things (Participant 1, 10.01.2023).

Technical issues related to vehicle breakdowns, inadequate waste bins and lack of recycling machinery affect the day to day management of solid waste in MCC as highlighted above. Nuskiya and Sahana (2021) agree that, costs of buying and maintaining vehicles affects solid waste management practices. Chireshe (2020) also notes that lack of financial resources also affects the purchasing enough waste bins and recycling machinery. Financial resources are very crucial in sustainable solid waste management, in that it affects the costs of paying for essential services such as fixing vehicles as well as purchasing essential materials (Holm, et al, 2021; Breukelman, 2022).

3.3 Legal Issues

The other challenge affecting the proper management of solid waste in Mzuzu city was use of archaic laws. The study's findings established that MCC uses very old laws when giving fines to residents who dump waste in nondesignated places. One of the participants indicated that:

The laws and acts are outdated, were formulated in 1960. If you find a person and tell him that your fine is 500 kwacha [about half US dollar], they will pay willingly knowing that tomorrow they will dump again because they know that the amount is small. There is need for review and reinforcement, plus the punishment should be applied (Participant 1, 19.01.2023).

The findings revealed that despite having laws, MCC uses archaic laws when dealing with solid waste management practices, which is contrary to Urasa (2022) and Omar (2018) claim. Urasa and Omar belief that laws and policies need to be updated to suit the current situation, so as to prevent the dumping of solid waste anywhere by the residents. Olukanni *et al.* (2020) argue that effective laws warrant a clean and health environment, thereby compelling the public to have positive attitude and behaviour towards proper solid waste management practices. Therefore, MCC must ensure that they review the laws periodically, so that the fines that would be given to the law breakers conform to the current situation.

Conclusion and Recommendations

The study findings had provided an insight into the challenges faced by the MCC when dealing with solid waste. Proper solid waste management practices are necessary, in order prevent harm to both the human beings and the environment, as stipulated by the Waste Management Theory. The Waste Management Theory advocates that preventing harm from solid waste can be done by turning solid waste into non-waste products through recycling (Waste and ICCM, 2020; Tsai *et al.*, 2020). The recycled products could be used again. Regarding human resource, it is vital for the MCC to recruit enough staff so as to ensure that solid waste is properly managed. In addition, it is crucial to have adequate waste transportation vehicles and waste bins, in that these facilities enable proper waste management practices to take place.

For proper solid waste management to be achieved, it is essential for the MCC to review its laws regarding waste management practices so that anyone contravening the laws should be fined appropriately. The reviewed laws, would enable individuals to be vigilant and take issues of waste management seriously. Finally, in order to prevent harm to the environment and human health, it is extremely important for the MCC to have a recycling machinery or engage private entrepreneurs to carry out recycling activities. Recycling helps to turn back the used solid waste into other useful products that can be used again. This would help prevent dumping of solid waste thereby reverting harm to the environment.

References

- Akmal, T. and Jamil, F. (2021). Assessing Health Damages from Improper Disposal of Solid Waste in Metropolitan Islamabad-Rawalpindi, Pakistan. *Sustainability*, 13 2717.
- Asefa, B. and Mindahun, W. (2019). Suitable Solid Waste Disposal Site Selection Using Geographical Information System (GIS): A Case of Debre Berhan Town, Ethiopia. *American Journal of Environmental Protection*, 7(1):17-23. Available Online at: <https://pubs.sciepub.com/env/7/1/4>
- Beleya, P. Xin-Ci, C. and Ling-Wen, C. (2019). Challenges in Enhancing Solid Waste Management Towards Sustainable Environment: Local Council Perspectives. *Journal of Advanced Research in Business and Management Studies*, 16(1): 44-59
- Braun, V. And Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research In Psychology*, 3: 77-1-1
- Centrulo, N.M., Centrulo, T.B., Dias, F.G. and Ramos, T.B. (2020). Solid Waste Indicators In Local Sustainability Assessment: A Literature Review. *Ambiente and Sociedade Sao Paulo*, 23: 1-31
- Chen, X., Geng, Y. And Fujita, T. (2010). An Overview of Municipal Solid Waste Management in China. *Waste Management*, 30(4): 716-725
- Chireshe, A. (2020). *Evaluation of Municipal Solid Waste Illegal Disposal in Masvingo City, Zimbabwe: Towards A Sustainable Solid Waste Management Model. PhD Thesis*, University of South Africa.
- Debra, J.L Vidal, D.G. and Dinis, M.A.P A92020). Raising Awareness On Solid Waste Management Through Formal Foundation for Sustainability. A Developing Countries Evidence Review. *Recycling*, 6(6). <https://doi.org/10.339/ recycle6010006>
- Dri, M., Canfora, P. Antonopoulos, I.S. And Gaudillat, P. (2018). *Best Environmental Management Practice for The Waste Management Sector*, JRC Science for Policy Report, EUR 29136 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-79-80361-1, Doi:10.2760/50247, JRC111059.
- Environmental management act (EMA) (2017). *Malawi Environmental, Climate and Sustainable Development Laws*.
- Gonçalves, A.T.T., Moraes, F.F., Marques, G., Lima, F.G.J. and Lima, J.P. (2018). Urban solid waste challenges in the BRICS countries: a systematic literature review. *Revista Ambiente & Agua*, 13(2).
- Government of Malawi (2016). *Environmental and social management framework (ESMF)*.
- Malawi education sector improvement project (MESIP).
- Holm, R.M., Chunga, B.A., Mallory, A., Hutchings, P. And Parker, A. (2021). A Qualitative Study of NIMBYism for Waste in Smaller Urban Areas of a Low-Income Country, Mzuzu, Malawi. *Environmental Heights Insights*, 15:1-11.
- Kubanza, N.S. And Simatele, M.D. (2019). Sustainable Solid Waste Management in Developing Countries: A Study of Institutional Strengthening for Solid Waste Management in Johannesburg, South Africa. *Journal of Environmental Planning and Management*. doi:10.1080/0964568.2019.1576510
- Maskey, B. (2018). *Municipal Solid Waste Management in Nepal: A Case Study of Gorkha Municipality*. PhD Thesis, Hiroshima University.
- National Statistical Office (NSO) (2020). *City Population; Statistics Maps and Charts*. Zomba: National Statistical Office.
- Ndengu, D.M. (2012). *Designing and conducting quality research: a guide for post graduate students in the social sciences*. Mzuzu: Mzuni Press.
- Nwosu, A.O. And Chukwueloka, H.E. (2020). A Review of Solid Waste Management Strategies In Nigeria. *Journal of Environment and Each Sciences*, 10(6) 132-143

- Pongrácz, E. (2006). Progress in Industrial Ecology. *An International Journal*, 3(1/2).
- Prongracz, E., Phillips, P.S. And Keiski, R.L. (2004). Evolving The Theory of Waste Management-Waste Minimization. In Pongrácz, E. (Ed): *Proc. Waste Minimization and Resource Use Optimization Conference*. June 10, 2004, University of Oulu, Finland. Oulu University Press: Oulu, P. 61-76
- Reiners, G.G. (2012). Understanding The Differences Between Husserl's (Descriptive) and Heidegger's (Interpretive) Phenomenological Research. *Journal of Nursing and Care*, 1: 119. Doi:10.4172/2167-1168.1000119
- Sharp, J.G. (2012). *Success with Your Education Research Project* (2nd Ed). London: Sage.
- Tausova, M., Mihalikova, E., Culkova, K., Stehlikova, B. And Taus, P. (2020). Analysis of Municipal Waste Development and Management in Self-Governing Regions of Slovakia. *Sustainability*, 12, 5818. Doi:10.3390/Su12145818
- UNEP (2015). *Global Waste Management Outlook*. Vienna: ISWA.
- US.EPA (2020). *Best Practices for Solid Waste Management: A Guide for Decision-Makers in Developing Countries*. EPA 530-R-20-002.
- Wasteaid and ICCM (2020). *Community Waste Management in Malawi: A Feasibility Study for Improving Community Waste Management in Malawi*. Malawi.