



**THE EFFECTS OF DOMESTIC WASTE DISPOSAL AMONG
COMMUNITIES IN THE WESTERN REGION OF SIERRA LEONE -
A CASE STUDY OF WATERLOO, CALABATOWN, WELLINGTON,
FERRY JUNCTION, KINGTOM, AND LUMLEY**

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Abstract:

This study investigates the effects of domestic waste disposal among communities in the Western region of Sierra Leone and its effects on the environment in Western Rural and Western Urban areas. Waste management is a challenge in Africa and has caused health issues and adverse effects on the global climate. This study was conducted within the Freetown municipality, and data was collected from 300 respondents. A non-probability sampling technique was employed to collect information from respondents. According to the study, most people dispose of waste weekly, and their garbage is smaller. Also, the researchers revealed that people prefer burning waste in the air to other methods, and many do not have dustbins or containers in their compounds. Nevertheless, this method of waste disposal causes ill conditions in the heart, kidneys, and other vital organs. The study showed that plastics, rubbers, and paper are the common domestic waste in Freetown. Rubber and plastic are mainly used to gather waste, and this breeds parasites that cause malaria and other environmental diseases. Trucks and tricycles are used to transport waste to dumping sites.

Keywords: waste disposal, plastics, Freetown

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1. Introduction

According to Turay F. B. & Kamara O. G. (2024), the issue of domestic waste has become a significant concern in many urban areas worldwide, including the Western area of Sierra Leone. As the population grows and lifestyle changes, the generation of domestic waste has increased, leading to adverse effects on both the environment and the communities residing in those areas. The flooding it causes on the city's main street is thought to be due to indiscriminate waste disposal.

This indiscriminate disposal of domestic waste has emerged as a pressing concern for both the Western Rural District Council and the Freetown City Council. It poses a significant threat to the environment's social and economic challenges. To mitigate the detrimental impact on the environment, human health, economic challenges, and resource depletion, the government, through the various councils, should develop strong policies that will be implemented to salvage this deadly situation.

Solid Waste Management (SWM) is a significant public health concern worldwide, as poor management of waste not only leads to declining environmental health conditions but also contributes to disease outbreaks (Zulu, 2019). This creates the challenge of how to handle waste, especially after disposal (Guerrero *et al.*, 2013), making sustainable solid waste treatment a vital area of engagement for future city development. Effective and sustainable waste management practices must be developed to ensure that all generated waste is well disposed of and treated that.

As we are in the twenty-first century, the world must take steps to solve the ever-increasing burden of garbage – in its municipalities. We are all part of the problem, but we can also be part of the solution.

The United States produces about 200 million tons (220 million U.S. tons) of municipal solid waste each year. This equates to about 2 kilograms (4.4 pounds) of trash per person per day or 0.73 tons (0.8 US tons) per person per year. The amount of municipal solid waste has doubled since 1960, and the per capita waste has increased by nearly 10%.

The United States and Canada, therefore, are world leaders in waste production. For example, Toronto, Canada, is running out of places to put its municipal solid waste. Even with a very ambitious plan to reduce waste production by 50%, the metropolitan area will run out of space to accommodate waste generated. The outlying districts are not willing to be the sites of a new landfill for Toronto, and the metropolitan area is looking for disposal sites north of the city and in the United States. Many states that could serve as disposal sites are beginning to pass laws regulating the importation of waste from other countries and metropolitan areas. Toronto continues to struggle with its waste problem.

Archaeologists rely on the waste of post-societies to tell them about the nature of the culture and lifestyle of ancient civilizations.

Plastic waste also poses public health issues, as blocked drainage causes water to stagnate and mosquitoes to breed in a region where malaria is endemic in times of floods,

water is contaminated by mud, and water is washed into open drinking water wells, which can lead to poor health.

The problem of solid, liquid, and toxic waste management in Africa has come with urbanization in the developing world. An essential feature of the urbanization of the developing world is the rapid growth of cities and metropolitan areas. The high rate of urbanization in African countries implies a rapid accumulation of refugees. Social and economic changes that most African countries have witnessed since the 1960s have also contributed to increased waste generated per capita. As a result, municipal waste management constitutes one of the most crucial health and environmental issues facing managers of African cities. Proper waste management is a public benefit and obligation. Improper waste disposal by one individual affects the entire city. As a policy, countries have tasked every individual, establishment, or institution to contribute significantly to the process of keeping their communities and environment clean.

The solid waste problems facing us today have their roots in the economic boom that followed World War II. Marketing experts are set to work on new tactics to get consumers to buy and toss or, as economists say, to “stimulate consumption.”

After several decades of throw-away living, the disposable lifestyle in cleaning many cities and countries faced a shortage of space in old landfills. Solid waste has become a significant problem, and in a growing number of communities around the country, it has reached crisis proportions. Many parts of the country, in heavily populated areas like Freetown, are currently running out of places to put their garbage.

Sierra Leone is among the most vulnerable countries to climate change, and with an average rainfall of 3,600 liters (equivalent to about 18 bathtubs) per square meter per year, flooding affects the country regularly. The average flash flooding landslide that killed thousands of people in Freetown in August 2017 illustrates how the accumulation of plastics in drainage systems by poor city planning exacerbates the problems of last year’s flooding, which displaced about 5,000 slum dwellers in Freetown.

The study identified the types of domestic waste frequently generated in Freetown municipality and Western Rural District, as well as the environmental issues associated with the management of solid waste in the Western Region. Also, the study identified the method of waste disposal within the Western Region and recommended to the Government and non-governmental organizations how to tackle waste management issues In the Western Region of Sierra Leone.

2. Research Questions

- 1) What are the various problems encountered during solid waste collection and disposal?
- 2) What households in the Freetown municipal frequently generate different waste?
- 3) What are the effects of improper waste disposal on inhabitants living around the dumpsite communities in the Western Region?

- 4) What are the methods of waste disposal frequently used in Freetown and its environs?
- 5) What are the solutions and strategies for collecting waste materials in the Western Region?

2.1 Statement of the Problem

To fulfill Freetown City Council's mandate of assisting in the development of sound Waste management strategies and ensuring that the waste disposal method is proper in all parts of the city. Freetown City Council and Waterloo District Council have been supportive of Massada Waste Management company in having a proper way of managing the waste disposal method in Freetown and Waterloo.

Moreover, to encourage people and Massada Company and to promote sustainable resource development, over the years, the city council has bought many vehicles, waste disposal bills, and tricycles to help with the proper way of managing the waste. Despite these interventions, waste management strategies are still worrisome, as some communities dispose of waste materials in the gutters of their streets, which has caused much flooding in the streets of Freetown. Thus, this study seeks to investigate the proper implementation of the existing interventions and other plausible measures that could be used in managing waste disposal strategies in Sierra Leone.

3. Methodology

3.1 Research Design

The study employed a survey design because of its broad capability to solicit objective responses from the sample on the subject under consideration (Fowler Jr., 2013).

3.2 Population

The population comprised a selected number of people living around the dumpsite environment, officers of the dumpsite, Masada officers, and Freetown and Waterloo Councils.

The elements used in the collection of data for this study were strictly qualitative. The study also adapted to the descriptive and participatory of people in different communities. The research strategy involves people through interviews and participation of people in the questionnaire. Quantitative tools like census and survey processing (CSPRO) systems were used to capture the data and export it to SPSS for more descriptive statistics like tables and graphs.

This type of research design is to collect data from respondents who are believed to be a representation of a population, in a specific geographical area. Interview and questionnaire administration were used to conduct this study. A focus group discussion was also used to facilitate the gathering of relevant information to meet the objectives of the study and the area in question.

3.3 Sample Size and Sampling Procedure

Convenient sampling and purposive sampling techniques were employed to draw the sample population for the study. A total number of 300 residents were sampled out of the entire population that lives in the communities closer to the dump site. This sample size was considered appropriate for the study since it represents a fair size of the residents around the dumpsite communities in Freetown.

The time limit for the completion of the study was so short that it was impossible to choose a larger sample of the population. A purposive sampling technique was used to select residents with houses near the dumpsites. Convenience sampling was also used because only available and willing residents had questionnaires being administered to them. The sampled respondents were deemed to have the required information relevant to answering the objectives of this study. A purposive sampling technique was also used to select five (5) staff members from the Freetown City Council and five from the Western Rural District Council.

3.4 Mode of Data Collection

Both primary and secondary data sources were used for the study. Secondary data for this study were collected from the Freetown city council, which entailed relevant documents needed to answer the objectives of this study. In addition, articles, journals, textbooks, and other relevant information from the internet were also used.

Primary data were the first-hand information collected during the study. The primary data of this research were collected through the questionnaires administered to local inhabitants of the targeted communities and interviews conducted during the data collection for the study.

3.5 Research Instrument

Questionnaires comprising five sections and composed of open and closed-ended items were adopted and used to collect data from the respondents.

Section A contains items that solicited the demographics of the respondents; Section B contains items that elicited respondents' views on the extent of determining the different waste frequently generated by households in the Freetown municipal. Section C will examine the various problems encountered during solid waste collection and disposal; Section D will examine the effects of improper waste disposal on inhabitants living around the dumpsite communities. Section E will provide information on the methods of waste disposal frequently used in Freetown.

3.6 Data Analysis

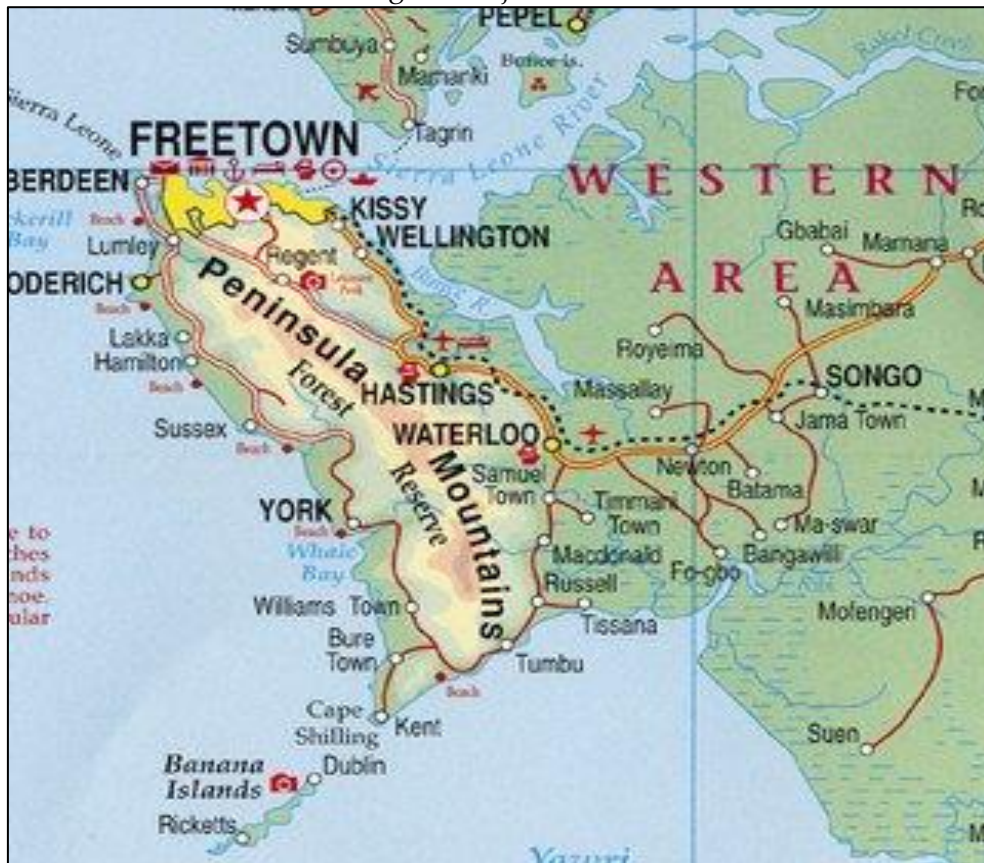
Quantitative analysis of the data collected from the field survey was done using SPSS software. The results are presented in graphs tables, graphs, and charts for straightforward interpretation.

3.7 Data Processing and Analysis

The questionnaires were administered in each community, i.e. Waterloo, Akram Ferry junction, Calaba town, Kingtom, and Lumley. The data were entered and edited on microcomputers using the Census and Survey Processing (CSPRO) software. CSPRO is designed to fulfill the census and survey data processing needs of data-producing organizations worldwide. CSPRO allows range, skip, and consistency errors to be detected and corrected at the data entry stage.

After the data had been captured using CSPRO, the data was exported to SPSS for forward descriptive analysis.

Figure 1: Map of Freetown Municipality and Waterloo Showing the Major Roads and Settlements



Source: CGIS Statistics Sierra Leone

4. Results and Discussion

4.1 Demographic Characteristics of the Respondents

Table 1 shows the demographic information of the respondents for this study. It shows that 81.7% of the respondents are female, and 18.3% are male. Also, 45.7% are single, and 45% are married. The age bracket shows that most of the respondents are within the age bracket 18-50, with the highest being 36-50. This means that more than half of the Freetown population is below 35 years old. About 51% of the respondents attended a

non-formal education, 71% attended primary and 30% attended secondary school. In addition, most of the respondents are traders, with 54%, 40% to farmers, 28% to NGO workers, and 22% to teachers. The biography information indicates that the respondents are capable of understanding the scope of this research and can provide truthful and honest information for this study.

Table 1: Demographic Characteristics of the Respondent

Detail	Values	Frequency	Percentage
Gender	Male	55	18.3
	Female	245	81.7
Marital status	Married	135	45
	Single	137	45.7
	Divorce	14	4.7
	Widow/widower	14	4.7
Age	18-35	123	41.0
	36-50	133	44.3
	50-60	33	11.0
	60-70	8	2.7
	70-80	1	.3
	80-90	1	.3
	90-100	1	.3
Education background	Non-formal education	153	51.0
	Primary education	71	23.7
	Secondary education	30	10.0
	Tec-voc. institution	19	6.3
	Teacher training college	12	4.0
	University education	15	5.0
Occupation	Trader	162	54.0
	Farmer	40	13.3
	Student	17	5.7
	Teacher	22	7.3
	Civil Servant	16	5.3
	NGO Worker	28	9.3
	Fishermen	5	1.7
	Doctor/Nurse	10	3.3

Research Question One: What Are the Various Problems Encountered During Solid Waste Collection and Disposal?

Figure 1 shows the percentage of household waste in Freetown. It shows that 82% of the respondents do not have public containers to deposit waste, and 18% have public containers in their compound. Also, it shows that 90% of the respondents do not have dustbins, and only 10% have dustbins in their compound. This implies that most people living in the city do not have dustbins or public containers in their compounds. As a result, these significantly contribute to spreading diseases and causing floods in the city.

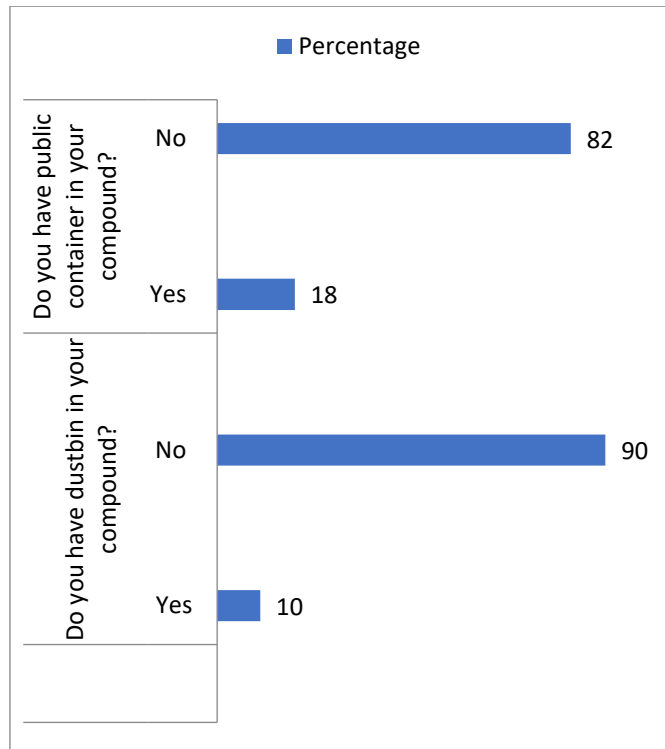


Figure 1: Percentage of Households Waste Collected in Freetown

To create awareness among the people, the city council should embark on public sensitization on the consequences of improper disposal of Waste among people in different communities in the western region. These are the problems encountered during solid waste collection and disposal, as household members do not have dust bills for collecting waste materials. Both Freetown and Waterloo Council have implemented robust methods to salvage this problem.

The extent of implementation of these interventions will help to prevent or detect any anomalies that may occur primarily in the rainy season. For instance, people might be afraid to be involved in disposing of waste in the street and drains when there is public sensitization about its consequences to them and the nation. Furthermore, briefing stakeholders, officers at the city council, and Masada waste management company would abreast them with the rules and regulations, dos and don'ts of waste disposal management, thus keeping them well informed about their responsibilities

Table 2: How Often Do You Dispose of Your Waste?

	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Daily	30	10	10	10
Weekly	252	84	84	94
Monthly	18	6	6	100
Total	300	100	100	

Table 2 shows how frequently the respondents dispose of waste. It shows that 84% of the respondents mainly dispose of their waste weekly rather than daily or monthly period.

It implies that many people in Freetown prefer to dispose of waste by week and this may allow breeding of parasites that cause malaria and inconvenient pollution.

Research Question Two: What Is the Different Waste Frequently Generated by Households in the Freetown Municipal and Waterloo?

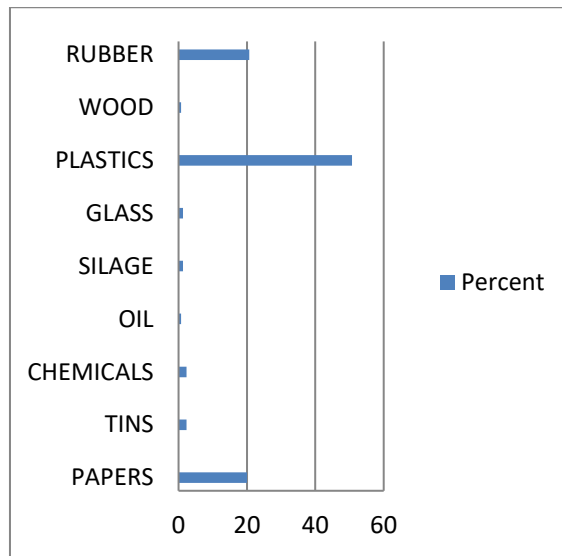


Figure 2: Types of Domestic Waste Frequently Generated in Freetown Municipal

Figure 2 shows that plastics, rubber, and paper are the most common waste frequently generated by households, which accounts for 50.7%, 20.7%, and 20.0%, respectively. This is why plastics and rubber drinks usually float in the street during the rainy season, which usually results in flooding during the rainy season in the streets of Freetown because plastics and rubbers do not allow the free flow of water in the gutter. The city councils and Masada waste management should come up with strategies that will be used for the proper collection of this waste in these communities to avoid flooding during the rainy season.

Table 3: Size of Waste Disposal

Detail	Frequency	Percent (%)
Large	51	17
Small	135	45
Medium	114	38
Total	300	100

Table 3 shows that most households produce little and medium-sized waste, with 45% and 38%, respectively. This indicates that most households have more small sizes of waste disposal than large or medium sizes because they can be quickly loaded in trucks and tricycles.

Research Question Three: What Are the Effects of Improper Waste Disposal on Inhabitants Living Around the Dumpsite Communities and Its Environment?

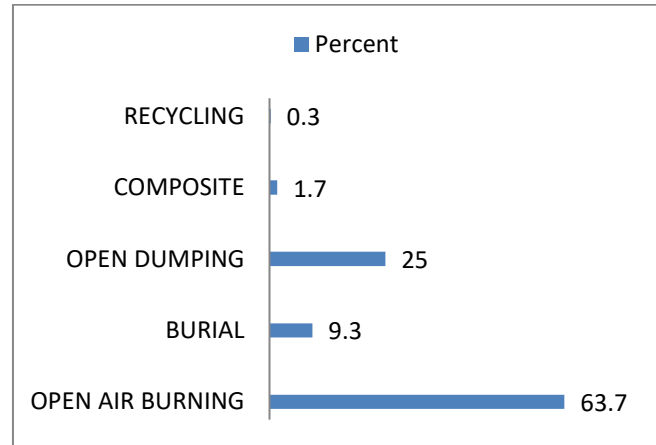


Figure 4: Method Used by Officials to Dispose of Waste from Households

Figure 4 shows the method used by officials to dispose of household waste. The figure reveals that 63.7% used open-air burning in the dumpsite, 25% used open dumping, and about 9% used burial to dispose of household wastage. This means that most people prefer open-air burning over other waste disposal methods. This method hurts the environment and causes air pollution and climate change.

This method harms the lives of inhabitants living around the dumpsite area in both the Freetown and Waterloo districts.

The burning of plastic grain and rubber releases chemicals into the air that we all breathe, causing severe lung damage and contributing to other long-term health problems. For people with lung diseases such as asthma and chronic obstructive pulmonary disease, even a single exposure to this type of smoke can worsen their disease.

Figure 5 shows the effects of the open-air burning method. It shows that open burning can lead to a threat to the normal functioning of human hearts, eye irritation, and breathing difficulties, which account for the burning of asbestos-containing materials, rubber products, and waste paints led to the production of toxic fumes and odorous smoke to the atmosphere which particles combine with the air, thus causing lodging deep in our lungs during respiration bringing about problems in breathing. With time, it can lead to diseases such as bronchitis, lung cancer, and asthma.

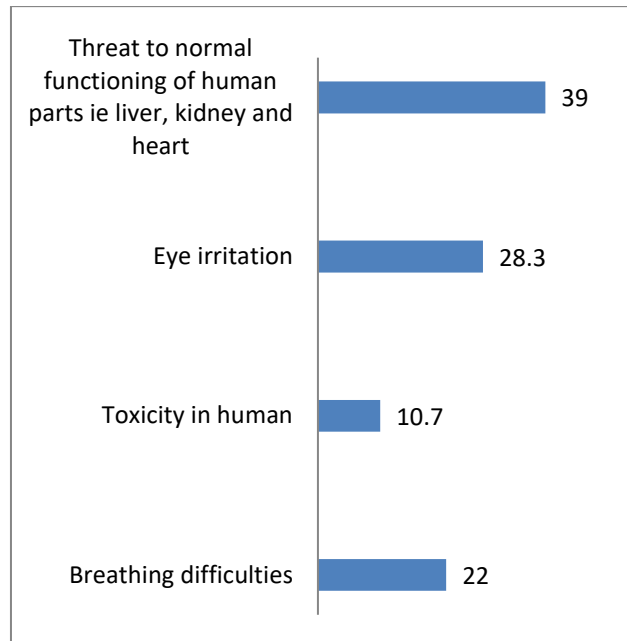


Figure 5: Effects of Open-air Burning Method of Disposal

All the categories of respondents alluded that open-air burns will threaten the normal functioning of human hearts, which accounts for 39%, followed by eye irritation, which accounts for 28.3%, and breathing difficulties, 22%.

Furthermore, if the proper way of handling waste is well handled, it will help eradicate most of the adverse effects on the lives of inhabitants living around the dump site.

Figure 7 shows that most households experienced malaria due to waste disposal, with 73.7%. This means that most areas served as breeding sites for mosquitoes, increasing malaria's prevalence in most communities.

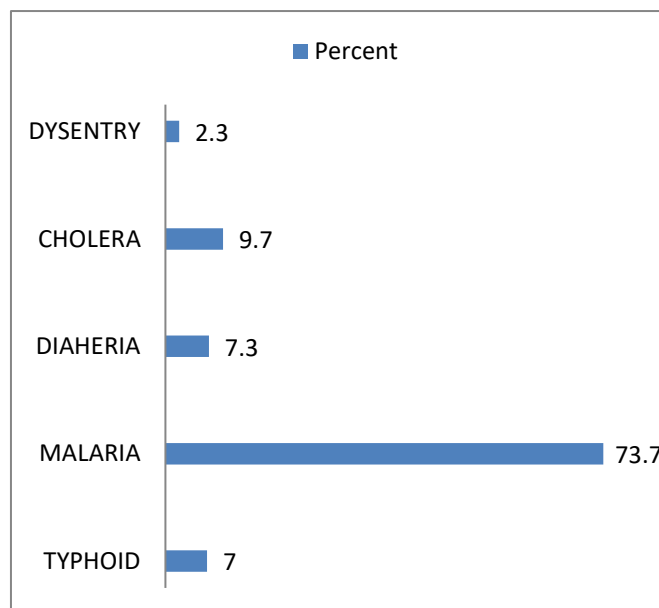


Figure 7: Common Sickness Experienced by Households

Research Question 4: What Are the Methods of Waste Disposal Frequently Used in Freetown?

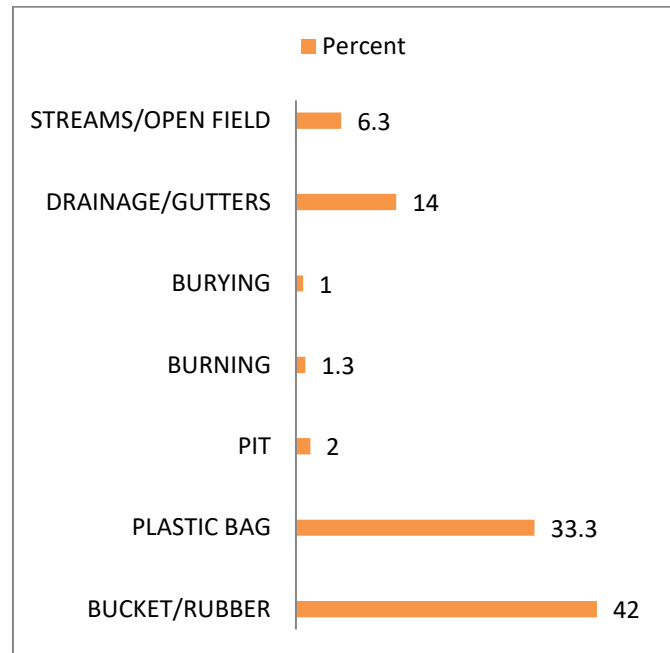


Figure 3: Method of Domestic Waste Disposed by Household

Figure 3 shows that 42% of the respondents used buckets to gather and dispose of waste, while 33% used plastic bags to gather and dispose of waste. This method is unreliable in gathering and disposing of waste generated by household members in this community.

Most categories of respondents admitted that there had been no proper way of disposing of their waste. The Freetown City Council and Waterloo City Council should distribute waste bills to all households in the Western region for proper waste collection in Freetown.

More security random checks were always deployed in schools and households to determine the proper ways of disposing of their waste in their communities.

These imply that the Freetown Council is honouring its roles in implementing interventions to curb indiscriminate ways of waste disposal.

Figure 9 shows that the primary means of waste disposal in Freetown municipal are through trucks and tricycles, which account for 58.7% and 30.3%, respectively.

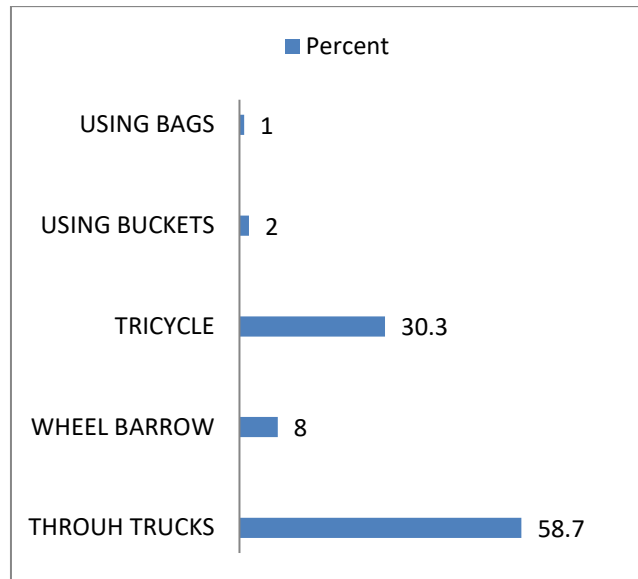


Figure 9: Means of Waste Disposal at the Dump Site

5. Summary of Findings and Conclusions

5.1 Summary of Findings

The summary of the findings is as follows:

- This study covers the types of domestic waste frequently generated in Freetown municipality, the environmental issues associated with solid waste in Freetown municipal, and the method of waste disposal within the Freetown municipal. From the research findings, the majority of the respondents strongly agreed that open-air burning and dumping or 'landfilling' has been the method of waste disposal in Freetown, which is the worst waste management option. It uses up space and creates a future environmental liability. It represents a waste of resources.
- The burning of plastic grain and rubber releases chemicals into the air that we all breathe, causing severe lung damage and contributing to other long-term health problems. For people with lung diseases such as asthma and chronic obstructive pulmonary disease, even a single exposure to this type of smoke can worsen their disease. This can result in hospitalization, increased use of expensive medications, and absences from their work.
- The table above further reveals that there are high environmental implications of indiscriminate disposal of waste in the targeted communities, which shows that there is always a stench smell of the environment, which is also prone to outbreak of diseases, which account for 56.3% and 23.0% respectively.

From the interviews, the effects of open-air burning have created most of the problems we encounter in our environment today, with climate change having the highest, followed by irritation of the environment and leaching into the soil. Burning biomass leads to the release of a thick black toxic smoke, mainly composed of carbon. The

large-scale production of soot leads to the absorption of sunlight and reduces the reflective nature of the environment. It results in reduced sunlight being reflected into space, known as the albedo effect, which contributes to global warming.

5.2 Way Forward and Suggestions for Further Study

5.2.1 Way Forward

Based on the findings, the following were suggested as a way forward:

- Stakeholders at community leaders should ensure that all facilities that need to be provided by them for the implementation of the proper way of disposing of their waste been given by the councils and government to avoid indiscriminate disposal of waste in the street gutters;
- Most people dispose of waste every week, and their garbage is in smaller sizes;
- Also, the research revealed that people prefer burning waste in the air to other methods, and many people do not have dustbins or containers in their compounds;
- This method of disposing of wastes causes ill-condition of the heart, kidneys, and other vital organs in the body;
- The study showed that plastics, rubbers, and paper are the common domestic waste in Freetown; rubber and plastic are mainly used to gather waste, and this breeds parasite that causes malaria and other diseases in the environment;
- Trucks and tricycles are used to transport waste to dumping sites;
- Sensitization programs and workshops to dilate on proper methods of disposing of waste and its consequences on the communities and nation;
- Massada waste management company should improve on the method of disposing of waste materials to avoid flooding and effects on communities' people;
- The government should finalize arrangements for the purchase/sale of dust bins, tricycles, and vehicles to help collect and dispose of waste.

5.3 Suggestion for Further Study

A similar study should be conducted to include the opinions of officers from Massada Waste Management company in Freetown, Sierra Leone, in implementing its interventions to curb indiscriminate waste disposal methods in the western region of Sierra Leone.

5.4 Limitations of the Study

A significant limitation of the study was that the views of Massada Waste Management officers were not sought.

6. Conclusion

Based on the findings from this study's research, it can be concluded that the waste management situation in Freetown Municipal is very bad; it hurts the environment and the health of residents in the communities closer to the dump site. The official must

provide the necessary waste management services and help recycle the waste to maintain good health. Based on the findings from this research, the following recommendations were made. The local government should provide an awareness-raising campaign for properly managing waste in Freetown. In addition, the local government should provide containers in all communities to collect waste. It will also be necessary for households to provide dustbins to help reduce waste dumping into gutters and stop flooding during the rainy season. It increased the number of tricycles or vehicles to enhance a smooth way of collecting waste. The Freetown city should enforce the laws for the unlawful disposal of waste. To have lasting waste management procedures, it is necessary to recycle waste to produce electricity.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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