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Comprehensive Assessment of Solid Waste Management Systems in Freetown; Analysis of Recycling Infrastructure, Collection Processes, Sorting Mechanisms and Material Recovery Facilities

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Abstract

Solid waste management in Freetown has been further complicated in the wake of rapid population growth and urbanization, resulting in considerable pressure to implement effective and sustainable solutions. This study fills the knowledge gap on the recycling infrastructure, solid waste collection processing, sorting and material recovery facilities specific to the Freetown waste management system. The aim of this study is to examine these components in terms of identifying inefficiencies and suggest sustainable practices to eliminate them. The study was guided by a mixed-method approach, which consisted of both quantitative and qualitative methods, and data collection was done through systematic random sampling. The sample of 384 respondents was collected, which includes stakeholders from a range of sectors. The outcome exhibited inefficient waste collection, a lack of formal recycling infrastructure, and suboptimal waste separation at house level, with 65.2% of respondents evidencing not separating their waste and 33% being without access to waste collection services that result in illegal dumping and environmental pollution. The analysis of the solid waste composition shows that a larger share of the waste generated in Freetown is composed of organic material (53% is being organic), which allows for composting programs to be initiated. This research establishes the inevitable requirement for infrastructure upgrading, mounting public awareness, and policy development. By taking into account these sectors, Freetown can become a more environment-friendly waste management system, which would mean a reduction in landfills and much-emphasized resource recovery.

Keywords

Solid Waste, Waste Recycling, Material Recovery, Waste Sorting, Municipal Solid Waste Management

1. Introduction

The rapid-growing of economy and urbanization have led to the rise of municipal solid waste (MSW) worldwide (Zhao et al., 2016). With this increasing population and urbanization, solid waste Management remains at the forefront of policy debate and discourse across the globe (Bom et al., 2017). One of the main goals of contemporary municipal solid waste (MSW) management and policy research is to develop and implement programs and practices that can increase recycling and reduce the amount of MSW flowing into landfills and incinerators (Park & Lah, 2018). According to Xu et al. (2016), recycling includes the methods of separating, collecting, and reprocessing or converting used or waste products into new materials. It is important to know that in the 21st century, the sustainable management of municipal solid waste (MSW) has become necessary at all phases of impact from planning to design, to operation, and to decommissioning. As a consequence, the spectrum of new and existing waste treatment technologies and managerial strategies has also spanned from maintaining environmental quality at present to meet sustainability goals in the future (Pires et al., 2011). Concern over solid waste management is growing, especially in developing countries with little funding, no technology, and no established policy framework (Pheakdey et al., 2022). Over the past decades, the problems associated with municipal solid waste (MSW) management have acquired an alarming dimension in the developing countries. High population growth rates and increased economic activity in urban areas of developing countries, combined with a lack of training in modern solid waste management practices, complicate efforts to improve solid waste management services. In developing nations, the amount of solid waste generated per person in urban residential areas is significantly lower than in developed nations; however, the ability of developing nations to efficiently collect, process, dispose of, or reuse solid waste is severely constrained (Ahsan et al., 2014). Furthermore, Municipal solid waste collection schemes in cities in developing countries only cover a small portion of the urban population. Those without waste collection services are mostly low-income people living outside the city. One of the main reasons is the lack of funds to cope with the increasing amount of waste generated in rapidly growing cities. In many cases, the fees are not sufficient and the lack of funds from the city's general budget makes it impossible to provide an adequate level of service. However, economic constraints are not the only factor that affects the availability and sustainability of waste collection services. The poor management of SW services managed by cities is due to the lack of organizational structures, the lack of management processes, or the incomplete management of the

entities involved, and the use of appropriate technologies (Zurbrugg, 2003).

In Sierra Leone, the Freetown municipality has long had problems with waste management. The limited resources of the companies in charge of waste collection and disposal lend support to this (Gogra et al., 2010a) According to research conducted for the Government of Sierra Leone by Sood (2004) the Freetown municipality produces more than 742 tons of solid waste every day, or 0.45 kg per person on average. Of this, more than 84% is biodegradable organic waste, mostly from vegetable markets and residential areas, the few industries in Freetown generate about 20 tons of solid waste per day, the majority of which is made up of broken glass. The municipal solid waste management system in Freetown faces challenges such as lack of funds, low awareness, and ineffective collection and disposal practices, among others. Unhygienic municipal solid waste management practices such as dumping, open burning, and illegal dumping are common among households in Freetown municipality. Municipal solid waste sorting is not systematically carried out, making recycling and recovery almost impossible (Kanty et al., 2024). Increasing recycling reduces climate, environmental, and social impacts of materials use, and keeps valuable resources in use instead of in landfills (Lee & Lee, 2015).

1.1. Study Area

The capital and largest city of Sierra Leone is Freetown. It is a large port city on the Atlantic Ocean, located in the western part of the country in West Africa. Sierra Leone has a tropical, hot, and humid climate. The rainy season lasts from May to December and the dry season from December to April. The country receives 495 cm of rainfall annually, with Freetown receiving the most, over 3,500 mm, making it one of the wettest coastal regions in West Africa. Other major cities in Sierra Leone include Bo, Kenema, Makeni, and Koidu (Gogra et al., 2010a).

The port, located at Queen Elizabeth Wharf 11, is one of the largest natural harbors in the world and occupies part of the Sierra Leone River estuary (Gleave, 1997). Ships can dock at the Queen Elizabeth II Wharf, which also serves as Sierra Leone's main port. The city is divided into eight administrative sections: East 1, East 2, and East 3 are located in the eastern part of Freetown; Central Freetown contains Central 1 and Central 2; and West 1, West 2, and West 3 are located in the western part of Freetown.

1.2. Existing Situation

The 10-year uprising (1991-2001) had a significant impact on the economic and infrastructural development of Freetown, including the vandalism or complete destruction of waste management equipment, such as trucks, large bins/containers, and houses (Gogra et al., 2010a). Since the end of the war, the result of the high population migration has been poverty, poor housing, inadequate sanitation, traffic congestion, pollution, poor public services, and chronic unemployment, especially among the youth, most of whom are not able to work. The ubiquitous

accumulation of garbage is visible everywhere. In addition, most of the city's sewers are clogged with garbage. A number of manhole covers have been removed to remove the debris. Many existing containers (large containers) that also serve as transfer stations for solid waste have been broken. Garbage is often strewn everywhere and scavengers, mainly children and stray dogs, birds, pigs and other animals, dig through the garbage and scatter it. Residents of coastal areas of the city throw their garbage into the sea. In slums, collected garbage is often set on fire. This situation contributes greatly to the significant increase in the incidence of vector-borne diseases in the city (Gogra et al., 2010a). The FWMC today still struggles to manage waste with a tight budget, a trained but inexperienced workforce, inadequate and faulty equipment, inefficient collection practices with varying levels of service and poor and unsanitary operational practices, in the absence of environmental control systems and little or no legislative authority and experience in waste management (Gogra et al., 2010b).

2. Literature Review

2.1. Global Context of Solid Waste Management

One of the major challenges of the 21st century is municipal solid waste management (MSWM), especially in urban areas all over the world. The increase in the generation of solid waste is dependent on the population and wealth of any country. The negative impact of waste generated by anthropogenic activities on human health and the natural environment can be reduced only through effectual and efficacious management of solid waste. A suitable framework of waste management for a particular nation is developed after a thorough understanding of its environmental characteristics, waste produced, and resource availability (Pratap et al., 2021).

Material and resource recovery from waste has significant environmental benefits in terms of resource extraction and avoidance of the associated environmental burdens from the extraction process. Simply, resource recovery from waste, not only gains material benefits, but it also avoids potential environmental burdens to acquire the material from nature. Therefore, evaluation of waste management performance should take into account comprehensive resource recovery benefits as well as environmental benefits (Zaman, 2016). However, a Conventional response for collection, transportation, treatment and disposal of waste in an environmental friendly still remain a burden due to rapid increase in waste generation levels as a result of urbanization and economic growth (Memon, 2010).

2.2. Comparative Analysis of Solid Waste Recycling System in Sierra Leone China Demark and USA

2.2.1. Sierra Leone

Recycling and Reuse is considered an important element of waste collection. At present, recycling in Freetown is very limited, and practiced in a highly informal manner. Recycling is a series of activities that includes collecting recyclable

materials that would otherwise be considered waste, sorting and processing recyclables into raw materials such as fibers, and manufacturing raw materials into new products. Common household items that contain recycled materials include newspapers and paper towels; aluminum, plastic, and glass soft drink containers; steel cans; and plastic laundry detergent bottles. In Freetown, numerous scavengers, mostly women and children are always working at the two landfill sites, at illegal dumps and garbage skips to pick up saleable items such as plastic sheets, cans, and coconut shells for sale to local industry. Given unhealthy and often smoke-filled environment, especially at the two landfills, which poses considerable health risks to scavengers (Sood, 2004). At present, there are a few private recycling industries profitably operating in Freetown. These industries manufacture footwear, wheelbarrows, cooking pots, watering cans and other items using recyclable materials

2.2.2. China

Over the past decades China has been facing an increase in population and immense economic development. This development is also linked to an enormous growth in solid waste generation. No other country has ever experienced as vast or as fast an expansion in total solid waste quantities that China is now facing (Linzner & Salhofer, 2014). However, in addressing this situation, China has made great efforts to recycle valuable wastes and reduce the amount of MSW that would be disposed of in landfills and incinerated. For instance, increasing the harmless MSW treatment capacity by 252 (from 2107 t/d in 1980 to 533,455 t/d in 2014), and the number of non-polluting disposal plants increased by a factor of 47 (in 1980: 17 units; in 2014: 818 units) (Zhu et al., 2020).

2.3.3. United States of America

The recycling industry in US creates 700,000 jobs, US$7 billion in tax revenues, and US$37 billion in wages every year (Lee & Lee, 2015).

In the case of Florida, the city has developed several programs that will enhance solid waste recycling.

First, pay-as-you-throw is a recycling program that charges collection and disposal fees to households based on the amount of generated MSW; thus, households are assumed to make an effort to recycle more and generate less waste to save money.

Second, Recycle Bank is a private organization that rewards customers for increased recycling with discount coupons supplied by local vendors of goods and services (Hadjilambrinos, 1999) Households gain more coupons as they put in more recyclables in designated containers; thus, they are expected to recycle more.

Third, the existence of a recycled product market means that there is a private market of recycled goods within the county. For example, in some counties, recycled products, such as clothing and other apparel, furniture, office products and printing papers, are available (Hadjilambrinos, 1999). Households in counties with a recycled product market receive indirect incentives to recycle because their

increased MSW recycling reaches the local (county) recycling product manufacturers who are likely to sell the products at a cheaper price based on the lower cost of obtaining second-hand raw materials (recyclables).

2.2.4. Denmark

Denmark is one of the countries that has a high incineration capacity. In 2012 it experienced an over-capacity of 20 per cent due to the decrement of domestic waste amounts sent to incineration as a result of higher recycling rates and lower waste generation. In 2012, ten out of twenty-nine incineration plants imported waste. According to studies (Casti, 2020) next decade, waste available for incineration in Denmark is predicted to decrease due to the stringent recycling targets adopted in 2022.

2.3. Solid Waste Collection Methods

Inadequate collection and disposal of solid waste is a major factor in the spread of disease and environmental degradation (Kassim, 2006). However, waste management is more than just collecting waste (Beliën et al., 2012). Solid waste management involves the processes of generation, collection, transport, treatment, value recovery, and subsequent disposal. Poor design of any of these processes increases operational cost and can result in environmental pollution (Kyessi & Mwakalinga, 2009).

Collection of solid waste typically consumes 60 - 80 percent of the total solid waste budget of a community. Therefore, any improvement in the collection system can reduce overall cost significantly (Singh et al., 2014). According to Rambandara et al. (2019), One of the means to ensure enhanced performance in solid waste collection is the effective routing of collection trucks. Routing represents a path between locations such as an origin and destination for the routed object

Frequency of waste collection should be as high as once per day to avoid the accumulation of waste, which can spread infections (Attrah et al., 2022). For Freetown, Waste collection for residents is free this could be a major factor why the efficiency in waste collection is very low.

2.4. Challenges Faced by Stakeholders in Managing Solid Waste in Freetown

The management of SW in Freetown has become a significant problem that has been worrisome to residents, government, and international donors. The proper management of SW is essential for a healthy environment and the well-being of all residents in the area. Many findings have stated that if household, industrial, public, and commercial waste are not managed effectively, it will lead to environmental degradation. Open spaces in Freetown are being misused for activities such as illegal disposal of waste and defecation. Inadequate financial support, technical know-how, attitudes of the residents, and WM workers, mismanagement of funds, ineffective policy enforcement, low level of awareness and education, inefficient waste collection fees systems, etc., are all challenges that are

hindering the sustainability of SWM in Freetown (Kanty et al., 2024).

3. Materials and Methods

3.1. Research Design

In line with previous studies, the study used a mixed research design (Kanty et al., 2024; Sankoh et al., 2012). The ability to analyze data using both qualitative and quantitative methods increases the precision and depth of findings (Cataldo et al., 2020). A questionnaire and interviews were used to learn more about the backgrounds and experiences of participants with solid waste management methods, including as recycling, collection procedures, sorting systems, and material recovery facilities in Freetown (Cataldo et al., 2020; Hahs-Vaughn & Lomax, 2013).

3.2. Sampling Technique

The study used a simple random sampling technique to ensure that each participant in the target population had an equal chance of being chosen (Kanty et al., 2024). This method enhances the representativeness of the sample and minimizes selection bias, making the findings more generalizable to the broader context of solid waste management in Freetown. The approach was especially appropriate considering the wide range of stakeholders in waste management systems, such as householders, recycling plant operators, garbage collectors, and legislators. Through the provision of an objective sample, this method enables a thorough evaluation of the entire systems. The sample size of this study was determined using the formula, $N = \left(Z^2 \times p(1-p)\right) \Big/ m^2 = (1.96)^2 \times 0.5(1-0.5) \Big/ (0.05)^2 = 384$.

3.3. Data Collection

To collect both quantitative and qualitative data, a structured questionnaire was created and distributed, enabling a thorough examination of Freetown's solid waste management systems (Sankoh et al., 2012). While the qualitative data recorded stakeholder perspectives, difficulties, and suggestions, the quantitative data offered quantifiable insights into factors like recycling rates, collection effectiveness, and sorting accuracy. A comprehensive grasp of the systems, procedures, and mechanisms underlying solid waste management was made easier by this dual approach (Hahs-Vaughn & Lomax, 2013). Because of the questionnaire's standardized style, which guaranteed consistency in responses, the results could be compared and relied upon across various participant groups.

3.4. Data Analysis

The final sample consisted of 384 respondents to the survey. The responses to the questionnaire were entered into the Statistical Package for Social Sciences (SPSS) software and Microsoft Excel for statistical analysis and interpretations (Monson, 2024). The study's conclusions are reached through explanatory and descriptive analysis (Kanty et al., 2024).

4. Results and Findings

4.1. Demographics of Respondents

Freetown, the capital of Sierra Leone, is the most populous city in the country. According to the 2021 mid-term population and housing census, the city currently has a population of 200,004. This population consists of diverse groups from across Sierra Leone. Most of Freetown's lower-income residents live in hillside slum areas, which are often susceptible to natural disasters.

The survey findings revealed that 55.4% of the respondents were female, while 45.5% were male. This implies that the researcher captured a higher number of females than males in the study sample, as shown in Table 1.

Table 1. Frequency of sex distribution of respondents.

Responses	Frequency N	Percent %
Male	175	45.5
Female	209	55.4
Total	**384**	**100**

Source: Authors field Research, 2024.

4.2. Occupation of Respondents

Occupation level is linked to income, and has a greater connection with solid waste generation. Those with higher-paying jobs might be more willing and able to pay for formal waste collection services or invest in recycling equipment. Conversely, those with lower income might lack access to formal waste management services and rely more on informal waste disposal methods such as illegal dumping and burning. The investigation into the respondents' occupation level found that 31.4% were traders, 16% were government employees, 12% were housewives, 15.1% reported being self-employed, 15.3% reported being non-government employees, and 6% reported being unemployed. This shows that the majority of the respondents contacted were traders as shown in Table 2.

Table 2. Occupation of respondents.

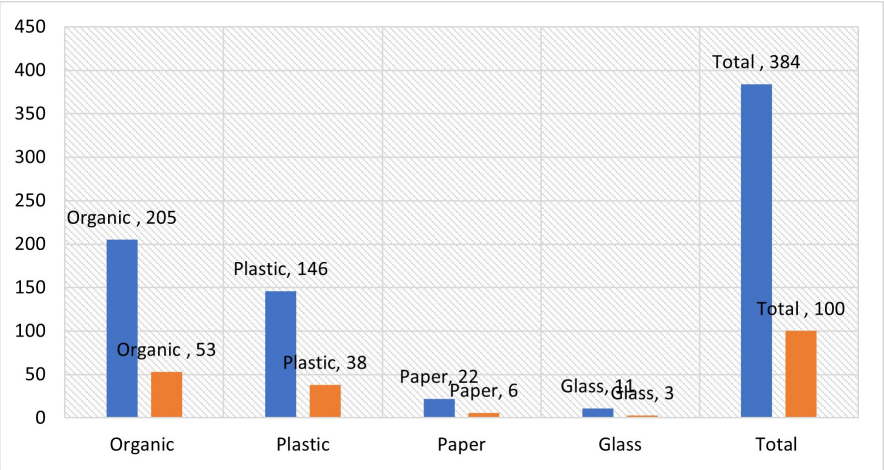
Responses	Frequency N	Percent %
Trader	120	31.
Government Employee	61	16
House Wife	45	12
Self Employed	58	15.1
Non-Government Employee	59	15.3
Unemployed	23	6
Total	**384**	**100**

Source: Authors field Research, 2024.

4.3. Composition of Solid Waste Generated in Freetown

The composition of solid waste in Freetown reflects a diverse type of materials generated by households, business and institutions. This is influenced by factors such as consumption patterns, economic activities and waste management practices. In Freetown, households with higher income generate more wastes than household with lower income.

The city generates a mix of organic, plastic, paper, metal and hazardous waste, with organic waste being the largest components. From the findings presented in Figure 1, it showed that of the waste generated in Freetown, Sierra Leone, 53% are organic waste, 38% plastic waste, 6% generated are paper and 3% are non-biodegradable solid wastes. This indicates that a greater proportion of solid waste generated in Freetown are organic wastes and it also suggests a strong potential for composting and organic waste recycling initiatives.



Source: Authors field Research, 2024.

Figure 1. Composition of solid waste generation in Freetown.

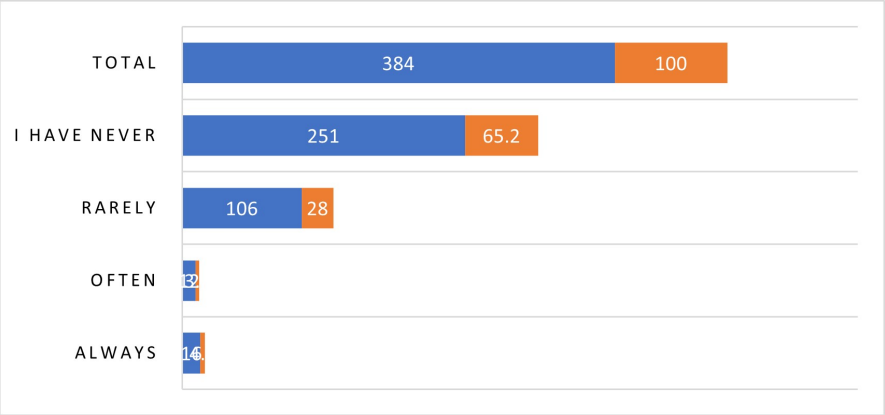
4.4. Separation of Solid Waste at Source of Generation

Waste separation at source of generation supports the recovery of valuable materials that can be reintroduced into the production circle, promoting a circular economy. When households separate their solid waste from recyclable wastes such as plastic, metal, glass and paper are kept clean and uncontaminated by organic waste or hazardous materials. This will improve the quality and efficiency of the recycling process making it easier to collect and process these materials.

The investigation conducted by the researcher revealed that of the respondents contacted 4.2% reported they always separate their recyclable from general wastes at home, 3.1% reported often, 28% reported they rarely separate their solid waste at home and 65.2% said they have never separated their recyclable from the general solid waste generated in their households.

This according to the data in Figure 2, shows that the vast majority of the respondents do not separate their solid waste at home, which is a major obstacle to

effective recycling and sustainable solid waste management.



Source: Authors field Research, 2024.

Figure 2. Percentage distribution of Solid Waste Separation at source of generation.

4.5. Frequency of Household Waste Collection

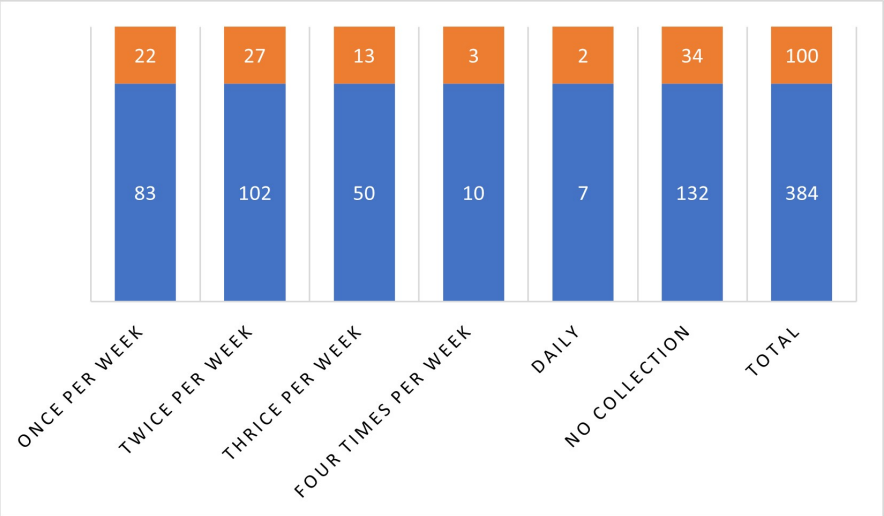
Frequent waste collection reduces the likelihood of waste accumulation in households and communities. Regular collection helps to control pests and odor, improving public health and making communities cleaner and more livable. The more efficient a waste is collected the less time it spends in households or communal collection points, reducing the chances of recyclable waste being mixed with organic or hazardous waste. Also, when households are aware that waste will be collected on daily basis or many times a week, they are more likely to adopt constant waste separation habits. Ultimately, frequent collection makes recycling processes more efficient because, it enables a steady flow of materials to the recycling facilities. In the study conducted, the researcher investigated the frequency of waste collection at households in Freetown and resulted is presented in **Figure 3** shows, 22.3% of the respondents reported collection of their wastes being once in a week, 26.8% reported collection as twice per week, 13% reported their waste collection as Thrice peer week, 3% reported a collection of four times a week, 2.1% reported a daily collection of their waste and 33.0% reported having no collection of their household wastes.

This according to the findings reveals unequal access to waste collection services across different communities in Freetown. While some areas benefit from more regular collection, a significant number of respondents 33.0% have no formal waste collection at all. This disparity highlights the need for a more equitable distribution of waste management services to ensure that communities, particularly underserved and slum areas in Freetown have access to regular waste collection.

4.6. Management of Solid Waste Collected by FWMC

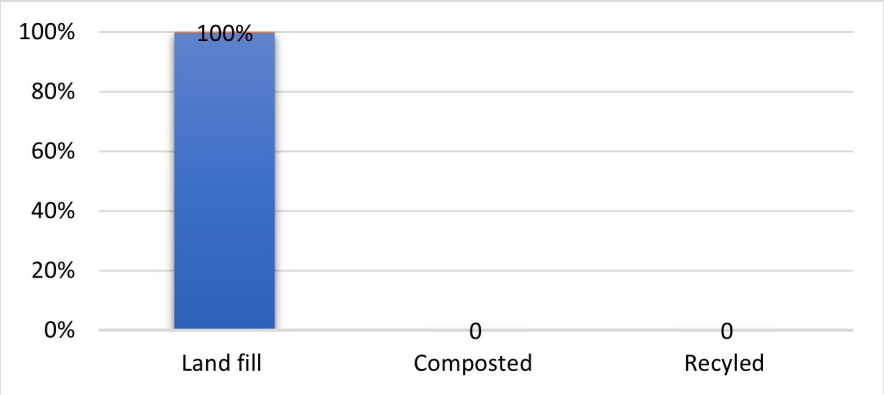
The management of waste collected by the companies handling Freetown waste is also a critical challenge in enhancing sustainable waste management practices. From the research Finding, in **Figure 4**, it revealed that, 100% of waste collected

by the Freetown waste Management council are managed through collection and dumping. This management system is not only unsustainable, but also harmful to the ecosystem and the human health.



Source: Authors field Research, 2024.

Figure 3. Household Solid waste collection in Freetown.



Source: Authors field Research, 2024.

Figure 4. Percentage distribution on management system of waste.

4.7. Sufficiency of Recovery Facilities to Handle Waste Produced in Freetown

When recovery facilities are adequate, more waste can be recycled or composted, this reducing the need to send waste to landfill. This doesn't only conserve the landfill space, but also minimizes the environmental issues associated with landfill, like methane emissions, leachate and soil contamination. From the research findings, presented in **Table 3**, 1.3% of the respondents agree that recovery facilities available to handle waste produced in Freetown are sufficient, 16.9% said its neutral, 63.8% disagree and 18.0% strongly disagree. This reveals that, material recovery in Freetown is challenged as facilities are insufficient to handle waste

produced.

Table 3. Frequency distribution of facilities in Freetown.

Responses	Frequency N	Percent %
Strongly Agree	0	0
Agree	5	1.3
Neutral	65	16.9
Disagree	245	63.8
Strongly disagree	69	18.0
Total	**384**	**100**

Source: Authors field Research, 2024.

4.8. Payment for Collection and Disposal of Solid Waste

Waste collection services in Freetown are not uniform, with some areas underserved. Payment for waste disposal encourages accountability from service providers. Whether the management is handled by public or private sector companies, regular payments can ensure that collection schedules are met, bins are provided and recycling options are available. From the study findings, 36.4% of the respondents claimed they pay for the collection and disposal of their solid wastes, while 64% said they don't pay for their waste collection and disposal as presented in Table 4.

Table 4. Frequency distribution of payment for collection and disposal service.

Responses	Frequency N	Percent %
Yes	140	36
No	244	64
Total	**384**	**100**

Source: Authors field Research, 2024.

5. Discussion

The results of this study establish revealing weaknesses and promising prospects in Freetown's MSWM processes. Nonetheless, the city continues to experience challenges in mainly inadequate collection systems and recycling facilities and poor segregation at household level. One of the biggest problems, though, is the complete absence of the official recycling system; instead, only some scavengers and a few private companies try to recycle at all. This leads to a considerable portion of waste is either dumped to the landfill or treated poorly through methods such as open burning. Backing this, Cruz et al. (2023) show that burning plastics inside a nation poses severe environmental and health consequences, which increases emissions considerably. In addition, low awareness and inadequate collection services also worsen the situation, The study showing a 65% of respondents

that do not separate their waste indicates a lack of awareness and engagement in Sustainable waste practices, also, a 33% reported no waste collection services in their areas, will lead to illegal dumping and accumulation of waste. These conditions results into, cases of illegal dumping of wastes and poses more environmental and health hazards to the people (Razzak, 2024).

Nevertheless, the study highlights some potential areas, in which the necessity of increasing the efficiency of the MSWM system in Freetown is recognized. Organic waste makes up 53% of the total waste therefore large-scale composting for purposes of recycling can be initiated and offer an opportunity to recycle while producing agricultural inputs like fertilizers. Furthermore, enhanced regulation standards, and higher recycling goals might be inspired by the Chinese and Danish examples, which have made important progress by policy-making with better waste management systems (Kanty et al., 2024). This study also supports the role of socio economy where family size, employment status and income levels, affects the amount and type of waste generated (Sankoh et al., 2012). These are some of the features that require consideration when decision makers wish to design strategies for efficient waste collection and transportation. For example, households with more members and high income generate more waste because they consume more, thus require specific strategies with regard to waste disposal (Kanty et al., 2024).

Waste characterization is particularly important for the successful implementation of sustainable waste management strategies since the waste fractions are categorized depending on their degree of biodegradability, water content, and corresponding risks (Sankoh et al., 2012). An assessment of waste needs to form part of any waste management strategic plan for the city of Freetown as the challenges continue to evolve. To ensure that the capacity for sustainable solutions is achieved, knowledge transfer and capacity-building initiatives from advanced countries in the implementation of MSWM, such as China and the United States, are also underlined. Moreover, enhancing public participation and enhancing women's involvement in MSWM will enhance the sector in a big way (Kanty et al., 2024). It is suggested that with the resolving of the technological and logistical challenges pointed out in this work, Freetown could strive for the progressive waste administration which has a lesser negative effect to the surrounding environment.

5.1. Conclusion

The study highlights the need for sustainable solid waste management in Freetown. The city's current system is characterized by inefficient collection low recycling rates and lack of public awareness, which poses environmental and health risks. Therefore, addressing these issues requires a holistic approach that combines community engagement, government policy and investment infrastructure.

5.2. Summary of Findings

In this paper a detailed assessment of Freetown's MSWM system has been carried

out while presenting some key areas of weakness and potential for advancement in recycling. The study calls for improved waste policies, increased citizen participation, and the adoption of policies that support the practice of composting waste particularly that which is organic. Solving these problems results in positive environmental and economic outcomes that will help build a pattern for a sustainable waste management plan in Freetown.

5.3. Practical Implications

The implications of this study are therefore useful for policymakers, waste management authorities and stakeholders. Those investment and awareness campaigns should specifically target separate waste collection and curb unauthorized disposal of waste. Understanding these socio-economic categories offers an approach to develop appropriate garbage disposal systems for the different groups of people living in Freetown. In addition, increased promotion of composting programs and implementation of strict measures drawn from best practices all over the world will improve the ability of the city in the management of waste. The study also recommends for investment in training and Capacity building which will enhance the technical skills of waste management personnel to improve operational efficiency.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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