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Waste Management and Livelihoods: Experiences from George Compound

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Abstract

This article examines the impact of waste management practices on the livelihoods of residents in George Compound, an informal settlement in Lusaka. Lusaka continues to face escalating waste management challenges due to rapid urbanization, strained infrastructure, limited financial resources, and gaps in both societal engagement and enforcement mechanisms. While substantial research has explored waste management in urban contexts, there is a notable lack of focus on the direct link between waste management practices and livelihoods in informal settlements. Addressing this gap, the study explores the relationship between waste management systems and residents' livelihood. The research evaluates current waste management practices, investigates barriers hindering efficiency, and assesses the direct and indirect effects on residents' economic and health outcomes. Data was collected from a stratified random sample of 100 residents,

supplemented by interviews with key informants, including municipal officials. A mixed-methods approach was employed, integrating quantitative analysis through descriptive statistics and qualitative insights via thematic analysis. The findings highlight the crucial role of informal waste collectors in mitigating waste challenges and identify significant obstacles, including limited awareness, inadequate infrastructure, reliance on traditional practices, and equipment shortages. Additionally, the study reveals both the health risks associated with poor waste management and the economic opportunities it creates. The article concludes that waste management has a profound impact on the livelihoods of George Compound residents, offering both risks and opportunities. Recommendations include awareness campaigns, promotion of circular economy initiatives, and strengthened enforcement to support sustainable waste management.

Keywords: Waste Management, Livelihoods, Informal Settlements

Introduction

As nations experience growth, urban populations tend to increase, largely driven by rural-to-urban migration in search of improved economic opportunities. This demographic shift results in a significant concentration of the population in urban areas. Currently, 56% of the global population, or 4.4 billion people, reside in cities, and this figure is projected to rise to nearly 70% by 2050 (World Bank, 2023). In Zambia, rural-to-urban migration has been a major contributor to urban population growth as individuals move to cities like Lusaka and Kitwe in pursuit of better livelihoods and access to services (Zulu *et al.*, 2020) ^[36]. This migration often leads to a shift in livelihoods. According to Nsama (2023) ^[18], "about 80% of the rural population's livelihood is dependent on agriculture since they have land as a natural resource and maximize their benefit from the land." However, upon moving to urban areas, these individuals frequently transition away from land-based livelihoods to non-agricultural activities. What has been consistent, however, are higher poverty rates in rural areas than in urban areas. This is indicative of geographical isolation and the biased approach to development which discriminates against rural areas, thereby favoring rural-to-urban migration (Nyanga *et al.*, 2024) ^[19]. Rapid urbanization presents numerous challenges, especially in terms of the demand for essential services such as healthcare, housing, transportation, water supply, and waste management.

One of the most pressing issues urban areas face is the escalating volume of waste generated. This surge in waste can be attributed to rising income levels, which drive increased consumption of food and goods. According to the United Nation Environment Programme (2024) ^[26], global waste generation is estimated at 2.3 billion tonnes per year, equating to 0.79 kilograms per person per day. With continued population growth and urbanization, this figure is expected to rise by 73% to

approximately 3.88 billion tonnes by 2050. Consequently, cities worldwide are striving to implement effective solid waste management systems to protect public health and the environment.

In Africa, waste generation is influenced by factors such as population growth, urbanization, a burgeoning middle class, shifting consumption habits, and the global waste trade (African Union Development Agency, 2021)^[2]. Solid Waste Management is one of the most critical issues confronting Sub-Saharan Africa. While waste production in Africa remains lower than in developed regions, Sub-Saharan Africa is poised to become the leading region in global waste generation if current trends continue. Despite this, most cities in the region struggle to establish efficient waste management systems, primarily due to limited municipal budgets, inadequate national investment, and insufficient decentralization of authority (Debrah *et al.*, 2022)^[5]. On average, only 44% of waste is collected in Sub-Saharan Africa, with significant disparities between urban and rural areas. Informal settlements, in particular, are often excluded from waste collection services due to their inaccessibility and residents' inability to pay collection fees, which exacerbates public health and environmental risks (Kumar *et al.*, 2022)^[9].

Lusaka, the capital of Zambia, faces significant challenges in managing waste. As the population grows, the city produces an estimated 2,700 tons of waste per day, accumulating nearly one million tons annually. However, less than half of this waste reaches formal disposal sites, leaving large amounts uncollected (Makuyana *et al.*, 2022)^[11]. This situation creates unsanitary conditions that pose severe health risks to residents. George Compound, an informal settlement on the outskirts of Lusaka, is one of the areas most affected by waste mismanagement. With over 70,000 residents, George Compound struggles with issues such as high unemployment, poverty, poor sanitation, environmental degradation, and inadequate waste management infrastructure (Zambia Governance Foundation, 2023)^[35]. The accumulation of waste has led to the spread of disease vectors and unsanitary conditions, particularly affecting informal sector workers who rely on a clean environment for their livelihoods. George Compound is also a well-known cholera hot spot, a problem closely tied to ineffective waste management practices (Vonk, 2021)^[27].

Research Context

The growth of urban populations worldwide has led to increasing challenges in waste management, especially in low-income and informal settlements. By 2050, global municipal waste generation is projected to increase by 70%, reaching approximately 3.4 billion metric tons annually (Alves, 2023)^[3]. This surge in waste production, driven by urbanization, population growth, and evolving consumer habits, has placed immense pressure on waste management systems, many of which are already struggling to cope. Waste composition, which includes inorganic, organic, hazardous, and electronic materials, is a critical factor in developing effective waste management strategies, as understanding recyclability, combustibility, or biodegradability helps in creating targeted solutions (Xavier and Xavier, 2023)^[33].

Globally, countries such as Japan, Sweden, and Germany have implemented effective waste management systems that offer valuable lessons. Japan exemplifies effective waste

management, emphasizing public awareness through education campaigns that promote the "Reduce, Reuse, Recycle" (3Rs) principle. Advanced sorting systems ensure nearly 100% garbage collection rates, with household waste promptly disposed of and processed in incineration plants (Moshkal *et al.*, 2024)^[13]. This has resulted in impressive waste collection rates and cleaner cities. Similarly, Sweden's waste management model combines recycling, energy recovery, and strict regulations. Notably, only 1% of Sweden's waste ends up in landfills, with the rest either recycled or converted to energy, contributing to the heating of one million homes and providing electricity to 250,000. Citizen participation in sorting waste and strong regulatory frameworks further bolster Sweden's success (Kim and Mauborgne, 2021; Prashar, 2022)^[8, 20]. Germany also excels by implementing a five-tier waste hierarchy prioritizing prevention, reuse, and recycling, underpinned by stringent regulations, with an emphasis on minimizing environmental impacts (Nelles, 2016)^[16].

In contrast, African countries face significant challenges in waste management due to rapid urbanization and inadequate infrastructure. Sub-Saharan Africa, for example, saw a rise in waste generation from 81 million tonnes to 174 million tonnes between 2012 and 2016, with projections suggesting a jump to 269 million tonnes by 2030 (Adedara *et al.*, 2023)^[1]. Despite these challenges, some African nations are making strides in improving waste management. Rwanda, for instance, has gained recognition for its proactive measures, such as banning plastic bags and promoting waste segregation and recycling, earning Kigali the title of "Africa's cleanest city" (Mtonga, 2022)^[14]. South Africa, through its revised National Waste Management Strategy, has embraced the circular economy concept to reduce waste and promote sustainable growth (International Union for Conservation of Nature, 2020)^[7]. However, municipalities across the continent continue to face significant pressures due to inadequate resources and rising waste volumes.

In Zambia, waste management has historically been influenced by circular economy practices involving reuse and recycling. However, the growth of urban populations worldwide has led to increasing challenges in waste management, especially in low-income and informal settlements. In Zambia, cities like Lusaka and Kitwe face significant waste management challenges due to rapid urbanization and the proliferation of unplanned settlements, where inadequate infrastructure and limited municipal capacity exacerbate the problem (Mulenga *et al.*, 2021)^[15]. The accumulation of waste, coupled with the country's reliance on open dumping, burning, and burying, has resulted in severe environmental and public health challenges. Despite having legislation such as the Environmental Management Act (2011) and the National Solid Waste Management Strategy (2004), Zambia continues to grapple with ineffective waste management. This has contributed to perennial outbreaks of diseases like cholera and environmental degradation, including soil and water contamination (Waste Portal, 2012)^[28]. There is a clear need for a more modern and comprehensive waste management strategy that addresses current challenges and offers sustainable solutions.

Many countries lack adequate facilities for waste collection, transportation, and treatment. In low and middle-income nations, most waste remains uncollected or improperly disposed of in poorly managed dumpsites. Limited

government investment exacerbates this problem. For instance, Mauritius has made notable strides, doubling its solid waste revenues since 2007 to finance improved waste management systems (Matheson, 2019) ^[12]. However, similar investments remain limited in many developing countries. Proper waste management can be costly, posing significant challenges for low-income nations. The World Bank highlights that lower-income countries allocate significantly less funding to solid waste management, leading to inefficient systems and uncollected waste (World Bank, 2022) ^[31].

Public understanding of proper waste disposal is often insufficient, particularly in developing regions. Limited educational programs on waste segregation and circular economy principles hinder progress (Debrah *et al.*, 2022) ^[5]. For instance, studies in Thailand revealed low community engagement in government-led waste initiatives (Yukalang *et al.*, 2017) ^[34]. Addressing this requires robust education campaigns and integrating waste management into school curricula.

Political apathy toward waste management remains a significant barrier. Leaders often prioritize more visible projects, such as infrastructure development, over sustainable waste systems (Mir *et al.*, 2021). Weak governance and corruption further undermine waste management efforts, as seen in Zambia, where limited enforcement of anti-dumping laws and financial constraints cripple Lusaka's waste collection systems (Simukonda, 2015) ^[23].

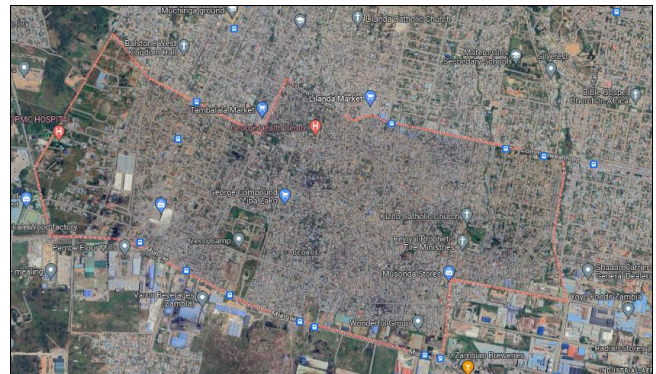
The impact of waste management or lack thereof on livelihoods is multifaceted, affecting public health, the economy, and social structures. Unsustainable waste management practices can result in environmental degradation, which directly influences public health. For instance, in many developing countries, waste is often disposed of in open dumpsites, which leads to air, water, and soil pollution. Research by Siddiqua *et al.* (2022) ^[22] and Conte *et al.* (2018) ^[4] highlights that uncontrolled landfill, especially in developing nations, are a major source of environmental pollution, with adverse health impacts. Njoku *et al.* (2019) ^[17] found that individuals living near landfills suffer from higher incidences of respiratory and other airborne diseases. According to the World Health Organization, air pollution is responsible for approximately 7 million premature deaths annually.

The economic impacts of waste management are also significant, with both positive and negative consequences. Recycling industries, such as those involving scrap metal, glass, and plastic, have created income-generating opportunities for many, particularly in low-income areas (Haywood *et al.*, 2021) ^[6]. In the context of trade policy and development, Kaleng'a and Nsama (2020) ^[29] highlight that effective waste management strategies can enhance trade competitiveness by promoting sustainable industrial practices and reducing environmental degradation. They argue that integrating waste management into trade policies not only supports environmental sustainability but also fosters economic growth by creating green jobs and opening new markets for recycled products. Therefore, aligning waste management initiatives with trade policies can lead to a more sustainable and prosperous economy. On the other hand, poor waste management can have detrimental effects on businesses and workers. Accumulated waste in urban areas diminishes the attractiveness of commercial spaces,

impacting business performance. Furthermore, waste-related health issues reduce employee productivity and increase absenteeism, as diseases like cholera spread easily in areas with poor sanitation. Socially and culturally, waste management affects the cohesion and identity of communities. Accumulated waste in public spaces erodes community pride and can lead to social divisions, as seen in Thailand's Tha Khon Yang area. Poor waste management practices led to negative attitudes among residents, who blamed each other for the state of their environment, further weakening community cohesion (Yukalang *et al.*, 2017) ^[34]. In Zambia, the negative impact of waste management on livelihoods is evident, particularly in urban areas like Lusaka. Growing waste piles in the city's Central Business District (CBD) have raised public health concerns, with authorities designating the area a high-risk zone for cholera outbreaks (Kuwema, 2022). Although waste management provides livelihoods for many, especially informal waste pickers, these individuals often work under hazardous conditions. At Lusaka's Chunga dumpsite, workers are exposed to significant health risks, lacking basic protective gear, despite some measures being put in place to safeguard their health (Sambo *et al.*, 2020) ^[21].

Research Methods

The study was conducted in George compound, a densely populated informal settlement located in Lusaka, the capital city of Zambia. George was selected as the study area due to its diverse population, combination of formal and informal housing structures, and the significant waste management challenges faced by its residents.



Source: Google Maps (2024)

Fig 1: Map of George Compound

The study employed a mixed methods approach. This involves the integration of quantitative and qualitative research methods to draw on the strengths of each. This approach allowed the researcher to use a diversity of methods, combining inductive and deductive thinking, offsetting limitations of exclusively quantitative and qualitative research through a complementary approach that maximizes strengths of each data type and facilitates a more comprehensive understanding. Stratified random sampling was used to constitute the sample comprising of 100 respondents. The Sample size (n) was determined using the formula below and an estimated total population of (N) of 70,000 residents. The confidence interval of the study was 90% translating into 0.10 marginal error (e).

$$n = N/1 + Ne^2$$

Where

- n = sample size
- N = population size
- e = Margin of error
- $n = 70,000/1+70,000 \times (0.10)^2$
- $e^2 = (0.10)^2 = 0.01$
- $70,000 \times 0.01 = 700$
- $n = 70,000/ 701 = 98.86$

Therefore, a sample size of about 100 provided the study with a 90% confidence level. Using a larger sample could have increased the precision of the results; however, constraints such as time, budget and available resources were taken into consideration and as such a sample size of 100 was chosen based on these factors, which should provide a reasonable representation of the population while maintaining feasibility within given limitations.

Questionnaires were administered to 100 respondents who are residents within George compound which were administered in distinct subgroups or strata based on specific characteristics. The sample size was divided into four strata based on area location in the compound. The first strata comprised of residents that are at the edges of the compound, which is easily accessible as it is near the main road. The second strata considered those residents that stay in the center of the township, which are usually comprised of narrow hard-to-reach roads. The third strata considered residents that stay near the compounds markets and the final strata took into consideration those that operate in George’s informal sector. Purposive sampling was employed to collect interview data, as the key characteristics of the participants were already known, making this method the most appropriate for the study. It is important to note that qualitative data was gathered from participants until saturation was reached, meaning no new themes emerged.

The qualitative data was then coded and analyzed using thematic analysis. This process involved categorizing and interpreting the data to identify recurring themes and patterns. The identified themes were aligned with the research objectives and used to both support and challenge the quantitative findings. Quantitative data was analyzed using Excel and presented through descriptive statistics.

In terms of ethical considerations, the research adhered to principles of informed consent and voluntary participation. Permission was obtained from the Ward Councilor, and all participants provided consent by signing a consent form prior to their involvement in the study.

Results

Demographic Characteristics of Respondents

A total of 100 respondents participated in the study, providing a comprehensive dataset. The gender distribution was nearly balanced, with 47% of participants identifying as female and 53% as male, ensuring that both male and female perspectives were included in the analysis.

The age distribution of respondents was also examined, as it can influence how waste management practices impact different age groups. The largest group was comprised of individuals aged 18-29, making up 38% of the respondents, followed by the 30-39 age group at 34%. Respondents aged 40-49 accounted for 16%, while those aged 50-59 represented 9%. The smallest group was those aged 60 and above, comprising just 3% of the total respondents.

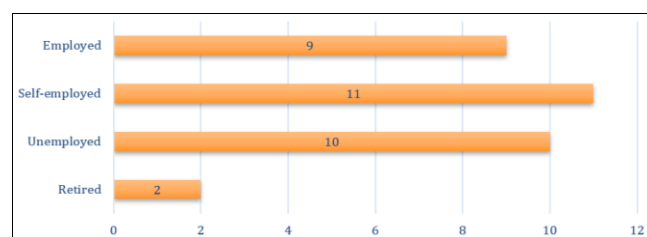
Table 1: Gender and age of participants

		Number	Percentage
Gender	Male	53	53%
	Female	47	47%
Total		100	100%
Age	18-29	38	38%
	30-39	34	34%
	40-49	16	16%
	50-59	9	9%
	60-69	3	3%
Total		100	100%

Source: Fieldwork

Occupation Status of Respondents

The occupational status of the respondents provided insights into their economic activities and potential vulnerabilities. The breakdown of occupational status among participants was as follows; 2 of the respondents were retired, 10 were unemployed, 11 were self-employed and 9 were employed.



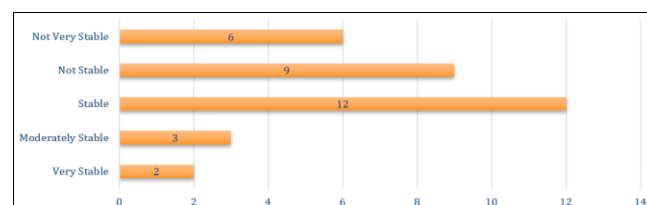
Source: Fieldwork, 2024

Fig 2: Occupational Status

Results above shows that, most of the households in this area are either self-employed and or unemployed at all. Despite this being a good thing for the country, this can cause a lot of challenges in households waste management as there is no sustainable income generation. In times when they are financially down, such households are most likely going to fail in making payments to the waste collector companies.

Income Stability of Respondents

Evaluating income stability was fundamental to understanding the economic context in which residents of George compound operate. Respondents were asked to rate their income stability on a scale of 1 to 5, with 1 representing very stable and 5 indicating not very stable. Out of the total 32 respondents, 2 respondents indicated very stable, 3 were moderately stable, 12 were stable, 9 were not stable and 6 were not very stable.



Source: Fieldwork, 2024

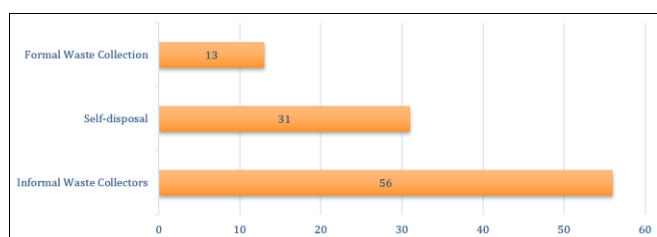
Fig 3: Income stability

Results above shows, that households in this area have some kind of stable incomes and this can be argued to be one of the reasons why interventions by the government seem to be working and helping the government avoid the resurgence

of cholera. One of the respondents from the local council, indicated that, when community members have stable incomes, they are most likely going to sustainably make payments for waste management. According to this council officer, stability of incomes have largely improved the capacities of households to make payments and this directly improves the capacity of companies to continuously collect the waste in the compound.

Current Waste Management Systems Waste Collection Method

The study into the waste collection methods adopted by the respondents revealed diverse approaches within the community. Notably, a significant portion of the residents, 56 individuals, indicated that they rely on informal waste collectors, potentially highlighting alternative, community-based waste management practices. 31 respondents reported opting for self-disposal, indicating that they manage waste independently. A total of 13 respondents relies on the formal waste collection services provided by the council.



Source: Fieldwork, 2024

Fig 4: Waste collection methods

Information gathered from key informants within the councilor's office revealed that informal waste collectors engaged by the council were the most active in the compound, while the council itself primarily managed waste from the markets. One key informant explained this, stating:

Formally there's no programme that I can point at, but informally under waste management we have these waste pickers who go around to pick bottles, plastics and the like, and as an initiative of this office there is a group that we are empowering called Lima youth club. So, under Lima youth club, they hire a tractor and then they start collecting garbage in the compound, then they go dump at the dump site (KI1, Lima Ward 23 Constituency Office).

Additionally, it was found that the council opted to empower the youth due to the previous contractor's inconsistencies in collection services in the area.

Waste Storage Methods

Understanding how respondents store their waste was a crucial aspect to the study, as it has implications for hygiene, safety and environmental factors. Respondents were asked to mention 1 or more of the methods that they used. The findings regarding waste storage practices were equally diverse. For instance, 38 respondents mentioned using backyard ditches as a means of waste storage, possibly reflecting limited access to formal storage solutions or a preference for convenience. In contrast, 9 respondents indicated using open dumping areas, a practice that raises concern about sanitation and environmental hazards.

Meanwhile, 22 respondents opt for the use of bins/containers, demonstrating a more structured approach to waste management, potentially contributing to improved waste containment and sanitation within the compound. Most respondents, comprising 50 individuals, utilize sacks or plastic bags for temporary waste storage. This prevalent practice suggests a preference for convenience and mobility but may raise concerns about the durability and environmental impact of such storage methods.

Field data provided deeper insights into the variations in storage techniques employed by respondents. Interviews revealed that the use of sacks was a prevalent storage method. This preference was largely attributed to limited backyard space, which made creating ditches unfeasible, and the convenience of disposing of the sacks when collectors conducted their rounds. One respondent emphasized this point, noting that sacks were both space-efficient and practical for waste disposal when collection services were available.

We put our garbage in old empty mealie meal sacks for the garbage collectors to collect. We put the garbage in sacks because it makes it easier to store our garbage considering that the garbage collectors don't come on a regular basis. Sometimes they collect the waste once a week, sometimes twice. Although we only use garbage collectors because we don't have a big yard, if we had a bigger yard, we could have dug a ditch at the back of the house which is price friendly (P2, George Compound).

Waste Disposal Methods

Examining how waste is disposed of within the compound provided insights into the environmental impact and sustainability of waste management practices. Respondents were asked to choose one or more of the methods that they practiced to dispose of their waste.

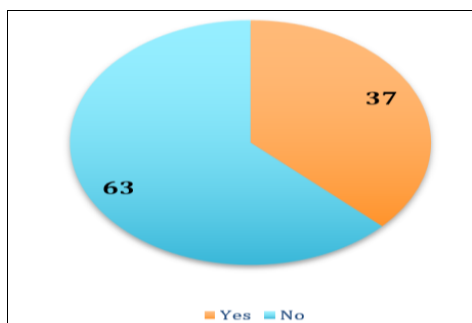
A notable portion, 25 respondents, reported resorting to open dumping areas for waste disposal. This practice raises significant concerns related to environmental hazards, including pollution and health risks within the community. Conversely, 50 respondents rely on formal council collectors for waste disposal, indicating a dependence on waste management services. Furthermore, 13 respondents participated in recycling activities, demonstrating an eco-conscious approach to waste management, which could potentially contribute to sustainability efforts within the compound. Interestingly, 22 respondents undertake self-disposal as it offers a cheaper alternative. This showcases a degree of self-sufficiency in waste management practices, which may have unique implications on their livelihoods. Lastly 41 respondents reported using burning as a waste disposal method. While this may be a practical approach for some, it raises concerns regarding air quality and the environmental impact of burning waste materials.

Barriers to Waste Management

Subscription to Waste Collection Services

Understanding the level of subscription to formal waste collection services was crucial in assessing the community's reliance on such services. A notable 37% of respondents indicated that they do not subscribe to waste collection services, suggesting significant portion of the community relies on alternative waste management methods. In

contrast, the majority, comprising 63% of respondents, do subscribe to waste collection services, highlighting a substantial demand for waste management services within the community.



Source: Fieldwork, 2024

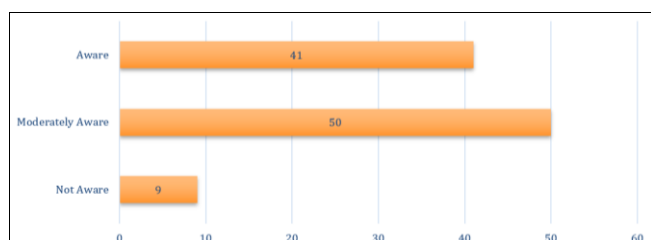
Fig 5: Number of respondents that are subscribed to waste collection services

For those respondents who do not subscribe to waste collection services, an open-ended question was posed to gain insights into their reasons for this choice. The majority cited affordability as a barrier indicating that the cost associated with waste collection services presents a significant obstacle for many residents. Although most of the respondents highlighted that they subscribe to waste collection services, the researchers observed that some households persisted in practicing undesirable waste management habits. For instance, burning of plastics, paper, fabric, e-waste and improper disposal of certain items were noted. Interviews with some of the residents shed more light on this phenomenon, as they disclosed that they only utilized collection services for specific waste types, particularly those with the potential to produce foul odors when left unattended. This observation raises questions about whether there may be room for more tailored or comprehensive waste management solutions.

One of the respondents from the community leadership indicated that, most community members do not accept and hide to the government’s call on every household to subscribe to a waste management company. This is associated with challenges of payments and in this regard, most of the households had started subscribing but could not manage to make monthly payments to the waste companies. This is one challenge that is leading to increased uncollected waste in the area.

Proper Waste Management Awareness

Awareness plays a pivotal role in promoting responsible waste management practices. When respondents were asked about their awareness of proper waste management methods, a spectrum of responses emerged.



Source: Fieldwork

Fig 6: Community waste management awareness

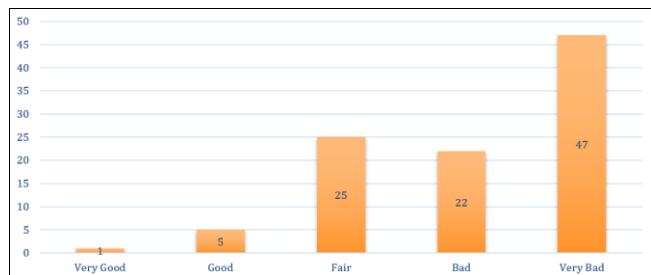
A minority of 9 respondents indicated that they were not aware of proper waste management methods. This finding highlights a potential information gap that could hinder the adoption of more responsible waste management practices. A larger group of 50 respondents described themselves as moderately aware of proper waste management methods, suggesting a level of familiarity but room for improvement. Encouragingly, 41 respondents expressed a high level of awareness regarding proper waste management methods, indicating that a substantial portion of the community possesses knowledge of best practices. This variation in awareness levels suggests that while some residents are well-informed, there remains a significant portion of the community that may benefit from targeted educational initiatives to enhance their understanding of effective waste management practices. When a key informant was asked if the councilor’s office offers sensitization campaigns, he highlighted that;

On our own, like this office, we do our best. Let’s say when we have meetings, we do what we call community integrated meetings, I’m going to talk about security, someone will talk about health, someone will talk about substance abuse, and another will talk about waste management. So, in that integrated meeting we go as, it’s actually an integrated team, people from health and the like so we talk about different issues (KI1, Lima Ward 23 Constituency Office).

Despite this, responses obtained from the residents highlighted that there is no sensitization campaign with regards to waste that they are aware of. Majority of the respondents stated that most of the sensitization campaigns that happen in the compound are with regards to health-related matters from George Clinic, Cholera awareness during rainy season and GBV matters.

Community Participation in Waste Management

Assessing residents’ views on their community’s participation in proper waste management practices provided insights into the overall sentiment regarding waste management within George Compound. A significant number of 47 respondents described the community’s participation as “very bad,” suggesting dissatisfaction with the current state of waste management practices. 22 respondents characterized the community’s participation as “bad,” indicating a prevalent negative perception. 25 respondents considered the community’s participation as “fair,” reflecting moderate view of the situation. 5 respondents perceived the community’s participation as “good,” while 1 respondent perceived as “very good” indicating a positive outlook. These varying perceptions reflect the complexity of community engagement in waste management efforts and highlight the need for further investigation into the factors contributing to these opinions.



Source: Fieldwork, 2024

Fig 7: Community participation in proper waste management

Key informant from the council highlighted that people’s attitudes in his constituency were very bad and there was a need for a mindset shift. In an interview he highlighted that:

“We are all supposed to be very active in matters of waste, but to our people it is very difficult. They see that it is not their responsibility, it is the responsibility of Lusaka City Council and the government to take care of the waste. Even when our collectors go, they would rather go for the cheaper illegal waste collector, mindset again comes in” (KI1, Lima Ward 23 Constituency Office).

This suggests that the negative attitude is a clear indication that George residents have scanty information on waste management and livelihood opportunities to a larger extent. The researchers also observed that while some households engaged in poor waste management practices, many respondents tended to place the blame on those around them. One respondent highlighted that most people in the compound show little concern for sanitation and habitually litter. Another respondent further added.

“On my end, I really don’t concentrate on what the neighbors are doing, as I mind my own business. One of the reasons why is you might make agreements with your neighbors to handle our waste with care and use waste collectors, but they end up going behind your back to use illegal waste collectors and littering” (P5, George Compound).

This comment underscores the perception that residents of George Compound demonstrate a lack of concern for their environment, as they dispose of waste irresponsibly. The respondent further clarified that she avoids involving herself in her neighbors’ actions, choosing instead to focus on her own practices. She highlighted that while attempts are made to establish agreements with neighbors to manage waste responsibly, these agreements are often violated, with individuals continuing to use illegal waste collectors and litter carelessly. This illustrates how the behaviors and attitudes of others can influence an individual’s commitment to proper waste management.

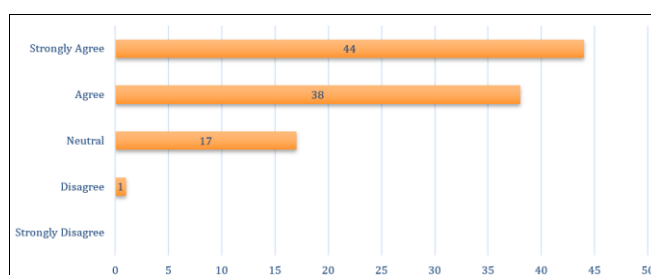
Main Barriers to Effective Waste Management

When asked to identify the primary obstacles to effective waste management in George Compound, most respondents pointed to the poor enforcement of waste management laws, residents' lack of awareness, and inadequate services provided by the municipal council as the most frequent issues. Information from key informants also highlighted residents' lack of awareness as a significant challenge faced

by the council. One informant acknowledged the insufficient enforcement of waste management laws, stating:

“Yes, there is poor enforcement from the local authorities, because as a house if you fail to subscribe, you have to be prosecuted, but there is no enforcement from the local authority” (KI2, Lima Ward 23 Constituency Office).

The key informant also noted the lack of adequate infrastructure to support effective waste management, linking this issue to a shortage of resources, such as machinery and equipment, as well as limited financial support from the government. Additionally, the informant pointed out the absence of storage bins at the markets to temporarily hold waste before collection. This, combined with the rapid generation of waste in the markets and the fact that the council only operates one tractor, leads to slow waste collection. As a result, open dump sites form, which are then exploited by illegal waste collectors as disposal sites.



Source: Fieldwork, 2024

Fig 8: whether waste management is related to health and sanitation

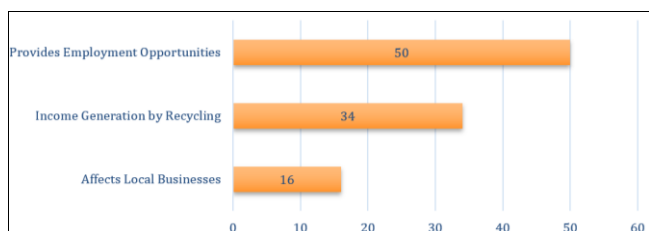
When residents were asked if poor waste management affects their health and sanitation, the responses painted a clear picture; a substantial 44 respondents strongly agreed that poor waste management has a detrimental impact on their health and sanitation. This strong consensus highlights the urgency of addressing waste management issues within the community. Additionally, 38 respondents agreed that their health and sanitation are affected by poor waste management, further emphasizing the importance of improving waste management practices. 17 respondents remained neutral on the issue, while one (1) disagreed with the notion that poor waste management affects their health and sanitation. These diverse responses indicate varying degrees of awareness and perception regarding the issue.

When participants were asked about the specific ways waste management impacts their health, their responses provided valuable insights. A total of 66 respondents identified unpleasant odors and air pollution as major concerns, suggesting that these environmental factors significantly affect the community's health. Additionally, 47 respondents expressed worries about exposure to harmful substances, underscoring the health risks posed by insufficient waste management practices. A notable 88 respondents pointed to the increased risk of disease transmission as a direct consequence of poor waste management, further emphasizing the urgent need for enhanced waste disposal and sanitation efforts. Researchers noted that the severity of these health impacts varied across seasons, with many respondents highlighting that the challenges are more

pronounced during the rainy season. One respondent explained that drainage systems are often clogged with waste, leading to blockages during rainfall. When drainage systems overflow, the resulting floods can carry waste into people's yards. This respondent also described a harmful practice where individuals take advantage of the flowing water to dispose of waste, such as diapers, allowing debris to be carried downstream, which ultimately affects other community members. This behavior was identified as a key factor contributing to the prevalence of waterborne diseases during the rainy season.

Effects of Waste Management on Community Commerce

Understanding the economic ramifications of waste management within the community was essential for a holistic assessment of its impact on livelihoods. 16 respondents indicated that poor waste management negatively affects local businesses, potentially by deterring customers due to unsightly waste or odors. 34 respondents pointed out income generation through recycling, highlighting the potential economic benefits that can arise from recycling activities within the community. 50 respondents noted that waste management provides employment opportunities, showcasing the role of the waste sector in contributing to livelihoods.

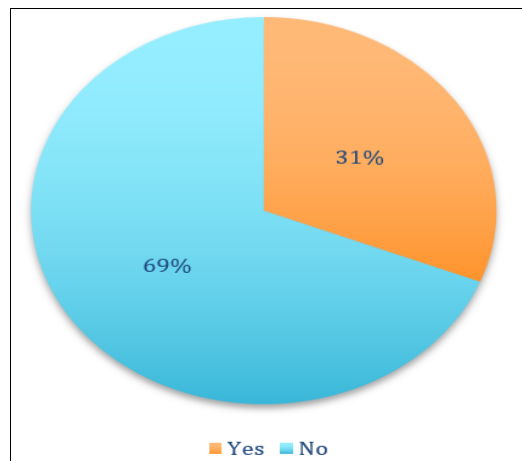


Source: Fieldwork, 2024

Fig 9: Effects of waste management on local economy

Despite some businesses being affected by poor waste management, the researcher observed that several households' livelihoods largely depended on waste for income generation. For example, interviews with area ward councilor revealed that several youths in the compound generate income by selling used plastic bottles and sacks to Chinese companies. He highlighted that when the youth club is collecting waste, they separate plastics and the sacks that the residents pack their waste in and sell them to companies in the industrial area. He also highlighted that there was a local NGO that made a business out of waste although the initiative is no longer active. *"There is an NGO that came up with an initiative to recycle left over garbage, for example left over tomatoes, cabbage or nshima which they use to make fish and animal feed using black soldier flies. Although this initiative has now collapsed"* (KI1, Lima Ward 23 Constituency Office)

To assess the level of participation in recycling within the community and its financial implications, respondents were asked if they made any money from recycling. A total of 31% of respondents indicated that they earn from recycling, signifying a substantial portion of the community engages in this income-generating activity.



Source: Fieldwork, 2024

Fig 10: Do you earn from recycling

Findings from interviews further highlighted that residents were able to generate income from selling used cooking oil bottles, broken plastic basins, metal drums, glass bottles which they sold for money or exchanged for useful items like brooms and braziers. One respondent highlighted this saying, *"We keep empty cooking oil containers that we usually exchange with brooms to sellers that usually go around the compound. There are also other people that go around buying broken plastic dishes that usually sell to recycling companies in the industrial area"* (P6, George Compound).

In an interview with one of the buyers he highlighted that him and his colleagues usually go around the compound to pick used "Junta" bottles which is a cheap local whiskey and to buy broken plastic basins which they sell in the industrial area to Chinese companies. The respondent highlighted that he makes income out of this, as this is his job. Respondent also highlighted that he is able to sustain his family through this activity.

Discussion

Current Waste Management Practices in George Compound

The first specific objective of the study was to evaluate the current waste management systems in George Compound. This was crucial to understanding the existing practices regarding waste management in the area. To achieve this, the study explored the methods used by residents for waste collection, storage, and disposal. The findings indicated a correlation between income stability and the likelihood of subscribing to waste management services. Respondents with unstable or low incomes often resorted to self-disposal methods.

Regarding waste collection, the study revealed that 56.25% of respondents relied on informal waste collectors. This trend emerged after the previously contracted private waste management company underperformed, prompting the local ward councilor's office to empower a group of youths, previously illegal waste pickers, to manage waste collection. This initiative reduced the accumulation of waste in open dumping areas and minimized illegal dumping. The Lima Youth Club, a local group providing waste management services, offered these services at a lower cost compared to

the previous contractor, making them accessible to a greater number of households. Contrary to the findings of Kumar *et al.* (2022)^[9] and Siame (2018)^[24], who argued that residents in inaccessible areas of informal settlements often lack waste collection services, this study found that such services were available throughout George Compound. Informal waste collectors employed strategies such as using wheelbarrows to reach households located along narrow roads. However, the Lima Youth Club has yet to be formally recognized. Additionally, 12.5% of respondents reported using the Lusaka City Council (LCC) for waste collection, though LCC services were limited to markets and public areas. These respondents were primarily involved in the informal business sector. Furthermore, 31.25% of respondents did not subscribe to any waste collection service, opting instead for traditional methods like backyard ditches, which they found cost-effective and efficient.

The study also examined waste storage techniques used by residents. Findings showed that most respondents used sacks and plastic bags for temporary storage, as these methods were recommended by waste collectors for ease of collection and cost efficiency, with charges based on the weight of the bags. Other respondents preferred bins and containers for their hygienic advantages. However, the use of sacks posed health risks, as they often leaked and were accessible to stray dogs. Traditional methods, such as backyard ditches, remained common among respondents due to their affordability. Additionally, some residents practiced open dumping, influenced by neighbors who engaged in similar behavior, highlighting the need for greater awareness about proper waste management.

Finally, the study investigated waste disposal practices among residents, which revealed diverse approaches. While the majority claimed to dispose of waste responsibly through collectors, some also admitted to burning plastic waste and using backyard ditches when necessary. These practices, such as burning plastic waste and using backyard ditches, pose significant environmental and health risks, including air pollution and groundwater contamination. Additionally, the persistence of open dumping, often driven by social norms, underscores the need for stronger waste management regulations and targeted awareness campaigns to encourage safer and more sustainable disposal methods. Addressing these challenges requires prioritizing community education and introducing affordable, eco-friendly waste disposal alternatives. Furthermore, formalizing and supporting initiatives like the Lima Youth Club could improve waste management coverage and reliability, reducing dependence on harmful disposal practices.

Barriers to Effective Waste Management in George Compound

The second specific objective of the study was to identify the barriers to effective waste management in George Compound. The findings revealed several obstacles that hinder efficient waste management. While many respondents indicated they subscribed to waste collection services, the study observed that this did not always translate to proper waste disposal practices. For instance, households often dispose of kitchen waste appropriately to prevent foul odors but resorted to burning items like plastics and paper.

The study also identified behavioral factors as significant barriers. A common attitude among residents involved

dumping waste in open spaces simply because others in the community were doing so. This collective behavior influenced perceptions within the community, leading to resistance toward collaborative efforts aimed at improving waste management. Some respondents expressed distrust in their neighbors, believing that even those who agreed to follow proper waste management practices often reverted to improper disposal methods. These findings align with the work of Yukalang *et al.* (2017)^[34], who argue that waste accumulation in public spaces undermines community unity and pride, fostering social divisions as residents blame each other for the problem. This was evident during interviews, where most respondents criticized the waste practices of their neighbors and the general community. The lack of social cohesion and resulting divisions were identified as significant barriers to effective waste management due to the absence of collective concern.

To understand the proliferation of open dumping sites, the study explored the role of institutional inefficiencies. Respondents attributed this issue to irregularities in garbage collection and the lack of communal bins in areas like markets. Many residents opted not to pay for waste collection services because of dissatisfaction with service delivery, such as delays in waste collection or uncollected waste over extended periods. Others turned to illegal waste collectors, who were more reliable and accessible. Additionally, some respondents refused to pay for waste services, perceiving little value for money since heaps of uncollected waste continued to affect their businesses, leading them to dispose of waste at open dumping sites. These behaviors were linked to systemic challenges faced by the council, such as budget constraints and a lack of equipment. Statements from key informants corroborated Simukonda's (2019) findings, which highlighted inadequate funding for waste management activities, making it difficult for the Lusaka City Council (LCC) to provide efficient and cost-effective services.

The researchers noted that better sensitization efforts could address these challenges by encouraging residents to form cooperative initiatives, such as the "Lima Youth Club," and utilize Constituency Development Fund (CDF) allocations to manage waste locally. Such community-based solutions could alleviate the council's burden while generating income for families, improving service accessibility, and promoting sustainability in waste management. However, the study also found that a lack of political will from the government hindered long-term solutions for waste management in George Compound. Many respondents reported that the government only paid attention to waste management issues during election periods or during cholera outbreaks. These findings align with Wilson and Velis (2022), who argue that the absence of political commitment is a significant barrier to effective waste management, as it often leads to insufficient funding and support for waste management activities.

The Effects of Waste Management on The Livelihoods of the Residents of George Compound

The third specific research objective was to assess the effects of waste management on the livelihoods of residents in George Compound. This objective was critical in understanding the relationship between waste management practices and residents' well-being, economic opportunities, and the environment. The study found that waste

management significantly affects residents' health, economic activities, and overall livelihoods.

The findings revealed a strong consensus among residents about the negative effects of poor waste management on health and sanitation. Key concerns included the heightened risk of disease transmission, foul odors, and air pollution, particularly for residents living near trading areas and open dumping sites. Similar findings were reported by Njoku *et al.* (2019) [17], who demonstrated that individuals residing close to landfills and illegal dumping sites experienced more frequent health issues, negatively affecting their livelihoods. The challenges in George Compound were found to be particularly acute during the rainy season, as the combination of flooding and poorly maintained drainage systems created favorable conditions for cholera outbreaks. The researchers also noted that the area's limestone geology slows water absorption into the ground, exacerbating flooding issues during the rainy season and increasing health risks.

The study further highlighted the impact of waste management on local businesses. Respondents operating near open dumping sites identified unpleasant odors and unsightly conditions as major factors deterring customers, thereby negatively affecting their sales. Despite these challenges, the findings underscored the economic potential of waste management for the local economy. Many residents derived income from waste-related activities such as employment in waste collection, recycling, and selling recyclables like plastic and glass bottles. These activities not only supported livelihoods but also showcased the opportunities inherent in responsive waste management and recycling initiatives.

Recycling emerged as a significant source of income for many residents, with several individuals establishing it as their primary livelihood. The income generated from recycling enabled families to afford school fees and meet household expenses, with respondents engaged in recycling reporting stable or very stable incomes. This highlights the transformative role recycling can play in sustaining livelihoods. However, the study also emphasized the untapped potential for broader participation in recycling activities. Expanding these initiatives could promote environmental sustainability while fostering economic growth in the community.

Conclusion

The main objective of the study was to assess the impact of waste management on the livelihoods of the residents of George Compound. This was broken into three specific objectives as follows: To examine current waste management systems in George Compound; to explore the barriers to effective waste management in George Compound; and to identify the impacts of waste management on the livelihoods of residents of George Compound.

In respect to the first objective, the study concludes that informal waste collectors play an important role in waste management if properly utilized, which offers a more community-based solution to waste challenges. Even when subscribing to collection services, households in George compound continue to practice undesirable waste management habits. As such there is a great need for community awareness and sensitization on the dangers of certain practices.

With regards to the second objective, A lack of awareness and knowledge regarding proper waste management practices has contributed to undesirable waste disposal behaviors. These behaviors have led to community members pointing fingers and blaming other residents, which affects social cohesion and willingness of other residents to practice good waste management. This acts as a massive barrier to effective waste management in the community. Other identified barriers included inadequate infrastructure in the community to handle the current waste generated by the compound and limited resources due to financial constraints at the municipal council.

In respect to the third objective, residents are significantly affected by poor waste management practices, with concerns related to foul odors, air pollution, exposure to hazardous substances, and increased disease transmission. It also affects the proper functioning of some businesses as it may deter customers due to questions of sanitation and unpleasant smells. Despite this, Waste management serves as a source of employment opportunities and income generation for residents, particularly through recycling initiatives and the sale of recyclable materials. Several residents sustain their livelihoods from recycling and other waste management practices, presenting a significant economic opportunity.

Overall, based on the findings, and in line with the main objective, the study concludes that waste management has an impact on the livelihoods of residents of George Compound. This impact has negative and positive effects on their livelihoods as ineffective waste management poses a threat to their health and the environment in which they live in. At the same time waste management offers various economic opportunities for the residents to earn a living from to sustain their livelihoods.

Recommendations

Based on the study findings, the researchers propose the following recommendations:

Policy Measures

There is need for the Government to establish a strengthened waste management policy addressing the contemporary waste challenges being faced by cities across the country. These policies can prioritize the promotion of circular economy, integrated waste management and environmental sustainability.

Enforcement Measures

The study highlighted that despite waste management being governed by legislation like The Public Health Act and The Solid Waste Regulation and Management Act (2018), enforcement has remained a challenge as there is little or no enforcement conducted. As such, there is need for improved enforcement by prosecuting those that violate the laws and procedures stipulated in this legislation.

Tailored Education and Awareness

Lusaka City Council and local civil society organizations should formulate initiatives aimed at raising awareness about proper waste management practices and this should be prioritized. This includes educating residents about the importance of responsible waste disposal and the health and environmental implications of improper waste management.

Affordability Measures

The Ward councilor's office can explore options to make waste collection services more affordable, ensuring that they are accessible to all residents. The council can consider subsidized programs, payment flexibility and more community-based solutions like the Lima Youth Club.

Promote Recycling Initiatives and Economic Empowerment

The Government, through the Ministry of Green Economy, and Lusaka City Council should encourage residents to engage in recycling activities. These initiatives not only contribute to environmental sustainability but also offer economic opportunities for the residents. Encouraging residents to engage in income-generating activities such as recycling and the sale of recyclable materials which can enhance their livelihoods. Community-based recycling programs can be initiated to facilitate the collection and recycling of materials. Other considerations can be the establishment of recycling centers, providing training on recycling best practices, and create a market for recycled materials. These can offer economic empowerment and should be further explored.

Accessible Formal Waste Collection Services

The community's access to formal waste collection services should be improved, ensuring that residents have reliable and convenient options for waste disposal. This is essential as studies revealed that residents opted for illegal waste collectors due to their area not being serviced on a regular basis.

Seasonal Waste Management Strategies

Given the pronounced issues arising during the rainy season, waste management strategies should consider seasonal variations. Proper drainage and waste collection mechanisms should be placed to prevent flooding and mitigate health and sanitation concerns.

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