

# Needs and Expectations of the Lukunga Population regarding Solid Household Waste Management

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## Abstract

Solid household waste management in the Lukunga health district, Kinshasa City-Province, capital of the Democratic Republic of the Congo, is a significant challenge for all residents. This study aimed to identify the population's needs and expectations regarding waste management improvement in the context of rapid urbanization and growing environmental challenges. We employed a qualitative descriptive phenomenological approach. Semi-structured interviews were conducted with 15 participants. Interviews were recorded, transcribed, and thematically analyzed until theoretical data saturation was achieved. The study revealed several major issues: waste collection services are virtually non-existent, leading to massive waste accumulation in streets and widespread illegal dumping. Health and environmental consequences are concerning, particularly disease spread and increased flood risk. Residents lack knowledge about proper waste management practices. Participants proposed various solutions, including: Increasing the number of public waste bins, implementing community composting, utilizing innovative waste management technologies, strengthening environmental education. This study highlights the need for an integrated and participatory approach to improve waste management in Lukunga. It emphasized the importance of environmental education, infrastructure improvement, and involvement of local authorities and NGOs in implementing sustainable solutions. It provides a database for developing waste management strategies tailored to local needs and realities in Lukunga.

## Keywords

Solid Household Waste Management, Population Needs and Expectations,

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## 1. Introduction

Kinshasa, the capital of the Democratic Republic of the Congo, faces significant challenges in managing solid household waste (Bagalwa et al., 2013). Like other neighborhoods in the metropolis, the Lukunga Health District is confronted with the problem of constant accumulation of garbage cluttering the streets, degrading the environment, and threatening public health. This disastrous situation has made solid household waste management a top priority for local authorities and residents.

Despite extensive research and proposed solutions to improve waste management in Kinshasa, the situation remains alarming. Households often lack adequate environmental education and are forced to manage their waste independently. Improper waste disposal not only leads to aesthetic degradation of urban ecosystems but also contributes to the spread of preventable environmental diseases.

Several problems resulting from waste management in this area are exacerbated by population densification, characterized by an increasing number of plots housing households of more than 8 people and continuous rural exodus (Pembi et al., 2022). These factors further complicate the task of the state, which is already hampered by financial constraints, the absence of adequate urban development plans, and the lack of effective advocacy policies.

In this context, this study aims to explore the needs and expectations of the Lukunga population regarding the improvement of urban solid waste management in households. This allows us to illustrate current challenges and identify trust-sensitive avenues for improvement by examining the lived experience and perspective of residents. This participatory approach (Hashemi et al., 2021) will also propose solutions adapted to local conditions, addressing the socio-economic and cultural specificities of the studied district.

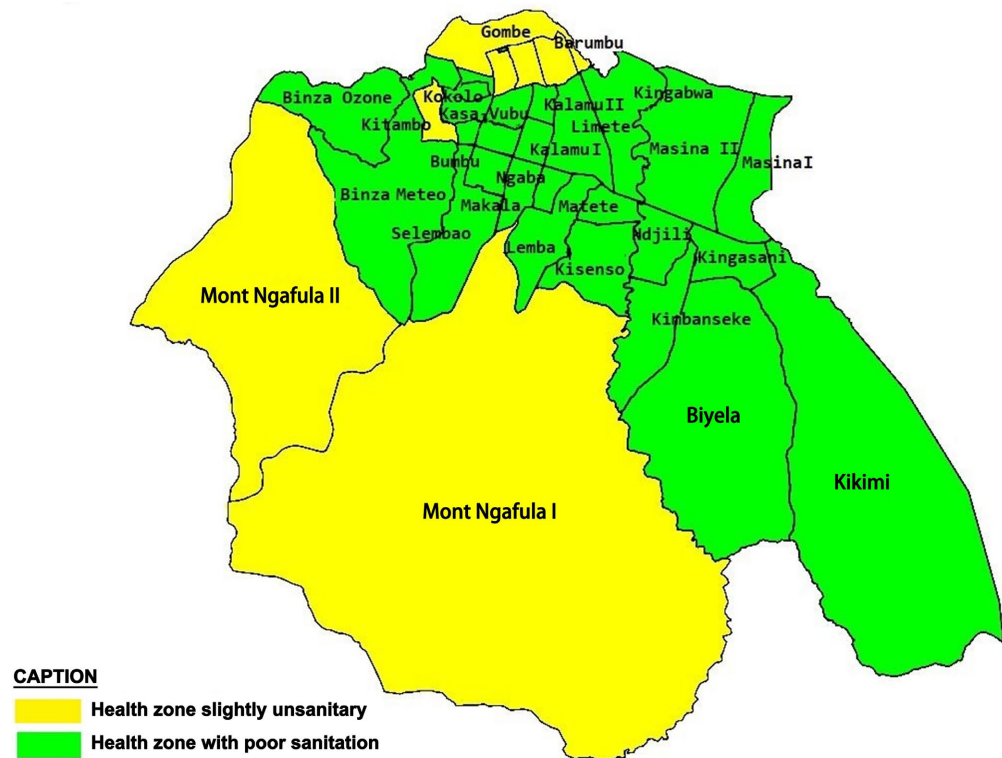
The results of this study would constitute a database for developing effective and socially acceptable waste management strategies that can directly contribute to improving the quality of life of local residents and environmental health in the local realities of this district. We aim to use community contributions to help design a sustainable and effective integrated solid waste management plan that meets the needs and expectations of people living in the Lukunga health district. More broadly, this participatory approach can help generate ownership of solutions by residents, which is necessary to ensure the sustainability of waste management projects.

## 2. Material and Methods

### 2.1. Study Area

This study was conducted in the Lukunga health district (Figure 1) of Kinshasa

City-Province, the capital of the Democratic Republic of the Congo. This district is part of Kinshasa's decentralized health system. Like other urban health districts in Kinshasa, Lukunga was created as part of health system reforms in the DRC. Its main objectives were to decentralize health services at the local level and bring them closer to the population.



**Figure 1.** Lukunga health district description.

## 2.2. Target Population and Sampling

Our study population consisted of residents of the Lukunga health district, regardless of their social status. In accordance with the interpretive paradigm of qualitative research, we used non-probability sampling of the purposive or intentional type (Tucker et al., 2020). This strategy allowed us to select participants with characteristics relevant to this study.

Inclusion criteria:

- Resident in the Lukunga Health District.
- Aged over 18 years.
- Freely consenting to participate in the study.
- Present during the survey period.

## 2.3. Sample Size and Saturation

The sample size was guided by the principle of theoretical data saturation (Fusch & Ness, 2015). This saturation was reached with fifteen (15) individual participants when new data no longer provided additional necessary information.

## 2.4. Methodological Approach

This study relied on a combination of descriptive phenomenology and social constructivism (Guillemette, 2022), to offer an in-depth understanding of waste issues in Lukunga. The social constructivist perspective helped us to moving beyond a mere technical and economic analysis of waste management and exploring its social and cultural dimensions to arrive at a contextually interpretation of the data. This approach allowed new culturally appropriate solutions to emerge, thus increasing the chances of their adoption and sustainability.

## 2.5. Data Collection

### ➤ Semi-structured Interviews

Semi-structured interviews (Johnson & Onwuegbuzie, 2004) were conducted by our research team with an average duration of 25 to 40 minutes per interview, during the period from November 25 to December 25, 2024. An interview guide was developed and used to orient the interviews towards our research questions, while allowing active exploration of participants' experiences.

### ➤ Informed Consent

For each interview, we first had to obtain informed consent from each participant, providing them with information about the purpose of the study, data confidentiality, and their freedom to withdraw.

### ➤ Recording and Transcription

The interviews were digitally recorded and transferred to a computer, while maintaining the nuances of oral discourse in local languages.

## 2.6. Validation and Adaptation of the Collection Tool

Based on our research domain, we critically evaluated the data collection instrument, which also gave us insights into its strengths and weaknesses. Modifications were undertaken to adapt the tool to the study of Lukunga citizens' experiences.

## 2.7. Increasing Credibility and Transferability

- Pilot interviews with five (5) community members were conducted to refine the wording of questions.
- Particular attention was paid to collecting detailed descriptions of the context and participants' experiences.

## 2.8. Triangulation and Verification

### ➤ Validation

We implemented data triangulation (Horincq Detournay et al., 2023), using multiple sources of information (interviews, observations, relevant documents), to strengthen the validity of the results.

### ➤ Peer Review

Three (3) qualitative researchers were invited to independently review the collected data and preliminary interpretations. This team approach allowed us to

confront viewpoints and deepen the analysis to strengthen the credibility of the conclusions.

## 2.9. Data Analysis

An inductive thematic analysis of the transcribed data was performed through an iterative process involving automated and manual methods, using the “atlas.ti” software to encode the data as follows:

- Identification of salient themes with initial coding.
- Grouping of codes into higher-level categories.
- Review of themes with reference to the research questions.

This methodology prompted us to develop an adequate and contextualized understanding of the perceptions and needs of the Lukunga population regarding waste management, which opened perspectives towards proposing adapted and sustainable solutions.

## 2.10. Study Limitations

Firstly, the subjectivity of the collected data, based on individual experiences and perceptions of participants, constitutes both a strength and a limitation for this study. While this subjectivity can integrate deep contextual and personal information, it can also introduce possible biases in the results. We attempted to minimize these biases through triangulation of data sources as well as continuous reflexive analysis. It should be noted that our conclusions were reached only through the prism of participants’ perspectives.

Secondly, the non-probability sampling technique, although suitable for an exploratory qualitative study, often restricts the statistical generalization of results. A reasoned choice of who could exclude the information we obtained was still useful, but also left out certain viewpoints or experiences. While this approach can provide depth in certain areas of waste management, it may not capture the full range of perspectives.

## 3. Results

The data in this **Table 1** reveal that participants had an average age of 37.4 years. The youngest respondent was 24 years old, while the oldest was 56 years old. This range represents the diversity of generations in the sample. Most subjects were between 30 and 45 years old, indicating the prevalence of middle-aged adults. The participants included 9 men and 6 women. The distribution indicates that the sample has a slight male predominance (60% men and 40% women), showing a slight imbalance. In terms of education level, we found that 53.3% of participants had a secondary level, 33.3% a university level, and 13.3% a primary level. The distribution shows that most participants had a secondary education level, followed by a university level, and a small number had a primary level. The education level seems relatively detached from age. Among women, four had a secondary education level, one had a university level, and one had a primary level. Men pre-

sented a greater diversity of education levels. Overall, participants with university education were between 30 and 36 years old, except for one participant who was 34 years old. We observe a fairly similar distribution of education levels between genders, with a slight tendency for men to have a more advanced education level in this sample.

**Table 1.** Distribution of participants according to profile.

Identification	Age	Sex	Education level
Participant 1	24	F	Primary
Participant 2	56	M	Secondary
Participant 3	44	F	Secondary
Participant 4	48	M	Secondary
Participant 5	36	M	University
Participant 6	35	M	Primary
Participant 7	45	F	Secondary
Participant 8	36	M	Secondary
Participant 9	34	M	University
Participant 10	44	F	Secondary
Participant 11	32	M	University
Participant 12	29	F	Secondary
Participant 13	30	M	University
Participant 14	32	M	University
Participant 15	36	F	Secondary

**Table 2.** Problems related to waste collection.

Theme	Sub-theme	Verbatim	Saturation
<b>Problems related to waste collection</b>	Absence or insufficiency of collection service	<i>“In our neighborhood, the waste collection service is almost non-existent. Piles of garbage accumulate everywhere and it has become our daily nightmare”</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, a12, a13, a14, a15)
	Access difficulties for collection services	<i>“The lack of good urbanization and lack of funding make waste collection very difficult in our environment. Roads pose serious traffic problems. We must therefore find alternative ways to manage our waste.”</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a16)
	Lack of infrastructure	<i>“We don’t have enough public trash bins, which pushes people to throw their waste in the streets. This creates piles of garbage that attract rats and insects.”</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a9)

**Table 2** presents verbatims indicating a concerning context of waste management in Lukunga. A vicious cycle of inefficiency in waste collection, coupled with insufficient infrastructure, creates risks of long-term negative impacts on the health district and its inhabitants. The waste management service is virtually non-existent, resulting in piles of garbage thrown in the streets and illegal dumps eve-

rywhere. To make matters worse, the apparent absence of public trash bins and the deplorable state of roads make it impossible for collection trucks to access many neighborhoods, or even be visible. The impacts of this disastrous management are numerous and worrying; in particular, the proliferation of rats and insects spreading diseases that endanger residents' health. Deprived of official solutions, residents often turn to waste incineration, polluting the air in a way that is detrimental to lung health.

Flooding is a dangerous factor for people living in urban environments and constitutes a major threat to community infrastructure, often caused by waste blocking drainage systems. Due to too much waste, the aesthetics of the urban landscape deteriorate, and this impacts the quality of life of the inhabitants.

The accounts in **Table 3** show residents' concern about the impact on health and the environment. They fear for their health, especially that of their children, as they live, work, or play in unsanitary homes and streets littered with waste. Other very important problems that are also criticized are odor nuisances and vector proliferation, which generate daily nuisances and represent a great risk to the population's health due to the presence of uncontrolled dumps. These testimonies highlight the need for action to improve solid household waste management in Lukunga to reduce health risks for residents and improve their living environment.

**Table 3.** Environmental and health consequences.

Theme	Sub-theme	Verbatim	Saturation
Environmental and health impacts	Environmental pollution	<i>"Illegal dumps are multiplying next to our houses, and this represents a health risk. We have no choice but to live among these piles of garbage."</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, a12, a13, a16)
	Health risks	<i>"I fear for my children's health. And the piles of garbage that litter the streets attract rats, flies, and mosquitoes carrying diseases."</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a8, a10, a11, a12)

**Table 4.** Waste management and treatment problems.

Theme	Sub-theme	Verbatim	Saturations
Waste management and treatment problems	Lack of sorting and recycling	<i>"The lack of education for waste sorting means that everything gets mixed. This makes recycling more difficult and more waste ends up in landfills."</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a16)
	Management of special waste	<i>"Electronic waste accumulates at my home because I don't know how to dispose of it safely. These dangerous products have no collection system."</i>	(a1, a2, a3)
	Unsubstituted alternative solutions	<i>"I burn some waste on the ground because there is no collection solution in our neighborhood. It makes a lot of smoke, but I have no choice."</i>	(a1, a10, a11, a13)

Considering the problems of waste management and treatment, the verbatims in **Table 4** highlight that, due to the lack of education on waste sorting, the volume

of waste going to landfills increases, creating complications for recycling. Residents want to separate their garbage, but the city lacks recycling infrastructure and any education on this subject, which hinders individual attempts. The disposal of special waste, for example, is another sub-theme addressed in the report, but presents a more significant specific challenge due to the absence of a collection system for these types of hazardous waste. Finally, the word-for-word reports show that alternative solutions, such as burning waste on the ground, are insufficient and lead to air pollution problems.

From a socio-economic perspective, the verbatims in **Table 5** concerning costs and inequalities associated with waste offer relevant insight into the functioning of the informal service. Some residents must pay for an informal service to have their waste collected, as it works better than the almost non-existent public garbage collection. However, the cost involved makes this solution inaccessible to some, and thus, we end up with a lot of waste in the streets. As for the role of informal workers in waste management, the verbatims show that these collectors can earn their living by sorting recyclable waste, but they lack supervision and this work is dangerous, as they are sometimes harassed by the authorities. These accounts highlight critical issues regarding equitable collection and accessibility of waste management services for all community members.

**Table 5.** Socio-economic aspects.

Theme	Sub-theme	Verbatim	Saturations
<b>Socio-economic aspects</b>	Costs and inequalities	<i>“There are informal services to collect my waste, so I have to pay them something. It’s a system that works, unlike the normal garbage collection that doesn’t exist.”</i>	(a1, a2, a3, a4, a5, a6, a7)
	Management of special waste	<i>“I work as an informal waste collector and earn my living by sorting recyclable waste, even if there is no supervision. But it’s dangerous and sometimes we are harassed by the authorities.”</i>	(a1, a2)

**Table 6.** Lack of education and awareness.

Theme	Sous-theme	Verbatim	Saturations
<b>Lack of education and awareness</b>	Need for environmental education	<i>“The fact that education is not available is a huge problem. Many people throw their waste anywhere without considering the consequences on the environment and health.”</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, a16)
	Management of special waste	<i>“The problem is not just inadequate collection because we don’t know how to manage our waste. In our community, the vast majority of households neither handle nor appreciate their waste.”</i>	(a1, a2, a3, a4, a5, a6, a7, a8)

Considering the need for environmental education, it emerges from the excerpts in the above **Table 6** that a large number of people tend to throw their waste anywhere around them, leading to damage to the environment as well as health. This highlights the need to increase public awareness of good ecological waste disposal practices. The excerpts show a lack of knowledge among residents re-

garding good practices; they don't know how to dispose of their waste properly, which they highlight as a factor contributing to the presence of waste in the streets. They also note that in some neighborhoods, almost no household values or recycles its waste or has devices that can generate energy. These cases underscore the need to design pollution education systems that promote waste management practices at all social levels.

For **Table 7**, the verbatims show a range of improvements for waste management in a low-income community. Participants propose appropriate and innovative solutions to overcome this environmental problem. They believe this will ultimately contribute to better managing litter in the streets, adding that installing more public trash bins will certainly help improve infrastructure. It is proposed that a community initiative for composting organically generated waste adds value and sustainability to agriculture. Although some will oppose it, a tax is proposed based on the amount of water or electricity consumed, adjusted to each household's contributory capacity. Education and awareness are important, and a waste sorting and recycling program is suggested. Authorities and NGOs are also desired to train participants in waste valorization. A final point of interest related to technological innovation is the proposed creation of a mobile application to geolocate collection points and report problems, as well as the possible use of drones for site inspection.

**Table 7.** Suggestions for improvement.

Theme	Sub-theme	Verbatim	Saturations
<b>Suggestions for improvement</b>	Infrastructure improvement	<i>"We hope for more public trash bins so that people don't throw their waste in the street."</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a15, a16)
	Community initiatives	<i>"A large-scale community composting system would be a great addition given the amount of organic waste we produce, which can be used for local agriculture."</i>	(a1, a2, a3, a4, a5, a6, a7, a15, a16)
	Funding and taxation	<i>"I suggest a low tax that would be based on households and linked to their water and electricity consumption so that it is proportionate and adjusted to their contributory capacity. Introduce exemptions or reductions for the most vulnerable households."</i>	(a1, a2, a3, a4, a5, a6, a7, a12, a14, a16)
	Education and awareness	<i>"A campaign focused on waste sorting and recycling would be useful, as many people don't know how to properly dispose of their waste."</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, a12, a13, a16)
	Involvement of authorities	<i>"The government and local NGOs should invest in training to show people how to valorize waste, for example by making handicrafts or compost from it."</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a14)
	Innovation and technology	<i>"I suggest developing a simple application to geolocate waste collection points and report illegal dumps, critical areas, or full containers. Also, use drones for site inspection, if possible."</i>	(a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, a12, a13, a14, a16)

These suggestions highlight that the community cares about proper waste management in many forms, ranging from concrete short-term solutions to long-term technological solutions, as well as additional structural changes in terms of fund-

ing and education.

## 4. Discussion

### 4.1. Participant Profile

This study represents a diverse sample with demographic variations in terms of age, gender, and education level. Its wide age range (24 - 56 years) and mean age (37.4 years) offer an intriguing intergenerational perspective. This diversity may also allow for exploring changes in attitudes and behaviors regarding waste management across generations, as younger participants may be more open to advice and solutions surrounding environmental issues and new waste management technologies, while older participants can bring historical knowledge about the evolution of waste management practices in their neighborhood.

A strength of this study is its relatively balanced distribution of men to women. This exploration of gender in waste management potentially allows for investigating gender-related differences in perspectives and experiences, as women tend to be the primary responsible parties for household waste management, often due to their domestic task responsibilities. Men may provide varied narratives, perhaps seeking aspects related to waste flow, process systems, or provisional policy. The diverse education levels (13.3% primary, 53.3% secondary, 33.3% university) add to the study's richness by providing insight into how expectations and needs in waste management orient around educational attainment. They may show differences in knowledge of environmental issues associated with waste management at these education levels.

### 4.2. Health and Environmental Impacts

The verbatims presented in this study describe an alarming situation of waste management in Lukunga, where the management system is described as ineffective or almost non-existent, and the infrastructure necessary for collection (either incomplete, obsolete, missing, or/and ineffective), leading to a concerning situation for both public health and the ecological environment. Residents speak of enormous piles of debris lining the streets and a proliferation of illegal dumps, which together have led to an increase in rats and insects, potentially increasing the risk of disease transmission. Moreover, garbage clogging drainage systems would significantly increase the risk of flooding, endangering residents' safety and urban infrastructure health. The public health implications of this failing or non-existent management system are multiple and concerning. Similar studies have previously elucidated the deleterious effects of poor waste management on human health and the environment. Poor waste management leads to air, water, and soil pollution, and is a predisposing factor for respiratory, infectious, and parasitic diseases (Ngnikam et al., 2017). Furthermore, Wong focused on the adverse effects of ineffective waste management on water and soil quality and, consequently, the increased transmissibility of diarrheal and vector-borne diseases (Wong, 2022).

### 4.3. Costs and Inequalities Related to Waste Management

The verbatims on this theme show that some residents must pay informal services to have their waste collected, as it works better than public garbage collection. However, this is not an option for everyone, as it is a solution that has a cost and is not accessible to all, resulting in an accumulation of waste in the streets. All community members should have equitable access to waste management services, including fair collection, and residents' testimonies raise relevant questions on this issue.

These findings are consistent with other studies drawing attention to the expenses and inequalities associated with waste management. According to the opinion of M. Devados et al., waste is mainly financed by taxpayers, but its benefits are often unevenly distributed (Michel Devadoss et al., 2021). The inaccessibility of waste management services, particularly in rural and poor urban areas, has also been highlighted by the work of S. Diabagate and K. Konan (Diabagate & Konan, 2019).

### 4.4. Environmental Education and Awareness

The verbatims expressed for this theme demonstrate the importance of effective environmental education to encourage good ecological waste management practices. These results are in line with previous work, which emphasized, on the one hand, the importance of public awareness on waste management and, on the other hand, the need for environmental education to promote good waste management behavior. Environmental education meets an elementary condition for promoting the values of waste sorting and recovery and for avoiding their accumulation according to Ramachandran et al. (Kulkarni, 2020). The work of Hossain et al. also highlights the significant role of environmental education in facilitating community collaboration in waste management (Hossain et al., 2020).

### 4.5. Practical and Innovative Solutions

The study transcripts are full of meaning for potential solutions aimed at improving waste management in the Lukunga district. The suggestions made are consistent with recommendations established in the scientific literature for effective waste management. According to the results of N. Moufflet's study, practical and innovative solutions are essential to address waste management challenges (the large number of public trash bins, organic waste recovery, as well as innovative technologies) (Moufflet, 2024). The work of Dienge et al. is in the same line of technological innovation to improve waste management, particularly in the collection of electronic waste and monitoring of landfills (Dieng et al., 2018).

## 5. Conclusion

This qualitative study conducted in the Lukunga health district reveals a critical situation in solid household waste management. The evidence we collected speaks of a dysfunctional or non-existent collection system, insufficient or underutilized

infrastructure, and concerning impacts on human health and the environment. The narratives from this study clearly reflect the needs and expectations of the Lukunga population. Aware of the effects of inadequate waste management, they sometimes resort to informal solutions, which are often costly and push others towards environmentally unfriendly behavior.

The results emphasize a participatory approach in designing an integrated and holistic solid waste management system that reflects residents' wishes. This approach should include environmental education and public awareness, while addressing issues of cost and inequality in access to waste management services. Proposed solutions could include increasing public trash bins, valorizing organic waste, integrating innovative technologies, and strengthening environmental education. These steps would bring real hope for a better quality of life and improved environmental health for residents. Consequently, the findings of this study can provide a solid foundation for developing integrated solid waste management strategies in Lukunga, meeting the expectations of its inhabitants and contributing to a better quality of life.

Thus, our recommendations are:

- 1) Develop a formal household solid waste collection system, including program and budget, for each neighborhood in Lukunga, using collection vehicles adapted to neighborhood logistics.
- 2) Conduct awareness campaigns for the population on the importance of source waste sorting and detailed knowledge of different waste categories and good ecological waste management practices.
- 3) Establish sorting and recycling facilities for collected waste, with the participation of local actors (NGOs, etc.).
- 4) Involve youth in solid waste management through awareness and training programs for school children and young people.
- 5) Establish a waste management monitoring and control mechanism, including local authorities and NGOs involved in monitoring landfills and dumping sites (e.g., reporters).
- 6) Conduct awareness campaigns on public health issues associated with waste, in coordination with local health services.
- 7) Promote local participation in effective waste management through awareness-raising and dissemination of information on the cost and benefits of adequate household solid waste management, etc.

To deepen this analysis, further research on the socio-economic and cultural particularities of Lukunga, as well as on legal and institutional frameworks, would be necessary. A comparative study with other cities that have improved their waste management could also offer valuable elements for developing an adapted and sustainable strategy.

### **Conflicts of Interest**

The authors declare that there are no conflicts of interest for this study.

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