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COMMUNITY PARTICIPATION AND HOUSEHOLD WASTE MANAGEMENT IN THE MUNICIPALITY OF NGABA, KINSHASA-DEMOCRATIC REPUBLIC OF CONGO

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NAIROBI, KENYA

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DECLARATION

This research thesis is my original work. It has not been presented in any other University or institution of higher learning for any academic credit. All work sourced from other scholars and sources have been duly cited and acknowledged in this document.

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DEDICATION

I dedicate this work with the deepest affection to my father, Nestor Kabwangala, and my mother, Léonie Kambamba. Your unwavering support and the invaluable sacrifices you made throughout this journey have been my foundation; you carried burdens in the shadows so that I could reach the light. Beyond your guidance, it is the warmth of your unconditional love that has given me the strength to persevere and become the person I am today.

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TABLE OF CONTENTS

DECLARATION ..... **ii**
DEDICATION ..... **iii**
ACKNOWLEDGEMENT ..... **iv**
TABLE OF CONTENTS ..... **v**
LIST OF FIGURES ..... **viii**
LIST OF TABLES ..... **ix**
LIST OF ABBREVIATIONS ..... **x**
ABSTRACT ..... **xi**
CHAPTER ONE **1**
INTRODUCTION **1**
1.1Introduction 1
1.2 Background of the Study 1
1.2.1 Concept of Community Participation in Household Waste Management 7
1.3 Statement of the problem 15
1.4 Research Objectives 16
1.4.1 General Objective 16
1.4.2 Specific Objectives 16
1.5 Research Hypothesis 17
1.6 Research Assumptions 18
1.7 Justification of the Study 18
1.8 Significance of the study 20
1.9 Scope and Delimitation of the Study 22
1.10 Limitations of the Study 23
1.11 Conceptual Framework 25
1.12 Operation Definition of Terms 27
CHAPTER TWO **29**
LITERATURE REVIEW **29**
2.1. Introduction 29
2.2 Critical review of theories 29
2.2.1. Theory of Collective Action 29
2.2.2. General Systems Theory 32
2.2.3 Stakeholder Theory 35
2.2.4 Environmental Health Theory 38
2.2.5 Theory of Planned Behavior (TPB) 41
2.2.6 Theoretical Complementation 44

2.3 Empirical Literature Review 51
2.3.1. Household Waste Management 51
2.3.2 Environmental Education and Household Waste Management 61
2.3.3 Partnership Approach and Household Waste Management 70
2.3.4 Community Strategies and Household Waste Management 82
2.3.5 Legal Framework on Waste Management 92
2.3.6 Challenges Related to Implementation of Existing Legislation 100
2.4 Research Gaps 119
CHAPTER THREE 122
RESEARCH METHODOLOGY 122
3.1. Introduction 122
3.2. Research Design 122
3.3. Site description, study population and targeted population 122
3.3.1. Site Description 122
3.3.2. Study Population 124
3.4. Sampling Techniques and Sample size 125
3.5. Methods and Instruments of Data Collection 127
3.5.1. Questionnaires for Household Heads 127
3.5.1. Interviews for Community Representatives 128
3.5.3. Observation 128
3.6. Pilot Test 128
3.7. Data Quality Control: Reliability and Validity 129
3.7.1. Reliability 129
3.7.2. Validity 130
3.8. Data Analysis and Presentation 131
3.9. Ethical considerations 132
CHAPTER FOUR 133
DATA PRESENTATION, DISCUSSION AND INTERPRETATION OF FINDINGS 133
4.1 Introduction 133
4.2 Response Rate 133
4.3 Demographic Information 133
4.4 Socio-Economic Barriers Towards Community Participation in Waste Management 136
4.5 Relationship Between Environmental Education and Community Participation in Household Waste Management Practices 144
4.6 Community Partnership Approaches on Household Waste Management 153
4.7 Community Strategies Aimed at Improving Participation in Household Waste Management 157
4.8 Regression Analysis 165
CHAPTER FIVE 173
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS 173

5.1 Introduction 173
5.2 Summary of findings 173
5.2.1 Socioeconomic Barriers to Community Participation in Household Waste Management 173
5.2.2 Relationship Between Environmental Education and Community Participation in Household Waste Management Practices 174
5.2.3 Community Partnership Approaches on Household Waste Management 175
5.2.4 Community Strategies Aimed at Improving Participation in Household Waste Management 176
5.3 Conclusion 177
5.4 Recommendation 177
5.5 Areas for Further Studies 179
REFERENCES 180
APPENDICES 197
APPENDIX 1: CONSENT FORM 197
APPENDIX 2: QUESTIONNAIRE FOR HOUSEHOLDS IN NGABA 198
APPENDIX 3: INTERVIEW GUIDE FOR KEY INFORMANT INTERVIEWS (KIIS) 203
APPENDIX 4: OBSERVATION GRID 205
APPENDIX 5: MAP OF LOCATION OF STUDY 206
APPENDIX 6: ANTIPLAGIARISM REPORT 207
APPENDIX 7: APPROVED RESEARCH LETTER 208
APPENDIX 8: FIRST ARTICLE PUBLISHED 209
APPENDIX 9: SECOND ARTICLE PUBLISHED 210
APPENDIX 10: FIELDS PHOTO/OBSERVATION 211

LIST OF FIGURES

Figure 1: Conceptual Framework.....25

Figure 2: Interaction Between Theoretical Framework and Variables 47

LIST OF TABLES

Table 1: Matrix of Study Gaps in Theoretical Literature 48

Table 2: Matrix of Study Gaps 107

Table 3.3: Reliability Test..... 130

Table 4.1: Response Rate..... 133

Table 4.2, Demographic Profile of Participants 134

Table 4.3: Barriers to Waste Management Participation..... 136

Table 4.4 Perception of Waste Management Costs 141

Table 4.5: Participation in Waste Management Education..... 144

Table 4.6: Environmental Education Methods..... 149

Table 4.7: Environmental Education Challenges 150

Table 4.8: Community Partnership Approaches in Waste Management..... 153

Table 4.9: Community Strategies for Improving Household Waste Management..... 157

Table 4.10: Separate Waste for Recycling or Composting..... 160

Table 4.11: Model Summary of Households Waste Management 166

Table 4.12 ANOVA 166

Table 4.13: Coefficient..... 167

LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
AU	African Union
DRC	Democratic Republic of the Congo
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GST	General Systems Theory
NGO	Non-Governmental Organization
PAYT	Pay-As-You-Throw
POP	Persistent Organic Pollutant
POP	Persistent Organic Pollutants
SDG	Sustainable Development Goals
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Program
WWF	World Wide Fund for Nature

ABSTRACT

This study aimed to assess the impact of community involvement on household waste management (HWM) in Ngaba Municipality of Kinshasa, DRC. This study aimed to identify and understand the impact of socio-economic constraints, environmental education, community partnership strategies and community-based solutions on community participation in household waste management. It was based on the General Systems Theory that focuses on how the social, institutional and environmental issues are interrelated in solving public issues like waste management. The design used was a convergent-parallel mixed methods design, which involved collecting and analyzing quantitative and qualitative data at the same time. Target population includes 5,985 household heads and 8 local leaders. Stratified sampling was used to select 386 households with the use of Yamane's (1967) formula and all 8 local leaders were purposively selected. Structured questionnaires were used to collect quantitative data while interviews and observations were used to collect qualitative data. Triangulation was used to extend validity, Cronbach's Alpha was applied to the quantitative reliability test, and established procedures were followed for verification in the qualitative study to ensure trustworthiness. Quantitative data were analyzed descriptively and qualitative data were analyzed using the semantic thematic analysis and narrative thematic analysis in SPSS version 27. The results showed that many socio-economic and institutional obstacles exist to effective HWMC. However, the major problems were lack of government support, insufficient waste management infrastructure, low awareness among the public and lack of incentives to involve communities, despite the relatively low cost of waste services. The positive effect of EE on community involvement was through raising awareness and encouraging responsible waste management practices, but EE was limited by poor coordination and funding. Awareness creation and training were also partially achieved through community partnerships, but coordination and accessibility of these partnerships were not good. Some community-based initiatives had been established (e.g. recycling, clean-up), however these were underutilized because of lack of time, few people were interested or institutional support was weak. The results of regression analysis showed that the independent variables had a moderate relationship with waste management ($r = .326$, $R2 = .106$), which means that the independent variables explained only 10.6% of the variance in waste management. Statistically significant predictors were EE and community partnerships. The study suggests the development of formal participation mechanisms, enhancement of environmental education, promotion of recycling and waste separation, and better coordination and access to waste management services.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

In this first chapter, the study laid the foundation of the research by presenting the general context of the topic, the statement of the problem and the objectives of the study. Furthermore, it highlighted the importance of the study within the social work field, while outlining its scope and limitations.

1.2 Background of the Study

Waste management is an important global problem considering the wide ramifications that it brings about. In this regard, it falls in sync with Sustainable Development Goal 6, which underlines well-managed sanitation facilities, especially in growing cities at a global level (Ram et al., 2024). At one time, degradation of the environment accelerated post-World War II due to rapid industrialization. However, currently, it is mainly consumption patterns and industrial production trends which are contributing to greater pollution, deforestation, and degradation of natural habitats, thus underlining growing demands for worthwhile long-term solutions to manage or treat this wastage right from household to commercial spaces (Kushwaha et al., 2021).

Community involvement in management of waste is defined as involvement of local communities and household members in activities that help plan, implement and sustain waste management processes. Community participation in waste management implies not only the awareness of households about various problems related to waste generation and management but also practical actions such as sorting out waste at source, utilizing proper disposal facilities, conducting cleaning campaigns and participating in local decision making on sanitation issues (Tarigan et al., 2020). Empirical studies have revealed that when community members are

involved in such activities as sorting waste at source, utilizing waste bins, participating in recycling campaigns or conducting cleaning campaigns, the efficiency of solid waste management system increases considerably due to increasing joint efforts (Harnita, 2025).

In this case, the indicators play a role of measures that help to operationalize the phenomenon as well as indicate the degree to which the participation of the community in particular behaviours. Among the common indicators used are: Waste sorting at household level, assessed by the number of households engaged in separation of organic, recyclable, and non-recyclable waste; Waste bins provision and usage, meaning presence of waste storage containers in households as well as the way people use these bins; Community clean-up or recycling initiatives, showing involvement in joint waste-related activities; and Service fee payments, meaning willingness of households to pay for the use of waste services (Harnita, 2025; Lunojo, Sesabo & Ilembo, 2025). This means that indicators can differ based on cultural beliefs, awareness, and institutional support.

Waste management within the household can be viewed as encompassing all activities related to managing household solid waste from the point of creation through storage, collection, transportation, reusing, and recycling to disposal while considering their effects on environmental quality and public health. Household waste management is typically a dependent variable in many empirical investigations because its success usually depends on various elements such as consumer behavior, provision of waste management infrastructure, and community involvement (Ram et al., 2024; Sarker et al., 2024). An effective household waste management process is essential in realizing municipal sanitation objectives and conforms to international sustainable development frameworks that stress responsible production and consumption.

The following are key indicators of household waste management: rate of waste production, which may be expressed in daily kilograms per household and which measures consumption behavior; existence of waste segregation, which denotes how well are the waste streams handled before being collected; frequency and reliability of waste collection, which reveals the performance of the municipality; amount of recycling and reuse, showing how much waste is being diverted from its final destination; and appropriate methods of waste disposal, including authorized dumping and avoiding illegal open dumping and burning (Ram et al., 2024; Zephania, Msomba & Phillipo, 2025).

Within the setting of the Municipality of Ngaba, both of the variables under consideration have a correlation that can be considered analytically meaningful. Participation of residents in waste management activities like sorting, participating in campaigns, and paying for the service can be considered crucial to influencing the results of household waste management. Indeed, high levels of engagement in sorting and managing waste in a proper manner can result in decreased waste production and improved waste recycling rates, along with decreased health risks associated with such household practices (Lunojo, Sesabo & Ilembo, 2025). On the contrary, lack of participation due to insufficient information or lack of infrastructure for waste management can contribute to the maintenance of poor management practices and associated adverse health effects (Zephania et al., 2025). Thus, the analysis of these two variables and related indicators in Ngaba will contribute to the identification of possible associations.

Urbanization, which has been spurred by rural-urban migration, has made household waste management a rather complicated process, especially in cities that lack infrastructure and institutional capacity. With growing urban populations, there is also a corresponding rise in household waste, which paces pressure on cities that lack the capacity to meet such demands. An efficient process of household waste management in cities, therefore, demands harmony between governmental regulations, technology, and community-based initiatives. According

to Knickmeyer (2021), urbanization or industry development has been prominently linked with rising levels of household waste, yet most of these cities are major wasteland fillers. This becomes a significant factor in improving household waste sorting, reduction, and recycling initiatives. With enhanced household-based waste sorting, recycling levels are enhanced, thereby lessening pressure on landfills, which in turn makes cities cleaner and more environmentally friendly (Knickmeyer, 2021).

Empirical literature in recent years underscores the importance of the role played by community participation in relation to successful household waste management systems. In cases where municipality provides a waste management system, this process does not yield sustainability results unless households participate in source segregation, recycling, composting and collaboration with waste managers (Melawati, 2025). Studies have demonstrated that there is a direct link between successful outcomes achieved through reduction of waste and community participation practices, in which waste segregation practices have been shown to exhibit the highest levels of contribution to sustainability in this context (Melawati, 2025). Also, empirical findings from a number of urban studies confirm the impact that motivating households for adopting particular waste-related behaviors such as proper waste sorting and decision-making on waste issues can make for the sustainability of waste systems (Rogowska, 2024; Mpuya, 2025).

Alongside this, the importance of community participation in determining the success of waste management efforts at both the municipal and household levels is increasingly being recognized. Research emphasizes that active community participation in activities such as regular waste sorting, participation in group cleaning initiatives, and working alongside the local authority will contribute towards enhancing the environmental performance and efficiency of the waste system due to increased social ownership of the waste system (Harnita, 2025; Melawati, 2025). Furthermore, community participation has been established as an

important driver of behavioral change, leading to increased awareness about waste management, formation of social norms related to environmentally friendly actions, and collaborative governance between citizens and institutions of waste management (Zebua et al., 2025). It has been emphasized by recent research that community participation can act as a multiplier for policy efforts by promoting the inclusion of local communities in efforts of reducing waste generation, which highlights that waste management problems in urban settings within developing contexts require the inclusion of community participation for effective resolution (Zebua et al., 2025; Melawati, 2025).

Internationally, waste production is still a pressing issue. Recently, the World Bank has projected that the average individual currently generates 0.74 kilograms of waste per day. However, the amount of waste produced diverges significantly depending on the level of income. If current trends continue, the generation of municipal solid waste is likely to escalate considerably, especially in low-and middle-income countries. Variations in the methods of waste handling are mainly influenced by the capabilities of the region's economy and infrastructure. Compared to other parts of the world, the richest countries generate a larger volume of waste. However, they are likely to handle the waste effectively due to advanced technology and active public involvement. However, the sub-Saharan Africa, South Asia, and the Middle East/North Africa are likely to exhibit a significant increase in waste generation, likely to double or triple by 2050 (UNEP, 2024).

Experiences from developed countries have consistently shown the effectiveness of policy frameworks mixed with household engagement. For example, the United States is still one of the world's largest generators of municipal solid waste, at about 4.9 pounds per person per day, with a very low rate of recycling of only about 32% (Brien, 2023). In addressing this, community-based initiatives such as single-stream recycling, composting programs, and waste-to-energy technologies have been implemented to engage homes and reduce landfill disposal

(Badgett & Milbrandt, 2021). Similarly, Canada has advanced through such programs as Recycle BC, which encourage waste separation at the household level and raise public awareness, thus enabling cities such as Vancouver to attain high rates of recycling of over 60% (Wang, 2023). In Brazil, waste recyclable material collectors, known as catadores, are at the center of recycling activities. It plays a very significant role in the overall municipal solid waste management, especially in municipalities like São Paulo, where support by the municipal via cooperatives has not only raised efficiency but also ensured inclusion of people at the social level (Gutberlet et al., 2021).

Community participation has made considerable contributions towards enhancing waste management in various Asian nations. In Japan, the "3Rs" concept of waste management is used. The method requires residents to classify waste in various groups, with the process being supported by regulations and public awareness and education campaigns. The measures have seen some parts of the nation achieve recycling rates surpassing 80% (Noudeng et al., 2024). Another example of an Asian country that has succeeded in managing waste through community-based mechanisms is Taiwan. The nation was once referred to as the "garbage island." Taiwan has been able to turn around its waste management system through methods like mandatory segregation of household waste and payment as per weight generated. The approaches have seen the daily waste generation per capita fall to about 0.43 kilograms while maintaining recycling rate of about 55% (Chen, 2021).

European nations demonstrate how strict enforcement of policies and active engagement by citizens are essential in optimizing recycling rates. Leading by example is the case of Germany with a recycling rate of about 66% made possible by the Dual System and education programs to segregate domestic trash (Dehio, 2023; Jaakkola, 2023). Sweden recyclates to the extent of landfilling practically zero trash by incorporating trash-to-energy technology with about half of domestic trash turned to energy and the other half recycled (Caferra, 2023). Italy has also

done remarkably well in this area, especially in Milan with community-based projects to manage food trash in separate collection programs with recycling rates amplified to about 65% (Agovino et al., 2021). All the above cases above demonstrate how community participation is critical in ensuring sustainable results in trash recycling (Sharma et al., 2021).

In South Asia and Oceania, community-driven approaches continue to produce positive results. Women-led initiatives in Pune, such as SWACH (Solid Waste Collection and Handling), have demonstrated the effectiveness of inclusive, community-based waste management. These programs have notably improved recycling rates and livelihoods, while improving social equity. Australia offers a complementary model with an integration of technological solutions at the level of behavioral change initiatives. Programs such as Love Food Hate Waste encourage households to reduce food waste, while comprehensive curbside recycling systems in cities like Melbourne and Sydney (Picuno, 2021*)*.

It is projected that Sub-Saharan Africa will witness a rise in the production of wastes to double its current production levels by the year 2050 (UNEP, 2024). Currently, a considerable amount of the wastes produced in the area is disposed of in an unsafe manner or through poor disposal methods, putting people's health and the environment at risk. Tackling this problem is not only about providing people with access to basic waste disposal systems. There is also a need for solutions that consider the value of waste by adopting techniques like recycling, recovery, reusing and resource utilization (World Bank, 2023).

1.2.1 Concept of Community Participation in Household Waste Management

Community participation has recently emerged as a crucial aspect of household waste management due to the rise of inclusive environmental governance and sustainable development practice. Recent scholars have argued that whereas household waste management was traditionally the responsibility of municipal authorities, the current context demands the

structured cooperation of all relevant parties from governments and households to private enterprises and communities (Anyanwu et al., 2025). Rapid urbanization continues to increase waste production in major cities, prompting the need to move away from the top-down approach of waste governance towards an inclusive, participatory framework, thus positioning community participation as a key factor. According to contemporary researchers, community participation refers to informed and ongoing participation of households in waste planning, sorting, management, reduction, monitoring, and decision making (Hussein et al., 2025). It is important to note that this definition underscores the inherent multidimensionality of sustainable household waste management, implying that waste management is associated with behavior, society, institutions, technologies, and the environment.

In the period from 2020 to the current time, it was discovered that integrating households into waste management systems enhances their adherence to waste policies, promotes source segregation, and leads to positive environmental results. In studies carried out in Indonesia, Bangladesh, and Brazil, it has been noted that when sensitization, training, and empowerment are ensured, there is enhanced waste segregation, and households tend to cooperate with the local authorities in recycling and waste disposal (Setiadi et al., 2023; Rahman & Ahmed, 2022). More importantly, recent researches worldwide point out that community participation becomes possible where there is proper engagement in creating awareness, open communication channels, and proper waste services (Kim & Kim, 2021). As far as the past five years are concerned, it has become clear that the adoption of behaviors has become an important determinant of participation. Indeed, using the TPB model, recent studies prove that households' willingness to manage waste is influenced by their attitudes, subjective norms, and perceived behavior control (Tran et al., 2020).

The pattern of community participation in household waste management across African nations differs based on contextual factors including urban informal settlements, low municipal

capacity, lack of policy enforcement, and inadequate financial resources. Contemporary research on household waste management in Africa indicates that despite efforts to formally integrate communities in waste governance systems, participation is still hindered by structural obstacles (Osei-Tutu et al., 2023). Studies conducted in West and Southern Africa, including Ghana, Nigeria, and Zambia, suggest that while there may be willingness to participate among households, this desire is hampered by poor service delivery, lack of awareness, absence of sufficient waste infrastructure, and minimal engagement by municipalities (Munyuli & Lungu, 2024). A recent study conducted in Zambia in 2024 found that household participation was relatively low where participants felt their input would not impact municipal decisions or where waste collection was unreliable (Chileshe et al., 2024). Conversely, participation was increased where municipalities worked together with NGO and CBO organizations to organize waste management awareness campaigns, provide sorting facilities, and facilitate feedback mechanisms (Munyuli & Lungu, 2024). The current scholarship in Africa thus emphasizes the significance of stakeholder coordination, capacity development, and governance trust as determinants of participation.

Another trend among the continent's researchers includes the acknowledgment that socio-economic indicators, such as educational background, financial standing, and occupation, play an important role in the participation rate of communities in household waste management. In the case of the East African countries, the results of the relevant studies performed in Tanzania, Uganda, and Rwanda between 2022 and 2025 show that households with better educational background exhibit higher rates of participation in sorting waste, its recycling, and environmentally friendly waste disposal (Nkurunziza & Habimana, 2022). Nonetheless, the aforementioned literature reviews reveal that the poor can also engage in recycling effectively in case they have been offered appropriate training and support from the community. Accordingly, contemporary African literature increasingly stresses that equitable solutions

should be sought and models considered which take into consideration various peculiarities, such as high density of population, informal settlements, and cultural perceptions regarding waste (Chileshe et al., 2024). In spite of the fact that the issues faced by African cities might be different compared to other parts of the world, recent scholarly studies show that it is possible to achieve positive results when it comes to community participation.

In Kenya, existing research reflects the continental trends, providing important data regarding the relationship between community participation and waste management issues in informal urban settlements. In recent years, a number of studies carried out in Nairobi, Kisumu, Mombasa, and Kajiado County have demonstrated that community engagement can contribute to better efficiency of waste collection, increased environmental cleanliness, and prevention of diseases (Wamukota, 2022; Njeru, 2025). For example, it has been shown that the participation of households in recycling, cleaning campaigns, environmental clubs, and waste monitoring activities positively impacts their attitudes to waste disposal (Wamukota, 2022). However, existing literature indicates that the lack of awareness among the community members, inefficient waste collection, and weak consultation of households in policymaking contribute to their poor participation (Njeru, 2025). Recent Kenyan research also demonstrates that partnerships between CBOs, private waste collection companies, churches, youth groups, and households can facilitate community involvement in addressing waste management problems since they close the institutional gap (Njeru, 2025).

The other new theme in Kenyan literature focuses on how governance and regulation affect the participation of the community in waste management. Studies conducted from 2021 onwards reveal that inconsistency in enforcing bylaws, lack of adequate involvement of community members in the planning process of counties, and inadequacy in funding community participation in awareness programs restrict household participation in waste management activities (Odhiambo & Kambona, 2023). It can be noted from the findings that, despite the

country's progress in implementing policies, especially with the adoption of a decentralized governance system, implementation faces challenges. However, the reviewed studies unanimously agree that when households are allowed to participate in decision-making processes, sensitized appropriately, and offered adequate waste management services, their participation is remarkably high. Therefore, contemporary literature in Kenya indicates that community participation should be viewed as an important element in resource-constrained settings and a strategy that can lead to sustainable waste management.

Community participation plays a vital role in the proper management of solid waste in Africa's urban areas, and there are various factors that affect the effectiveness of community participation. Examples of such factors include those that have been identified through research conducted in Lindi Municipal Council in Tanzania. The research focused on analyzing factors that determine the level of participation in solid waste management. For instance, it was established that most respondents (92%) indicated their willingness to pay for solid waste management services, reflecting intrinsic motivations to participate in such activities (Tarimo, 2025). Nevertheless, many residents (59%) reported their dissatisfaction with the available municipal services, and there was a lack of proper enforcement of relevant regulations. Hence, community participation in solid waste management activities can be hindered by inadequate infrastructure, poor governance, and weak regulation enforcement, despite the voluntary nature of participation (Tarimo, 2025). The findings imply that although community participation is a crucial determinant of household solid waste management, it cannot be achieved in isolation from supporting governance and regulatory mechanisms. Households contributed to disposal and sorting operations in the area; however, the efficiency of their involvement was assessd by the functioning and effectiveness of the existing municipal services and governance systems (Tarimo, 2025).

In addition, similar research conducted in Addis Ababa, Ethiopia, has demonstrated the importance of household practices in shaping waste management results despite the availability of institutional frameworks to do so. In a study measuring household solid waste segregation, which is an important part of proper household waste management - only 21.3% of households were found to consistently engage in solid waste segregation, while almost 29% of households infrequently engaged in such practices (Adefris et al., 2023). It was noted that such poor segregation practice was linked to the level of awareness and involvement in community and social organizations discussing issues related to waste, thus showing that community involvement in terms of knowledge exchange and interaction is very important in ensuring positive waste management behavior (Adefris et al., 2023). It is further shown that the behavioral differences resulted from different awareness levels of the population and the need for knowledge, which means that without proper programs aimed at education and community involvement, households may not have the necessary capabilities or motivation to manage waste (Adefris et al., 2023). In this regard, both African cases discussed above show that waste management among households is strongly influenced by the willingness of communities.

Despite the problems with waste management in many African urban settings, there is proof that significant improvements can be attained through proper governance and public involvement. Kigali, which is located in Rwanda, is a perfect example of such a strategy. The city has improved its waste management policies by implementing enforceable environmental rules, such as prohibiting the use of plastic bags throughout the nation and a practice called Umuganda, which is a community-based cleaning exercise conducted monthly. This strategy has made residents actively involved in keeping the environment clean and minimizing waste. Consequently, Kigali is regarded as one of the cleanest cities in Africa (Ngombe et al., 2024; Nduwimana et al., 2025). Similarly, South Africa has pursued policies on waste reduction and recycling in its major municipalities; however, inequalities persist in most informal settlements

due to gaps in services and infrastructure. Kekana 2024, Volschenk et al. 2021. Conversely, Nigeria continues to grapple with heavy waste management challenges. Despite public–private initiatives like those headed by the Lagos State Waste Management Authority (LAWMA), Nigeria's waste collection rates continue to remain low. Adama 2022, Okafor et al. 2022. As opposed to this, Namibia presents an optimistic case whereby community participation in municipal waste systems at Windhoek has enhanced recycling and curbed environmental hazards (Kafula 2024).

In this regard, the Democratic Republic of Congo (DRC), more specifically Kinshasa, represents one of the many African metropolises experiencing growth dynamics. Inadequate waste management due to lack of infrastructure capacity to manage the waste currently poses significant challenges to United Nations agencies. In recent estimates, it was observed that only a fraction of waste generated by households in Kinshasa is currently taken to waste disposal facilities (UN-Habitat, 2023; World Bank, 2022). Nonetheless, it was observed that waste generated by plastics poses significant challenges to waste management in Kinshasa by contaminating water bodies and thus leading to floods due to blocked drainage (UNEP, 2024). Consequently, to address such waste management challenges in Kinshasa, so-called informal service providers like Pusu Pusu play an important role in waste recycling (Diambu, 2024). Other projects initiated by the Kinshasa government to address waste management include the Kin Elenda Project (Leonard, 2021).

Poor waste management at the municipal level is likely to yield negative impacts, as shown in cases like those in Ngaba. When poor waste collection mechanisms are prevalent, people might be compelled to use means like dumping and burning waste, which pose the danger of environmental destruction, as well as the risk of air pollution and respiratory health complications among other health problems. On the other hand, positive efforts from the community side show promising prospects. Community-based activities that bring together

homes, youth groups, and NGOs have made contributions towards efficient waste management. However, their impact remains constrained by limited funding, limited technical capacity, and weak institutional support (Mangenda, 2024; Okin et al., 2024). Evidence suggests that if grassroots efforts like these are supported with training, resources, and policy integration, they can significantly enhance urban waste management outcomes (Kabasele et al., 2021).

The history of waste management trends across the globe illustrates the need for sustainable approaches against wasteful consumption, not just depending on technological development. Although a circular economy involves efficiency and recycling in waste management, minimizing the generation of waste from consumption practices cannot be overemphasized (Jarrige & Le Roux, 2021). The inclusion of communities in waste management has been proved to improve the practice, especially when community members are incorporated in the planning and implementation of the strategy and when the necessary infrastructure is provided (Kafula, 2024). Communication, participation, and development are also essential in sustainable waste management practices (Abunyewah et al., 2021; Etim, 2024).

Despite having a wealth of global and regional knowledge on successful best practices regarding effective management of waste, a large area where research is needed in a localized manner, regarding how community participation leads to effective management of waste in a growing African city such as Kinshasa, lies in filling a research gap where little focus has been placed on how community participation is intertwined with institutional development. In light of this challenge, this research study aimed to explore the advantage of community engagement in the management of waste by households in Kinshasa City. This is done to contribute towards informed decision-making on strategies for waste management in Kinshasa.

1.3 Statement of the problem

The rapid rate of urbanization, population increments, and changes in consumption behaviors and patterns of household refuse disposal have also considerably increased household waste quantities in the Democratic Republic of Congo (DRC), with the existing refuse disposal structures remaining grossly inadequate in the city of Kinshasa. Recently, it was estimated that Kinshasa city produces about 95,000 tons of household waste every day, with only about 25%, or fewer, being obtained through proper channels of collection and disposal, with the remaining undergoing disposal through landfilling, burning, and improper disposal through drainage channels and rivers (World Bank, 2022; UN-Habitat, 2023). This situation has been observed to result in "uncollected household waste becoming among the most visible manifestations of the urban-environmental crisis." Without urgent and collective actions being taken immediately, the unchecked accumulation of household waste is also set to continue deteriorating public health crises, with floods during rainy seasons being expected to seriously threaten the sustainability of the environment, particularly in overpopulated towns like Ngaba.

While community-based interventions and informal recycling practices such as those being practiced by the Pusu Pusu in Kinshasa have been helpful in contributing to the reuse and recycling of household waste, waste management has not yet received enough coordination and support from any kind of official institutional arrangement. While these community-based activities have played a very significant role in offering valuable services in this regard, there are still some limitations that they are facing in terms of lack of funding, poor technical capacity, and inadequate availability of personal protective equipment (Mangenda, 2024). At an institutional level, there are still some challenges that are making waste management ineffective in the Democratic Republic of Congo in terms of poor coordination among concerned institutions, lack of waste management infrastructure, and poor involvement of households and other community members. The effectiveness of the DRC's entire

environmental legislation and regulatory framework is being undermined because of the weakness of its enforcement at the institutional level and the living conditions of the poor at the level of the DRC's sub-national poor living spaces in the major and productive areas of the country' (UNEP, 2024).

Though various researches and observations on the global and regional levels have pointed out that active community participation is the key and integral element for the effective management of household waste from the sustainability perspective, very little research work exists that tries to understand how community participation takes place in relation to the dynamics of solid waste management in the specific socio-economic environment of Kinshasa. Though the availability of research papers on the DRC exists in plenty that point towards the technical and infrastructure-related deficiencies associated from the angle of solid waste management practices in the concerned region (Kafula, 2024), very less emphasis appears to have been placed on the dynamics associated with the role of community participation. Hence, this research attempted to fill this research lacuna to some extent.

1.4 Research Objectives

1.4.1 General Objective

The general objective of the study is to examine the role of community participation in household waste management in Kinshasa.

1.4.2 Specific Objectives

The following specific objectives guided the study:

1. To assess the influence of socio-economic barriers towards community participation in waste management in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.

2. To determine the relationship between environmental education and community participation in household waste management practices in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.
3. To examine the influence of community partnership approaches on household waste management in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.
4. To evaluate community strategies aimed at improving participation in household waste management in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.

1.5 Research Hypothesis

Based on the specific objectives, the study examined the following null hypotheses:

H01: There is no statistically significant influence of socio-economic barriers on community participation in waste management in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.

H02: There is no statistically significant relationship between environmental education and community participation in household waste management practices in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.

H03: Community partnership approaches do not have a statistically significant influence on household waste management in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.

H04: Community strategies aimed at improving participation do not have a statistically significant influence on household waste management in Ngaba municipality, Kinshasa, Democratic Republic of the Congo.

1.6 Research Assumptions

Assumptions of the study are factors that researchers cannot control during the research process (Simon, 2011, as cited in Lokenga, 2024). The research took into account the following assumptions:

The first assumption is that the researcher and research assistants may able to access the study area without significant risk, despite the research was conducted in the municipality of Ngaba known for insecurities and criminality. This field conditions guaranteed a proper collection of data and the whole process.

The second assumption is that the households, local authorities and leaders may be willing to respond to questions and share experiences in the management of household waste management. This assumes that, targeted population might not perceive the research as intrusive, politically motivated matters or pointless.

The third assumption assumed they are existing some forms of community waste management initiatives, formal or informal, in the municipality of Ngaba, making it possible to explore community participation. This also entails that, partnership between households, NGOs and authorities can contribute to improving the management of household waste and facilitate access to educational and informational materials.

1.7 Justification of the Study

Kinshasa, which is the capital of the Democratic Republic of Congo, is also facing serious problems in managing its household waste. This is attributed to rapid growth of its population, lack of waste management infrastructure, low institutional capacity, and low financial capital. According to Mola (2023), a lack of a waste management plan and waste collection and treatment facilities has resulted in chaotic circumstances in the waste management sector. This implies that a significant amount of household waste is left unmanaged. This type of waste

often gets disposed of in public areas, leading to water and soil pollution. This puts citizens at a high risk of diseases.

The major issue revolving around the management of wastes in Kinshasa is simply open burning as well as open dumping. According to Yakubu et al. (2024), open burning and open dumping are signs of inefficiencies in the management of wastes in the system. This is because open dumping as well as open burning of wastes brings about land, atmospheric, as well as health pollution.

The current conditions, including those of Bhutan and Ghana, mandate shifting the more or less centralized waste management approaches to alternative models that incorporate social and behavioral dimensions. Community participation thus provides an avenue for addressing household waste management challenges where municipal capacity is weak. According to Nzeadibe and Mbah (2020), community involvement in waste management instills good environmental ethics and ensures a reduction of waste generation from households and minimizes negative ecological impacts. Active participation also fosters shared responsibility and local ownership of the initiatives on waste management.

Community participation also plays a role in environmental education and awareness at the household level. Involvement in waste management enhances residents' knowledge of appropriate practices and encourages the utilization of environmentally friendly practices at the community level. This involvement is even more applicable in urban municipalities like Ngaba, where waste management outcomes at the household significantly impact the whole issue of waste management.

The relevance of assessing the role of community participation in household waste management in Ngaba municipality cannot be overemphasized, as little empirical work has been done to explore the impact of socio-economic factors, environmental education, or

community schemes in this particular arena. The need to develop empirical knowledge in this particular field is important in planning at the municipal level.

1.8 Significance of the study

This research has its theoretical foundations in environmental/green social work, a social work practice that recognizes the interdependence relationship that exists between the wellbeing of humanity, social systems, and the environment. Environmental social work can thus be considered the extension, or continuation, of mainstream social work in the aspect that it encompasses ecological injustice, environmental hazards, and environmental structural inequalities that mostly affect vulnerable social groups in urban settings, as seen in the case of poor waste management in the rapidly urbanized city of Kinshasa, in the Democratic Republic of Congo.

In terms of theoretical contribution, this research makes an advance in environmental social work theories by connecting participation in communities to environmental behavior in households in a low-income setting in an African context in a real-world setting. This research helps to advance current theories in social-ecological and system theories in social work by positing environmental degradation as both a social and structural issue in need of a solution from within communities.

From the methodological point of view, this study adds to research methods in social work as it proves the relevance of community-based and participatory methods in studying environmental issues in a participatory way at the household level. The use of localized measures of participation offers a replicable model for future studies in social work in this area.

This is a highly relevant study for both the social work profession and the broader academic community. Social work is based on the main principles of social justice, respect for human dignity, and the understanding of people in their broader social and environmental context. The

Code of Ethics for Social Workers says that practitioners have a responsibility to challenge structural inequalities that impact vulnerable groups. Climate change and environmental degradation-including poor household waste management-create social, health, economic, and political impacts in which marginalized communities bear a disproportionate burden. As MacDonald (2020) stresses, there is an imperative need to further embed ecological awareness into social work practice, given the profession's commitment to minimizing inequalities and advancing social welfare.

This present study provides evidence-based insights for policymakers and municipal authorities on how community participation may be incorporated within household waste management frameworks in Kinshasa. The findings are expected to support the formulation of inclusive policies, strengthen local governance structures, and improve coordination between municipal institutions and communities. Improved waste management practices may directly contribute to public health outcomes and enhance environmental protection and urban sustainability, especially in growing African cities where poor waste management has been linked with increased disease transmission and environmental hazards in some quarters.

The study may also contribute to the local communities and community-based organizations through participatory approaches that empower the residents to be more actively involved in managing household waste. Community involvement instills a sense of ownership, collective responsibility, and environmental awareness-all important features for sustaining projects within the waste management sector. By focusing on community strategies that work and those which present a barrier to participation, this study supports resilience and environmentally responsible community building in Ngaba Municipality.

The practical insight provided by the study can be useful to inform program design, implementation, and evaluations of community-based waste management initiatives targeting

non-governmental organizations, environmental organizations, and development partners. It may guide the development of appropriate interventions that combine the short-term imperatives for managing wastes with long-term sustainability objectives, reinforcing collaboration between communities, local authorities, and civil society actors.

The study may add to the empirical literature on community participation and urban household waste management in African contexts, thus being of relevance to academicians and researchers. This study provides the much-needed context-specific evidence from Kinshasa, addressing gaps in existing research, besides forming a basis for comparative studies and further scholarly inquiry. The identification of effective participation models and persistent constraints in this research contributes to theoretical and methodological advancement in environmental management, urban studies, and social work.

1.9 Scope and Delimitation of the Study

The study explored the role of community participation in household waste management in the municipality of Ngaba, Kinshasa, Democratic Republic of the Congo. The research focused on community strategies, socio-economic barriers, environmental education, and community partnership approaches as key independent variables with household waste management serving as the dependent variable. A mixed method, combining qualitative and quantitative data, will be use in this study.

For a thorough and context-sensitive analysis, the study had defined geographical and temporal boundaries. Bryman, (2021) highlight that this a way of gaining deeper insight into local dynamics and formulating contextualized strategies. Therefore, the research will be conducted in Ngaba, a densely populated municipality in Kinshasa with an estimated 500,000 inhabitants, where effective household waste management remains a significant issue (Ngaba Heath zone office, 2024). The study will cover every phase of the research process, including proposal

drafting, data gathering, analysis, recommendation development and dissemination through publication to ensure a well-rounded understanding of community participation in household waste management during the study period. This narrowed focus supports targeted interventions and evaluation of community participation impact, while also offering localized insights valuable to scholars, policymakers, the ministry of environment, Kinshasa city council and local officials in Ngaba.

Ngaba was selected for this study for various reasons. Primarily, its high population density intensifies waste management challenges while also creating a chance to involve the community in managing household waste. Koffi (2023) notes that densely populated urban areas like Ngaba experience heightened strain on their waste management systems because of the large quantities of waste generated. Secondly, Ngaba has relatively looper capita income levels, which restrict the funding available for waste services. Research indicates that low-income areas typically lack adequate waste management infrastructure and struggle financially to adopt effective solutions (UN-Habitat, 2021).

Thirdly, widespread illegal dumping in the municipality has led to major public health issues. This is worsened by the municipality limited financial and administrative resources, which hinder its ability to manage waste efficiency as it is generated. Studies show that in comparable settings, poor waste management can cause serious environmental and health issues, including the spread of waste related diseases and deterioration of urban infrastructure (Nzeadibe and Mbah, 2020, p. 68.).

1.10 Limitations of the Study

Waste management is complex in nature, and it involves various stakeholders. It is difficult to properly assess the impact of community participation in such complex contexts like Kinshasa (Bryman, 2021). In mitigation, the implications of community participation were properly

assessed, and this was facilitated by properly identifying variables and using proper data collection instruments.

Data collection could be impacted by the slow pace of administrative and bureaucratic systems in the Democratic Republic of Congo, as well as the possibility of corruption that may impede the availability of this data. To address this, research project ensured consistent communications with the government and allow for sufficient time for the paperwork requirements to be met in advance to account for any delays.

The translation of questionnaires from English to French could have discrepancies and/or misinterpretations that may influence the accuracy of the results. Therefore, the research followed a rigorous process of translation, as the questionnaires will be pretested for accuracy in a small bilingual sample population by bilingual professionals. Additionally, research assistants who are bilingual in French and English helped to improve communication.

Security issues in Ngaba municipality, like gang activity and general insecurity, may affect field research. To handle this, the research ensured it employs rigorous safety protocols, conduct the field work during safer times of the day, work closely with the relevant authorities to ensure safe access to the proposed sites, or even conduct data collection remotely.

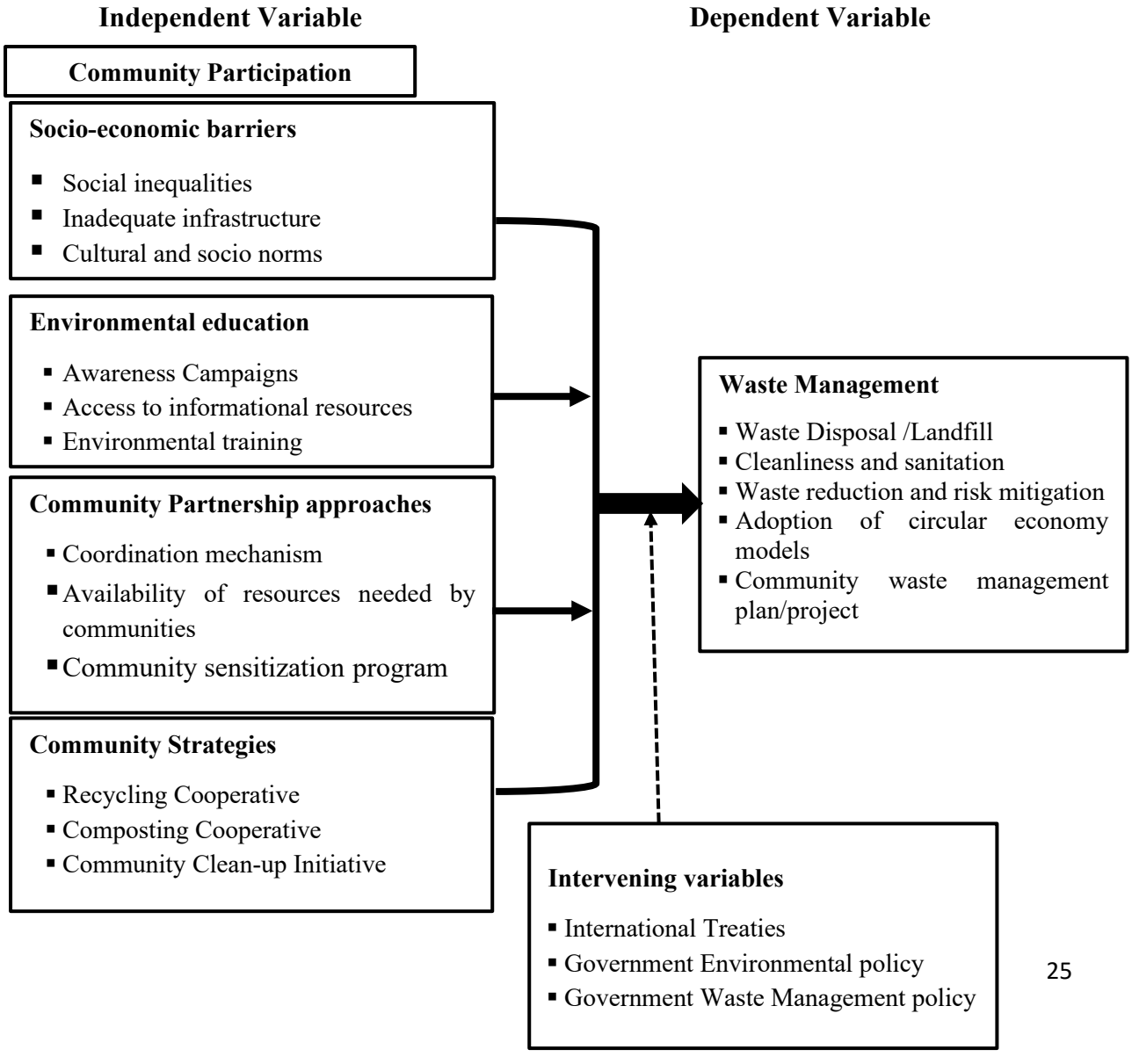
Unorganized approaches to waste management, including illegal dumping, and social desirability bias, can introduce inaccuracies to data since respondents might indicate more acceptable social responses to questions despite not actually practicing them (Beri, 2021; Boulding, 2020). The research utilizes correct methods to sample correctly for submission, data triangulation for cross-validation of answers via surveys, observations, and interviews, and options for anonymous submission to circumvent issues of social desirability. By recognizing these constraints and making efforts to apply the respective techniques for

mitigation, this study strives to provide true and authentic results in spite of the tough research environment in the Ngaba municipality.

1.11 Conceptual Framework

The conceptual framework presents the key variables of the study, thereby facilitating their measurement and analysis and its fundamental to ensuring the validity and reliability of the findings (Gauthier & al., 2020). Furthermore, Rogers (2021) emphasized that the conceptual framework underscores the importance and relevance of the study while aligning it within the broader context of existing body of knowledge. The relationship between the community participation and waste management was explained diagrammatically. See in Figure 1.

Figure 1: Conceptual Framework



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In this study, the conceptual framework outlined four independent variables: socioeconomic barriers, environmental education, community partnerships and community strategies, which are hypnotized to influence the dependent variable: Household waste management. Relationships between those variables are further moderated by intervening variables, including international treaties, national environmental policies and waste management policies. These external factors may either facilitate or hinder community participation in collective efforts to manage household waste effectively.

(I) Socio-economic Barriers: through this variable, the study assess the challenges that limit or discourage community participation in household waste management efforts. These barriers include social inequalities, inadequate infrastructure and cultural and social norms. Therefore, understanding these constraints is essential for identifying structural reforms and supportive mechanisms that can enhance and facility the participation of community in the management of household waste.

(II) Environmental Education: Environmental education is a key variable for community behavioral change in waste management practices. This variable assesses the scope and effectiveness of educational initiatives, including awareness campaigns, access to informational resources. With this variable, the objective is to evaluate the extent to which environmental education shapes community knowledge, attitude or involvement in waste practices.

(III) Community Partnerships approaches: involving public authority, private sector and local community in waste management plays a crucial role in strengthening household waste systems. This variable focuses on the extent to which such partnerships enhance community

capacity, promote shared responsibility and facilitate the mobilization of resources needed for effective waste management.

(IV) Community Strategies: This variable explores the initiatives developed at the community level to address waste management challenges in Ngaba municipality. The study assesses community-driven actions such as recycling cooperatives, composting initiatives, and the organization of community clean-up initiatives. By analyzing those indicators in the operationalization of the above-mentioned variable, the study aims to understand the effectiveness of these strategies in promoting more effective and sustainable household waste management. In addition, the study examines also the moderating influence of intervening variables on household waste management. These intervening variables provide a nuanced understanding of how external policies can either enable or constrain community participation in waste management efforts.

1.12 Operation Definition of Terms

Circular Economy: Promotes the efficient use of resources through recycling, reuse, and recovery, forming the foundation for sustainable waste management.

Community Environmental Education: Strengthens local engagement by raising awareness and building capacity for environmentally responsible behaviors and waste management.

Community Participation: Recognizes residents as active agents in planning, decision-making, and implementing waste management systems.

Community Partnership is based on shared responsibility and coordinated efforts among all actors and sectors to improve and sustain waste practices at the local level.

Cultural Beliefs: acknowledges the influence of traditions, values, and social norms on how communities perceive and handle waste.

Household Waste: Focuses on the treatment of daily residential waste in order to maintain the cleanliness of the environmental.

Legal and Regulatory Framework: Provides the policy structure that governs and supports community-based and sustainable waste management initiatives.

Stakeholders include all involved actors (public, private, and local community) whose collaboration is vital for effective and lasting waste solutions.

Sustainable Strategies: encourages long-term, balanced solutions that integrate ecological, economic, and social dimensions of waste management.

Waste Management: Encompasses all practices from collection to disposal that reflect community responsibility in maintaining cleanliness and reducing waste production.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter presented a review of theories and empirical studies on community participation and household waste management. It was therefore necessary to analyze the empirical literature review on community strategies, barriers to community participation, environmental education of community, and the partnership approach. This review aims to establish a theoretical framework that allows for a better understanding of the factors influencing community participation in household waste management. Additionally, gaps identified in the literature will guide the development of methodology and recommendations in subsequent chapters.

2.2 Critical review of theories

This study was guided by collective action theory, general systems theory, Stakeholder theory, Environmental Health Theory and Theory of Planned Behaviour to analyze household waste management in Ngaba.

2.2.1. Theory of Collective Action

The Theory of Collective Action was developed by economist Mancur Olson in 1965, as expressed in his book The Logic of Collective Action: Public Goods and the Theory of Groups. "Olson's key claim was that individuals in a group do not act in the common interest when they can receive the benefits from the collective good without having to bear any of the costs-a problem known as the free-rider issue." This insight has changed the orientation of literature concerning both the behavior of groups and the delivery of public goods. Subsequent scholarship extended the theory: Hardin, (2021) explored problems of cooperation in larger social settings, with particular emphasis on how trust and norms condition collective efforts, while Hardin, (2021) showed that communities themselves can establish mechanisms of self-governance that permit the effective management of common-pool resources independently

from outside authorities. These various contributions have continued to enhance the theory's relevance for the analysis of social behavior within community-based resource management, including waste management at the household level.

The major components of the theory are the problem of free-riders, public goods, selective incentives, and participation costs. Free-riders' problem: This explains that people in a community can avoid any initiatives to benefit the community as a whole but continue benefitting anyway (Poteete, & Ostrom, 2021; Rezsohazy, 2021). In a community's perspective, for example in waste management in households, some community members may depend on others in disposing of their wastes while doing nothing themselves (Hardin, 2021). However, Ostrom explained that 'Public goods are non-rival and non-excludable goods; once supplied, what happens to a public good is irrelevant, as it can be accessed by whoever can get at it, regardless of whether others benefit or not' (Rezsohazy, 2021; Nzeadibe and Mbah, 2020). They are simply goods shared by all in a community without any conditions for all benefits of communal goods will be enjoyed by all whether a member contributes or not (Nzeadibe & Mbah, 2020). Such provisions help align individual interests with community goals; hence, people are motivated to contribute regularly (Bundhoo, 2021; Rwigema, 2024). In addition, the necessary resources that are needed for engagement play an influential role in this respect. The more time, effort, and even personal resources a person is supposed to devote to the collaborative activity, the less likely he/she will engage in the activity, especially when one sees no direct benefits from his/her engagement.

In strength, Collective Action Theory offers a rather good way of explaining the determinants that affect participation in community-based activities and developing possible mechanisms for increasing participation. Collective Action Theory pays special attention to some possible barriers to engaging people in collective efforts and actions, including free-rider problem and the costs of engagement. In this way, it is possible for scientists and activists to create strategies

for addressing these problems. The theory has been successfully used and empirically tested in different fields, such as environmental management, health care, and community organizing. Moreover, the idea of selective incentives may prove rather helpful for encouraging community participation in different activities, including waste management at households.

Despite its practical applications, the theory has some limitations. Olson largely concentrated on large groups, which may not capture the functioning of smaller, more closely knit communities where the aspects of social relations and social norms are importance (Rezsohazy, 2021). The theory also gives little emphasis to the important effects of institutional structures, like local bodies and NGOs that may help in impeding or facilitating collective action (Buthelezi, 2021; Rwigema, 2024). Additionally, the theory gives little emphasis to the importance of intrinsic motivations like social identity and moral obligations of human behavior (Rwigema, 2024). To reduce these shortcomings in the present study, the theory has been combined with qualitative research to explore the importance of social norms and intrinsic motivations, and General Systems Theory to explore the relationship of the local bodies, NGOs, and the private sector in the aspects of handling solid waste.

In application to this paper, Collective Action Theory is used to analyze community involvement in managing household waste in Ngaba municipality, Kinshasa. It enables an understanding of participation levels, which are usually low, the role incentives play in engaging people, and perceived costs versus willingness to participate among its residents. The theory thus directly informs the objectives of the study, such as the assessment of socio-economic barriers to participation, an assessment of environmental education and participation, the influence of community partnerships, and identification of strategies for improved engagement. The theory provides a structured framework within which the study can design appropriate data collection tools and interpret findings regarding individual and collective behaviors in the community.

2.2.2. General Systems Theory

The General Systems Theory was propounded by Ludwig von Bertalanffy during the 1940s and 1950s, notably to develop a method of analysis that would transcend disciplinary boundaries and allow understanding of complex interactions within a system. Bertalanffy developed the theory in reaction to the problem of fragmented research, whereby problems were usually studied only piece by piece. He postulated that each part of the system is interdependent and, therefore, had to be studied as a whole. Particularly in urban contexts like Kinshasa, this perspective can be fruitfully applied since effective household waste management there requires coordinated actions at various levels-local authorities, private actors, and grassroots participants. Other scholars from the 1960s, like Elizabeth Steiner, Mihajlo, Mesarovic, and George Maccia, added extensively to the theory through its application to social and organizational systems, emphasizing feedback, control mechanisms, and hierarchy in complex systems.

Other theorists, too, contributed to the evolution of GST. Norbert Wiener, known for his work in cybernetic theory, emphasized the role of feedback in system stability and balance, and communication and openness in open systems and their relative importance to social and economic systems (Bertalanffy, 2021; Boulding, 2020). Recent researchers, Lokenga (2024) and Boulding, K. E. (2020), emphasize the interconnectedness of system components and how they cannot fully describe living and social systems by dissecting system components in isolation. GST was applied to various disciplines, such as biology, sociology, economics, and, presently, environmental resource management and local governance. For example, Bertalanffy, (2021) an applied system thinker, applied system theory to waste management in cities, which successfully identified system components and their interaction to solve a specific problem rather than addressing problems in isolation.

Several important concepts underlie GST. The first of these is an open system, which implies that systems interact with their respective environments by exchanging matter, energy, or information (Bertalanffy, 2021). Such an approach to household waste management allows for the investigation of interactions among members of the community, local authorities, and private service providers, whereby decisions by one player, such as investing in infrastructure on the part of government, have a direct impact on the nature of participation and behavior within the community. Second, feedback mechanisms stand at the heart of GST. It is observed that feedback involves a process where information from one system component is used to inform the operations of other system elements, effectively enabling it to adapt to its task environment and improve its performance (Boulding, 2020). In this respect, the Ngaba municipality can improve its waste collection strategies by informing municipal programs on waste collection and environmental education based on recycling and sorting actions initiated by the community; therefore, feedback loops play an important role in how the system improves its performance.

The third concept is interdependence, which insists that every element within a system depends on other components for optimal system function (Bertalanffy, 2021). For waste management, the success of the household approach depends on support from other actors such as the local authority and other organizations, and failing in other components can lead to poor system efficacy. Lastly, systemic cohesion refers to alignment and cooperation among system components in an effort to meet system goals (Murphy et al., 2019). It is clear that proper waste management can result if all actors in the process work towards meeting similar goals.

The major strength of the GST model is that it has a holistic approach, which enables a comprehensive interpretation of complex systems, rather than looking at matters separately (Bailey, 2025). For instance, within the context of Kinshasa, since the effectiveness of waste management is dependent on the collaboration or interaction between the government, private

organizations, and communities, a holistic approach is vital. The model, GST, puts much value on a feedback process, which enables unlimited improvements (Bertalanffy, 2021). The model understands the dependence between different players, so it promotes interventions that improve the effectiveness of community-based waste management initiatives (Bailey, 2025).

Although useful, GST has some drawbacks. The framework fails to consider directly the effect of socioeconomic obstacles like poverty, inequality in society, and poor infrastructure on the process of engagement and provision of feedback (DellaVigna, 2021). In addition, the framework is founded on rationality in people's reaction to provide feedback, which cannot possibly cover real-world practices observed in a complex setting such as Kinshasa (DellaVigna, 2021). Political, social, and institutional limitations can act as factors that thwart cooperation in the community's efforts for a better future and challenge the feasibility of recommendations given by the systems approach. In such circumstances, it is proposed that the research work employ for a better approach the Theory of Collective Action in addition to GST because of its main focus on inducement of cooperation in communities by paying heed to the costs of participation and free riders.

In this research, GST offers a conceptual lens for understanding interdependencies within a complex system of actors associated with household waste management within Ngaba municipality. The theory serves as a philosophical underpinning for assessing local government and for-profit organizations' interdependencies with NGOs and other actors within a given geographic area for sharing and processing information and adjusting to changing dynamics and priorities. Specifically, GST underpins the discussion analysis regarding the role of community strategies for enhancing participation and the impact of approaches for building a collective approach within a partnership for effective household waste management. The use of interdependencies and feedback dynamics within a systematic approach also informs this study by explaining performance within a complex system for understanding dynamics within

household waste management associated with constraints within a given system component for exploring socio-economic constraints and environmental education.

2.2.3 Stakeholder Theory

Stakeholder Theory is among the most influential paradigms in studying complex social phenomena where environmental, social, and institutional interests converge. Stakeholder Theory was developed in the 1980s as a reaction to the existing management paradigms that primarily viewed organizational performance solely in terms of shareholder wealth maximization. The central premise underlying this theory is that organizations/projects are not isolated from the surroundings in which they operate; rather, they exist within a web of relationships with various entities that affect and are affected by their goals and results. The principal representative of the theory is R. Edward Freeman whose seminal contribution shifted the focus of organizational purpose from creating value for shareholders to creating value for all stakeholders in an enterprise's activity (Freeman, 1984; as cited in Velte et al., 2023). This paradigmatic shift implies that successful organizational operation requires taking into account the interconnectedness of a firm/project with all of its stakeholders (Freeman, Harrison, & Zyglidopoulos, 2021).

One of the greatest advantages of Stakeholder Theory is that it provides a holistic approach to research subjects. Rather than focusing exclusively on technical aspects, Stakeholder Theory assumes that organizations or communities operate within a matrix of relations involving multiple actors whose interests, capabilities, and influence assess outcomes (Awa et al., 2024). In the case of household waste management systems, such an approach is invaluable because waste systems are inherently multi-actor; they include households as generators of waste, municipalities providing waste collection services and regulation, civil society organizations promoting environmental health, and informal waste workers whose livelihoods depend on waste streams. The holistic nature of Stakeholder Theory facilitates a comprehensive

examination of the interplay between diverse actors and their simultaneous involvement in shaping the efficiency of waste management interventions.

According to Stakeholder Theory, all legitimate stakeholders (groups and individuals impacted by or capable of impacting a particular project) should be included in decision-making processes (Awa et al., 2024). Thus, this theoretical framework minimizes the risk of ignoring marginalized groups, for example, low-income households or waste pickers, in planning and governance processes. The emphasis on inclusive involvement in decision-making can be especially useful in many African urban environments, where historical governance arrangements tend to favour formal stakeholders over citizens. In particular, in many African cities, where municipal waste systems are underdeveloped due to resource limitations, households develop informal systems for disposing of their waste, including collective waste disposal initiatives and informal collection organizations. The recognition of these informal stakeholders along with the formal ones enables researchers and practitioners to design interventions in line with context-specific realities and ensure that they are sustainable, culturally appropriate, and socially acceptable.

The theory under discussion can also be lauded for its sustainable perspective. As opposed to the economic rationalist theory with an acute focus on short-term gains, Stakeholder Theory resonates with the principles of sustainable development due to its emphasis on long-term engagement and results. The idea of sustainable development can be traced through this theory in several ways: firstly, as the process of developing relationships; secondly, as ensuring environmental safety, social well-being, and institutional efficiency. Indeed, sustainability cannot be achieved without a careful balance of interests across different stakeholders – the key idea behind the application of Stakeholder Theory in research. As noted above, sustainability requires less pollution, improved public health, and community resilience – something only possible through the reconciliation of various stakeholder interests. According

to existing research on the subject, people tend to adopt environmentally friendly attitudes (i.e., source separation, recycling, and participation in group clean-up activities) if their concerns are taken into account during the decision-making process. Thus, it seems reasonable to assume that the waste management system will prove more efficient if the intervention is based on developing trust and reciprocity among the stakeholders.

Despite its strength, Stakeholder Theory has not escaped criticism. One of the significant shortcomings mentioned in academic literature regarding Stakeholder Theory relates to the vague conceptualization of the term "stakeholder" used in the research. As a result, the lack of explicit criteria that define which actors should be included in stakeholder identification could generate biased or inaccurate analysis and, thus, lead to overlooking critical perspectives (Otieno, 2025). In the case of a research site like Ngaba, the absence of a clear inclusion criterion could easily mean that critical actors, such as community elders, informal recyclers, micro-entrepreneurs, and women's groups, would be overlooked and excluded from any participation strategy since they would not be defined as stakeholders by the researchers. Thus, the lack of inclusion criteria may unintentionally marginalize influential local actors whose practices affect household waste dynamics. To overcome this shortcoming, researchers could suggest an operational definition of a stakeholder and specify the criteria that will be used to identify relevant actors.

A further limitation of the Stakeholder Theory in general practice refers to the difficulty of incorporating various actors. Meaningful engagement entails consultations, feedback loops, and collaborative planning sessions to resolve conflicts, which may be rather resource-intensive and time-consuming. In case of resource-constrained environments like many African communities, this problem may become acute as local authorities lack the necessary means for sustained engagement. To deal with this issue, scholars may suggest engaging the actors through a number of stages, matching the level of engagement and collaboration to

available resources. For example, at first it is possible to conduct information-sharing and consciousness-raising campaigns, then move on to targeted consultations with relevant stakeholders, and finally incorporate collaborative decision-making for the parties that are directly impacted by the process.

In applying Stakeholder Theory to the municipality of Ngaba case, it becomes clear that households' involvement in effective waste management practices can be enhanced or diminished depending on their interactions with municipal authorities providing sanitation services, community leaders engaging residents, NGOs, educating and assisting households, and informal waste workers. Stakeholder Theory sheds light on possible barriers to the effective implementation of waste practices by highlighting such barriers as low levels of engagement. For example, in Ngaba, when residents do not find their interests (concerns regarding schedule of waste collection, placement of bins, recycling encouragement.) to be acknowledged by municipal authorities, the level of households' engagement in waste management practices will fall dramatically.

Moreover, the application of Stakeholder Theory will allow to examine the impact of the contradictory interests of actors on the results of waste management. Households may be more interested in facilitating access and saving expenses by using improper waste disposal methods. The municipal bodies may stress the importance of complying with regulations at the expense of lack of community involvement. As a result, conflicts may arise which should be managed through discussion, building up trust and problem-solving activities. Thus, Stakeholder Theory reveals that these relations are not technical in nature; rather, they demand negotiating skills and continuous learning.

2.2.4 Environmental Health Theory

The theoretical foundation of Environmental Health was based on the public health movements that emerged in the beginning of the 20th century. Winslow, in 1920, an influential pioneer of

environmental health, suggested that public health can be defined as measures to control environmental determinants of health for the purposes of promoting and improving well-being in the community, thus emphasizing sanitation, refuse disposal, clean water supply, and community hygiene. The theory has been further developed by international organizations including WHO since the 1950s to become an environmental health model that is focused on complicated connections between people and their environment in the broadest sense (WHO, 2022). Recent decades saw new developments in the environmental health theory with regard to health risks caused by rapid urbanization processes (Nweze et al., 2021; Koketso & Ncube, 2023).

This theory presupposes the idea that human health cannot be separated from the environmental situation within which individuals find themselves. The basic concepts in this theory emphasize the role of the environment in influencing health, noting that poor health is caused by waste accumulation, water pollution, and poor sanitation. Continuous interaction between humans and their environment is another important concept in the theory, implying that actions by individuals and communities shape the health dangers present in their environment. Moreover, the theory underscores the importance of prevention through environmental control by stressing that it is easier to prevent health threats by improving sanitation and waste disposal than cure individuals who are already sick. In addition, environmental health calls for cooperation among different sectors, including household units, municipalities, non-governmental organizations, and local communities, to manage environmental hazards effectively. Finally, contemporary applications of the theory include the aspect of equity because everybody deserves good environmental hygiene especially disadvantaged communities living in urban informal settlements like Kinshasa (Ncube & Zulu, 2021).

The first strength of Environmental Health Theory lies in its orientation towards public health. The approach establishes the connection between the behaviors associated with household

waste and the burden of diseases, including cholera, malaria, and respiratory illnesses, regularly observed in households within urban settings of Congo. Moreover, the holistic nature of this approach makes it possible to identify that environmental risks emerge from the activities of households, community norms, failures of governance, and lack of necessary infrastructure. These factors make the chosen theory highly relevant to the case in question, as the environmental risks in the Ngaba community are assessd by both community activities and lack of proper institutional structures. It should be also noted that preventive nature of the theory promotes the development of waste education programs, participation in the cleanup process, and involvement of the community members in managing household waste (Munyai & Maluleke, 2021).

However, the theory has weaknesses, some of which need to be addressed. The main weakness is that Environmental Health Theory may be prone to considering the physical environment more often than other factors, like socio-cultural, economic, and political determinants of waste disposal. Consequently, it might be perceived as suggesting that improvements in environmental health are only possible through technical solutions like provision of bins or proper drainage. To overcome this, researchers incorporate additional theories like Stakeholder Theory or Collective Action Theory to consider governance processes and decision-making at the community level. Yet another weakness of the theory is an assumption of automatic adoption of healthier waste disposal behavior if communities are warned about the dangers. It is not always so because poverty, lack of incentives, and general distrust toward the government influence the households' actions (Amegah, 2022). This is to be solved with participatory approaches, information campaigns aimed at influencing behavior, and incentives appropriate for the particular context. Finally, Environmental Health Theory cannot account for conflicting stakeholders' interests impacting environmental results. It can be overcome by incorporating governance or participatory development theory.

Environmental Health Theory has an application in research into community participation and household waste management in Ngaba Municipality. The theory provides evidence that poor waste disposal measures like open dumping, burning, and blocked drainage channels provide avenues through which diseases spread in overcrowded communities. Therefore, the theory is relevant to the claim that community participation is not only a civic duty but also a tool for protecting health because the involvement of people in activities like sorting waste, reporting cases of dumping, and taking part in cleaning campaigns reduces potential environmental health threats (Munyai & Maluleke, 2021). Moreover, its multi-sectoral nature fits well with the need for collaboration between multiple parties including households, municipal governments, neighborhood leadership, and non-governmental organizations in Ngaba. Additionally, the theory supports the focus on informal waste management processes that are common in Kinshasa as it highlights the role played by both formal and informal community practices in shaping environmental health outcomes. Importantly, the use of this theoretical framework makes it possible to present the analysis of household waste management as a public health preventative measure (Kibwage, 2021).

2.2.5 Theory of Planned Behavior (TPB)

Theory of Planned Behavior was conceptualized by Icek Ajzen in 1985, which came after the Theory of Reasoned Action by Ajzen and Fishbein in 1975. Ajzen, I. (2020) extended TRA to TPB in 1991 due to the shortcomings of the previous model. The author explained that TRA was ineffective in explaining behaviors under partial self-control. The author suggested that human behaviors were seldom voluntary; they depended on internal motives and external barriers. TPB became popular among environmentalists, health researchers, and sociologists, who extensively employed the theory in waste management investigations. Current researchers still modify the TPB framework, especially in papers investigating environmental sustainability, ecologically-friendly behaviors at the family level, and environmentally

responsible behaviors in developing countries (Maseko & Moyo, 2022; Oteng & Frimpong, 2023).

The foundation upon which TPB rests is that behavior is guided by intentions, and intentions are assessd by three main factors. These factors include the attitudes, subjective norms, and perceived behavioral control held by individuals. The factors are indicative of how behavior is influenced cognitively, socially, and structurally. According to Ajzen, (2020), individuals initiate behavior change where they perceive such activities in the environment as advantageous, socially approved, and capable of being performed. As evidenced in recent studies within the environmental context, individual involvement in waste sorting, recycling, and proper waste disposal can be predicted by the three cognitive factors (Amankwah et al., 2021; Chisango & Chikodzi, 2022).

Attitude towards the behavior is another key component of TPB, and it alludes to how favorable or unfavorable one feels about doing something. For instance, in the case of waste management, people could have attitudes about sorting waste, recycling it or having it disposed. Attitudes that are favorable to waste management would include the perception that sorting waste decreases disease, improves cleanliness and helps the neighborhood or society at large. People with positive attitudes toward waste management are more likely to engage in those behaviors (Maseko & Moyo, 2022). On the contrary, people with negative attitudes about waste management are less likely to participate. In TPB, the second key element is subjective norms, meaning the pressure from key others within the individual's social environment to do something. Norms would include expectations or pressure from neighbors, community leaders, local authorities, Non-Governmental Organizations (NGOs), or members of social groups to act in a certain way. In situations like those in Ngaba, where social life is very strong, there are many chances that people will engage in some behaviors simply because their social environment expects that of them.

There are a number of advantages that make the Theory of Planned Behavior especially relevant to the study of households' waste management behaviors. Firstly, the effectiveness of its predictive capabilities has been confirmed within the scope of environmental behavioral studies, which means that the theory would be helpful in uncovering the psychological factors that influence waste disposal. One more advantage of the Theory of Planned Behavior is that it considers the role of both individual, social, and structural factors and thus has a multidimensional perspective on waste management behavior, which is especially appropriate in the context of urbanized African communities. What is also important, the framework provides certain direction for implementing behavior change intervention programs as attitudes, norms, and behavioral control can be adjusted to increase households' involvement in waste management (Chisango & Chikodzi, 2022).

A popular critique against TPB is that it puts emphasis on rationality and fails to capture emotions, culture, and habit that may play a significant role in influencing waste behaviors in urban Africa. Some households may indulge in open dumping simply out of habits rather than through logical reasoning. Other weaknesses associated with TPB include its assumption that intention will result in behavior, which is not usually the case since intention-behavior gap often occurs in waste behaviors owing to structural constraints including unavailability of waste bins, inconsistent garbage collection, insecurity issues, and difficult road conditions. Another shortcoming with the theory is that TPB fails to emphasize the impact of environmental context, such as economic challenges, ineffective governance structures, environmental inequalities, distrust toward the public sector, and others on waste initiative participation in slums (Maseko & Moyo, 2022). TPB could be enhanced by combining it with other theories such as Environmental Health Theory (considering the role of public health), Stakeholder Theory (capturing power dynamics) understanding the concept behind community-driven waste behaviors.

A useful way of applying the Theory of Planned Behavior in this study is its explanation of household behaviors regarding waste sorting and proper waste disposal as opposed to household behaviors where open dumping takes place. Differences in attitudes towards waste management among households explain whether or not the behavior is adopted. Moreover, perceived norms and beliefs influence the household decisions to participate in waste management activities. Households that hold favorable attitudes towards hygiene and whose neighbors are supportive in this regard are likely to be involved in waste sorting and disposal.

On the other hand, the household in areas where municipal services are lacking may not have control over the problem. Hence, there is less likelihood of them participating in waste sorting and management. Besides this, according to the theory, community members can influence each other based on social pressures. Since this study takes place in a closely-knit community, such behavior can be observed in Ngaba. Furthermore, TPB emphasizes the importance of finding out psychological and social barriers to participation, which will inform the recommendations for policies to address the matter, (Ajzen, & Fishbein, 2021).

2.2.6 Theoretical Complementation

The research employed five relevant theories to investigate the issue of household waste management in Ngaba Municipality. They were Collective Action Theory, General Systems Theory, Stakeholder Theory, Environmental Health Theory, and the Theory of Planned Behavior (TPB). Each theoretical perspective reveals an important aspect of household waste management in the specified area while, at the same time, complementing one another in describing a multifaceted process.

To begin with, Collective Action Theory offers the most fundamental understanding of why communities engage in joint actions in dealing with certain problems such as waste management. It suggests that any community-based task requires collective participation of the population; however, due to various socio-economic barriers, distrust or lack of motivation,

people may be reluctant to join forces in resolving a community-wide problem. Such a theory will assist in achieving the first objective of the study because it will help to clarify that certain socio-economic barriers may lead to reduced willingness to engage in any activity related to waste disposal. People may avoid such efforts due to the fact that the absence of any rewards may create an illusion that there will be no effect.

Further, General Systems Theory will assist in examining the interconnection between the different aspects mentioned above to make up a complete waste management system. Thus, according to General Systems Theory, any defect in one subsystem (for example, weak municipal services, insufficient number of waste collection trucks, inefficient community organization) will have an impact on the overall performance of the waste management system. The theory is consistent with the third research objective in that the theory stresses that dynamic interaction among the subsystems (municipal authorities, NGOs, community leaders, and households) will increase participation in household waste management activities.

In addition, Stakeholder Theory is another framework useful to understand the role of different actors involved in household waste management in Ngaba and examine their interconnections. In particular, the stakeholders in question are residents, community leaders, municipal authorities, waste collectors, environmental NGOs, and local educational institutions. According to Stakeholder Theory, household waste management participation depends on the cooperation and communication between the parties. Therefore, Stakeholder Theory will help to meet the second and third research objectives in that it demonstrates that stakeholders can promote participation through awareness campaigns and cooperation between NGOs and residents.

Moreover, Environmental Health Theory provides another perspective on the issue of household waste management because it relates this behavior with health consequences. The idea is that inefficient disposal of waste leads to an increased risk of diseases in communities,

which can be prevented when communities participate actively in waste prevention measures. Thus, this theory provides support to the fourth objective in terms of proving the necessity of implementing community waste management measures in Ngaba Municipality. Furthermore, Environmental Health Theory reinforces the role of stakeholder groups responsible for health issues, such as public health officers or non-governmental organizations in the community. Therefore, this theoretical perspective is compatible with Stakeholder Theory.

Similarly, the Theory of Planned Behavior (TPB) is the integration of the individual psychological component within the wider context of the social and systemic environment. TPB highlights that residents' attitudes towards cleanliness, perceived social norm within the community, and their confidence regarding sorting, storing, or disposing of wastes influence their active involvement in waste management processes. TPB directly contributes to the second research objective through its association with the impact of environmental education on behavioral intentions. TPB further provides guidance in the fourth research objective through its insight into the use of community-based interventions in promoting positive attitudes, perceived social norms, and self-efficacy among community members.

The interaction between theoretical framework and variables under study is presented below:

Figure 2: Interaction Between Theoretical Framework and Variables

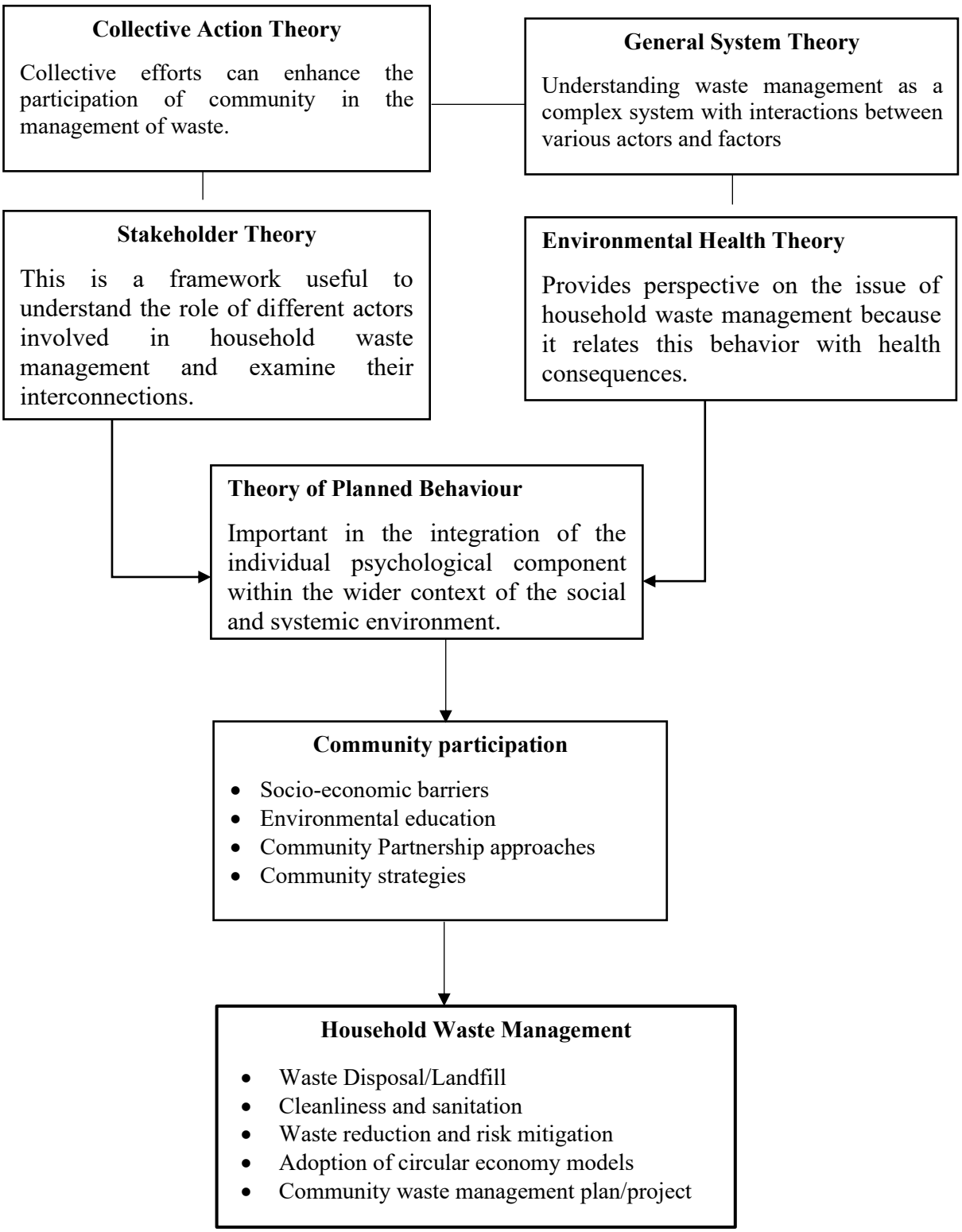


Table 1: Matrix of Study Gaps in Theoretical Literature

Author/Year	Title of Study	Population/Location	Findings	Issues not addressed/Gaps
Olson, M. (1965)	The Logic of Collective Action	N/A	Collective action often faces free-rider problems, where individuals do not actively participate without incentive mechanisms.	The influence of socio-economic barriers faced by communities, particularly vulnerable and marginalized groups, in the management of waste was not addressed.
Hardin (2021a)	Cooperation and Collective Action in Large Social Settings	N/A	Extended collective action theory by exploring problems of cooperation in larger social settings, showing how trust and social norms condition the success of collective efforts.	Does not address how formal institutional structures (local bodies, NGOs) can facilitate or hinder collective action, nor the role of intrinsic motivations such as social identity and moral obligation in shaping participation.
Hardin (2021b)	Self-Governance Mechanisms for Managing Common-Pool Resources	N/A	Demonstrated that communities can establish their own mechanisms of self-governance to manage common-pool resources effectively, independent of external authorities.	Does not address how socio-economic barriers or resource poverty in urban informal settlements can undermine communities' capacity for self-governance in waste management.
Agrawal, A. (2001)	Collective Action and Institution	Rural collectivity	Local institutions are essential for solving common resource problems through community cooperation.	Neglects the impact of public policies and institutional support on resource management in urban contexts, where corruption or scarce resources can undermine community initiatives.
Bertalanffy (1968)	General System Theory: Foundations, Development, Applications	N/A	The whole is more than the sum of its parts; systems are interconnected and interdependent.	Guidance on the application of systems theory to overcome barriers such as insufficient waste management infrastructure not discussed. Does not sufficiently address the challenges of establishing waste management systems in complex urban contexts, such as Kinshasa, where infrastructure is limited.

Author/Year	Title of Study	Population/Location	Findings	Issues not addressed/Gaps
Wiener, N.	Cybernetics and the Role of Feedback in System Stability	N/A	Emphasized the role of feedback in system stability and balance, and the importance of communication and openness in social and economic systems.	Does not directly consider socioeconomic obstacles (poverty, inequality, poor infrastructure) that can distort or block feedback processes in real-world, resource-constrained systems such as urban household waste management.
Boulding, K. E. (2020)	General Systems Theory and the Interconnectedness of System Components	N/A	Stressed the interconnectedness of system components, arguing that living and social systems cannot be fully understood by examining components in isolation.	Assumes rational responsiveness to feedback, an assumption that may not hold in complex, resource-constrained urban settings like Kinshasa; offers limited guidance for overcoming infrastructural barriers to system coordination.
Freeman, R. E. (1984)	Strategic Management: A Stakeholder Approach	N/A	Proposed that organizational/project success depends on creating value for all stakeholders, not just shareholders, given the interconnectedness of an organization with the groups and individuals that affect, or are affected by, its goals and outcomes.	The term 'stakeholder' is vaguely conceptualized, with no explicit criteria for inclusion; in contexts like Ngaba this risks overlooking informal actors (e.g., waste pickers, community elders, women's groups). Meaningful multi-actor engagement is also resource- and time-intensive, which is difficult to sustain for under-resourced local authorities.
Winslow, C.-E. A. (1920)	The Untilled Fields of Public Health	N/A	Defined public health as the science and practice of controlling environmental determinants of health, including sanitation, refuse disposal, clean water supply, and community hygiene, to promote community wellbeing.	Prioritizes the physical environment over socio-cultural, economic, and political determinants of waste behavior; assumes households will adopt healthier disposal practices once informed of risks, overlooking the roles of poverty, lack of incentives, and distrust of government.

Author/Year	Title of Study	Population/Location	Findings	Issues not addressed/Gaps
Ajzen, I. & Fishbein, M. (1975)	Theory of Reasoned Action	N/A	This model is based on the premise that the behavior of a person is influenced mainly by his or her intent to behave in a certain manner. The intentions are formed through the following two factors: the attitudes towards the behavior and the expected reactions of significant others.	Ineffective at explaining behaviors that are not fully under an individual's volitional control, a shortcoming later addressed by the Theory of Planned Behavior; does not account for perceived behavioral control or structural constraints relevant to household waste behavior.
Ajzen, I. (1991)	The Theory of Planned Behavior	N/A	This theory was then further developed by the inclusion of perception of behavioural control, giving rise to a model where one can explain a behaviour by virtue of three inter-related elements, namely; the attitude of the individual towards the behaviour, perceived social pressure or subjective norm, and whether the individual thinks he is able to perform such a behaviour.	Emphasizes rational decision-making and underplays emotion, culture, and habit in shaping waste behaviors; assumes intentions reliably translate into behavior, ignoring the intention-behavior gap caused by structural constraints such as unavailable bins, irregular collection, and insecurity in informal urban settlements.

2.3 Empirical Literature Review

This section analyzes literature on household waste management in relation to socio-economic factors, environmental education, partnerships, and community interventions. This literature review is based on the funnel method of organizing literature, starting from international literature to that done in Africa, and finally focusing on the DRC and Kinshasa specifically, which is the research site for the current project. Relevant findings from previous literature at every level are critically analyzed in order to ascertain the extent of knowledge that exists and the gaps that remain unanswered in the existing literature. It is the gaps in the literature that form the basis of the current study.

2.3.1. Household Waste Management

At the global level, World Bank (2022) conducted a comprehensive empirical evaluation of waste generation and management through the What a Waste 2.0 project. The investigation looked into patterns of waste generation and management in different countries using longitudinal data and panel data analysis. The data were sourced from official databases and national environmental agencies representing more than 200 countries. Instead of focusing on individual respondents as the unit of analysis, the study used country-level waste information and became one of the most comprehensive global studies on waste management. Standardized data extraction procedures and environmental performance indicators were used to collect the data, and time-series and trend analysis, regression techniques, simulation, and forecasting were applied to evaluate changes in waste generation. Projections of future waste trends until 2050 were also made. The results showed the continued increase in global waste generation, with urbanization, population growth, and consumption changes identified as major drivers.

These projections also indicated that the volume of waste will increase significantly in 2050, while the study has revealed the existence of a positive relationship between the level of income and volume of waste produced. With these developments, the World Bank called for the use of

integrated waste management, including reduction, recycling, proper policy enforcement, and development of waste management infrastructure. Despite the wide scope of the geographical area under analysis, the study has certain limitations that should be noted in relation to the current research because of its heavy reliance on aggregated secondary data and limited understanding of waste handling practices at the household level and community participation. Its large geographical scope provides little insights on the specifics of informal settlement in developing countries, while behavioural and sociological factors affecting household waste practices have not been studied sufficiently. This research addresses these limitations through obtaining primary data from households.

Likewise, the United Nations Environment Programme (2022) analyzed sustainable waste management on a global scale using a mixed methodology based on qualitative analysis of waste management policies and quantitative modeling of environmental indicators. Countries were purposefully selected in order to enable comparisons according to their development levels and existing waste management approaches, with information gathered using policy analysis, key informant interviews based on standardized questionnaires, and environmental performance indicators. Qualitative information was analyzed through content analysis while quantitative data was subject to multivariate statistical analysis, comparative analysis, and cross tabulations. As the findings highlighted that sustainable waste management relies on the coordination of waste collection, recycling, awareness-raising, and institutional systems, the effectiveness of which greatly depends on the quality of governance in each country, the research consequently emphasized the need to reinforce institutional structures and involve relevant stakeholders in waste management activities. However, since it is based on the policy and institutional perspective, it provides limited coverage of grassroots experience, since perceptions of the policymakers may be not always adequate to those of households that live in poor urban conditions. Moreover, the specific challenges facing households in low-income

urban areas were not properly addressed. These gaps provided a good rationale for the present study which would get information from households and assess community participation from within the local context.

Bundhoo (2021) compared waste management governance in developing countries based on a multi-case study investigation. The study used mixed methods, including quantitative and qualitative, where selected cities in Africa, Asia, and Latin America formed the basis of the study through purposive sampling. Data were gathered using structured questionnaires, key informant interviews, and policy analysis, with descriptive statistics, consisting of frequencies and percentages, together with inferential analysis using chi-square test. The findings revealed a strong association between governance quality and the effectiveness of waste management arrangements, with inadequacies in infrastructure, monitoring system, and community participation as the key constraints to effective waste management. This study thus recommended increased use of participatory governance strategies and greater involvement of communities in the activities of waste management. However, the comparative nature of the study brings certain limitations to its applicability to urban settings due to differences in the nature of institutional frameworks and socio-economic conditions existing in different countries and cities that may complicate generalizations. Moreover, the study did not employ any advanced inferential techniques like regression analysis to explore possible causative links. This research tries to address these limitations by focusing specifically on Ngaba Municipality and employing inferential statistical analysis in exploring the relationships between the variables in the study.

The investigation of Chen et al. (2020) is concerned with the issue of citizen participation in waste governance in Singapore and Taiwan, with particular emphasis on the effects of the "Pay-As-You-Throw" (PAYT) policy. The study used a quasi-experimental design to compare the patterns of waste generation before and after the implementation of the policy and to select

more than 1,000 households of different income groups using stratified random sampling. Households' waste and municipal records provided data for conducting household surveys, while multiple regression analysis, ANOVA, and paired t-tests were used to detect changes in waste generation and recycling behavior. It was shown that PAYT policies were associated with decreases in the amount of waste generation and the increase in recycling rates and that there were differences across income groups. Based on the results, the authors recommended the inclusion of economic incentives in waste management policies to encourage responsible household behavior. However, it should be noted that the findings cannot sufficiently explain waste management behavior because the study has been conducted in economically well-developed countries with relatively developed waste management systems. Moreover, waste management practices within the informal sector and cultural influences, which are quite relevant to developing countries, were not adequately taken into account. The current study addresses the problem in question by analysing household waste management in the Democratic Republic of Congo.

The study by Gümüş and Dursun (2024) aimed to analyse household knowledge, attitudes and behaviours related to solid waste management in Mamak District, Ankara, Turkey. Quantitative cross-sectional survey design was used in order to study household waste management practices at a specific point in time. Adults aged 18 years and older were recruited via convenience sampling, with 204 respondents completing a questionnaire composed of 30 items. The instrument measured household environmental awareness, attitudes to waste segregation and recycling and participation in household waste management and was validated and piloted as well as its reliability was evaluated by internal consistency procedures. Frequency analysis, percentage analysis, and mean scores were used to describe household and behavioural characteristics, while inferential procedures included normality tests, Analysis of Variance (ANOVA), Pearson correlation and multiple regression. These methods were used to

explore differences in knowledge, relationships among knowledge, attitudes, and practices, and predictors of household participation in waste management. The findings suggested that environmental consciousness, educational attainment, and attitudes were significant predictors of household participation ($p < 0.05$). Although the participants showed a great deal of awareness and positive attitudes towards the topic, actual participation in waste separation and recycling was moderate. The researchers advised on improving environmental education, household accessibility to waste recycling facilities, and behavior change campaigns. However, the use of convenience sampling undermines the generalizability of findings, and important aspects such as institutional trust, incentive structure, and socio-cultural influences are not taken into account. Moreover, the quantitative design does not provide sufficient explanation of why there was no congruence between awareness and positive attitudes and participation. The present research seeks to address these problems by using a mixed-method approach and taking socio-cultural factors into account.

In terms of the African context, Nzeadibe et al. (2021) considered the issue of household waste management in rapidly developing Nigerian cities. The study used a cross-sectional design aimed at assessing the household waste management practices within a certain period of time and comparing various socio-economic groups. Systematic random sampling was employed to select socio-economically diverse households, whereas structured questionnaires were utilized to acquire the required data. Observation checklists were also applied to validate responses and examine the household waste-handling practices. Before implementing the main data collection phase, the research instruments were subjected to validation and pilot testing, including evaluation of reliability through Cronbach's Alpha test. To summarize the obtained data, descriptive statistics was used with the calculation of frequencies, percentages, and mean values, while chi-square tests were employed to analyze the associations between categorical variables, and binary logistic regression identified factors contributing to proper household

waste management practices. The research found that inadequate infrastructure, irregular collection services, and lack of community participation represent major barriers to effective household waste management. To overcome them, the authors recommend improving the infrastructure and municipal services, raising environmental awareness, and increasing community participation. In spite of all the contributions, this study has several methodological and contextual limitations in regard to the quantitative orientation which provides limited understanding of the experience and perceptions underlying household waste behaviour. In addition, not enough attention was paid to informal settlements, in which poor waste management is common. This study is aimed to address these limitations through convergent parallel mixed-methods design.

Mensah et al. (2022) assessed the impact of public awareness and environmental education on household waste management in Ghana. The research covered urban and peri-urban areas and used cross-sectional research design with multi-stage sampling technique consisting of cluster sampling to select communities and simple random sampling to select households. Environmental awareness, attitudes, and participation were examined by means of structured questionnaires and semi-structured interviews, while the research instruments underwent the process of reliability and validity test through the process of pilot testing. The statistical analysis included both descriptive and inferential statistical methods, while Pearson correlation was used to assess the relationship between environmental awareness and participation and multiple regression analysis was used to examine the predictive impact of awareness on household participation in waste management activities. There were strong connections between the awareness of the environment and the participation of the respondents in waste management activities. Therefore, the researchers came up with a conclusion that awareness and educational programs can contribute towards making households become more interested in engaging in waste management processes. At the same time, the authors made a

recommendation for the expansion of awareness programs and inclusion of environmental education in school programs. Nonetheless, the aforementioned study had several limitations. First of all, the researchers ignored the presence of other factors influencing household participation, including trust towards institutions, cultural practices, and others. Second, the researchers did not use any behavioural model to explore the connection between awareness and participation. Thus, the present research tries to overcome these limitations by considering household practices and cultural practices together with other factors that might have an effect on participation in waste management.

Temesgen et al. (2025) evaluated household waste management practices in Ethiopia by conducting a systematic review and meta-analysis. Applying the PRISMA guidelines, the researchers synthesized evidence from over 20 empirical studies performed in the district, zonal and regional levels. The relevant literature was drawn from PubMed, Hinari, Cochrane Library, Wiley Online Library and African Journals Online databases. The data were gathered by means of standardized templates while methodological quality was evaluated based on established appraisal procedures. The authors calculated pooled prevalence estimates in order to establish the level of appropriate household waste management and used Adjusted Odds Ratios (AOR) to find out which factors significantly influenced household waste management practices. Statistical significance was determined with 95% confidence intervals while sensitivity analysis was performed to assess the validity of the results and minimize bias. It was established that only 32.06% of households demonstrated appropriate waste management practices. Higher educational status turned out to be positively associated with appropriate household waste management (AOR = 6.01; 95% CI: 1.35-10.67). Having positive environmental attitudes, higher income, availability of waste services, and participation in community-based activities were other factors identified as significant predictors of household waste management. According to the research, lack of adequate waste management in Ethiopia

is caused by low awareness, inadequate infrastructure, and inadequate community involvement and the following recommendations have been made: strengthen environmental education, improve waste management infrastructure, and increase enforcement mechanisms. The meta-analytical design prevents from exploring specific social and cultural aspects within certain communities, and using secondary sources of data prevents from getting current information about households' experiences. Also, certain mechanisms such as incentives and trust building have not been considered. In order to fill in these gaps, the present research uses primary information collected directly from households in Ngaba Municipality taking into account socio-cultural, behavioral, and trust-related factors and adopting a convergent mixed-method design, which combines inferential statistics and qualitative perspectives. Moreover, the research will consider intervention approaches, which include community engagement and social work.

Muheirwe et al. (2024) explored the relationship between formal and informal waste management systems in Uganda. Mixed methods, including household surveys and qualitative interviews of key informants such as waste collectors and municipal authorities were applied. Household sample was selected using stratified random sampling, while the sample of key informants was selected purposively. Data were collected using structured questionnaires and interview guides and document analysis; meanwhile, quantitative data were analysed using SPSS by means of descriptive statistics, correlation and multiple regression, and qualitative data were analysed through coding and content analysis. It has been revealed that exclusion of informal waste collectors from formal waste management systems has an adverse effect on the efficiency of service provision and coverage. Moreover, results of the regression analysis showed that integration of informal actors into formal waste management systems positively impacts household waste collection. Consequently, the researchers recommended the integration of informal waste collectors into formal waste management systems. Although the

study adds valuable evidence on the collaboration of informal and formal sectors, it does not provide enough explanation of what drives households' and informal waste collectors' effective participation in waste management. Particularly, factors related to community trust and behavioural effects are inadequately covered. In this regard, the current study will attempt to fill the research gap with respect to the issues discussed above in relation to Ngaba Municipality.

In the Democratic Republic of Congo, Holenu et al. (2022) studied the infrastructure and services for waste management in Kinshasa. The study used descriptive survey methodology, focusing on the availability and efficiency of waste management infrastructure, where municipal officials and household members formed the target groups. The study used purposive and convenience sampling techniques due to the practical constraints in the field, where information was collected with the help of questionnaires and field observations, and such indicators as the frequency of waste collection, availability of infrastructure, and disposal practices were analyzed using mostly descriptive statistics such as frequencies and percentages. The study found out that only less than 30% of generated waste is collected, with the lack of infrastructure and poor services by municipal authorities being the major factors that prevent effective waste management. The study recommended the need to strengthen the waste management infrastructure and collection services. However, there was no use of any inferential statistical technique to establish relationships between the variables. Also, no participatory dimension of household waste management and community involvement was adequately considered. The current research focuses on these aspects by using correlation and regression analysis in addition to explicit examination of the participatory elements.

At the local level, Sata (2025) assessed the existence of disparities in the availability of waste management services in Ngaba Municipality. The research used cross-sectional survey approach involving households located in various socio-economic areas. Stratified sampling

technique was used to select households from high and low socio-economic areas. Structured questionnaires were used to collect information, while descriptive statistics and inferential statistics, such as the chi-square test and ANOVA, were used to analyze the data. It was discovered that there were significant disparities in the availability of waste management services in various socio-economic areas. In most of the low socio-economic areas, services were irregular and poor. It was recommended that waste management services should be evenly distributed in socio-economic areas. Nonetheless, there was no much attention paid to participatory and community-based aspects of the issue. Therefore, the present research seeks to focus on the same issues. This is the reason why the current research investigates community engagement and participatory governance as possible strategies for improving the participation of households in waste management.

Similarly, McCabe (2020) studied the role of social work in fostering community participation and development. Qualitative methodology was utilized where the author applied the techniques of interviewing and document analysis in order to collect data. Thematic analysis was employed in the interpretation of evidence. The results of the study showed that social work can play an important role in facilitating community mobilization, education, advocacy, and community engagement in development projects. In this way, the author made recommendations on incorporating the mentioned social work approaches in community development projects. Despite the significance of the research, due to its qualitative nature, the findings cannot be quantitatively tested, which constitutes the limitation of the study in terms of determining the extent to which these social work approaches affect participation of people at large. This is the issue that will be addressed in the current study through combining quantitative and qualitative approaches.

2.3.2 Environmental Education and Household Waste Management

In the international realm, Kubanza (2021) conducted an empirical study aimed at assessing the impact of environmental education at the community level on household waste management practices. The study employed a descriptive cross-sectional research design, targeting urban households residing in certain selected municipalities. Multistage sampling was used to collect respondents from different socio-economic backgrounds. Data was collected through the use of structured questionnaires and key informant interviews to measure variables such as environmental knowledge, active participation in recycling, and disposal practices. Pre-testing was done prior to actual data collection and instruments' validity and reliability ensured through the use of Cronbach's alpha coefficient. Data was analyzed using descriptive and inferential statistics. Descriptive and inferential statistics were used to analyze the data. Descriptive statistics made use of frequencies, percentages and mean scores to describe the results of the study. On the other hand, the correlation analysis (Pearson correlation analysis) and multiple regressions were used to determine the relationship between environmental education and waste management practices in households. The results of the study showed that there was a statistically significant positive relationship between environmental education and waste management practices in households. In particular, households that have been exposed to environmental education programs tend to practice segregation of wastes, recycle and dispose of their waste appropriately.

Nevertheless, the research identifies an important contextual gap, as it indicates that environmental education programs in developing nations lack coherence, coordination, and institutional support from public organizations. From a methodological point of view, this study is dependent more on quantitative information than qualitative understanding about behaviors. The current study sought to fill the gap by using a combination of both quantitative

and qualitative information for understanding how environmental education impacts behavior in developing communities like Ngaba.

In a study by Brien (2023), carried out a rigorous comparative study investigating the effect of socio-economic differences on participation in waste management through environmental education programs. The research used a cross-national research design where it analyzed secondary data gathered through international surveys and performance data on waste management for various countries including North America, Asia and Europe. In this regard, sampling design for this study is rather broad since the data analyzed included large-scale datasets that were nationally representative in order to provide external validity. Statistical tools used in analyzing the collected data entailed the use of multivariate statistical techniques such as multiple regression analysis to assess the key factors driving participation in waste management, and Hierarchical Linear Modeling (HLM) to handle data with nested structures such as the individual within community and country. Using HLM, researchers managed to separate out the effects of individual characteristics such as education and income, as well as contextual characteristics such as national policies and infrastructure. Results indicated that socio-economic differences such as income and education level had a significant impact on participation in waste management practices. However, while the study suggests that there is a need for contextually oriented environmental education programs which take into account social-economic differences, it leaves a lacuna in terms of analysis since it does not take into account localized cultural, behavioral, and attitudinal dimensions that assess waste behavior among households. Moreover, it uses secondary data that makes it difficult to understand localized contexts. The present study attempts to address the aforementioned issues by employing primary data.

In the US context, for example, Badgett and Milbrandt (2021) carried out an empirical study that examined the effectiveness of media-based environmental education campaigns in

influencing waste management behavior among households. The study relied on a true experimental research design, arguably among the most powerful ways to establish causal connections as it entails the randomization of participants into control and treatment groups. The study sampled households from varied socio-economic backgrounds, particularly urban and semi-urban areas. Moreover, the researchers used probability sampling methods and eventually obtained several hundred households for data collection. Consequently, the study achieved sufficient statistical power in drawing conclusions with 95% confidence levels. For data collection, structured survey questionnaires were used to capture environmental awareness and behavior as well as measures of exposure to the environmental campaign media (frequency of exposure, media used). Measures of validity, particularly content and construct validity, were applied to test the relevance of the instruments, and reliability coefficients exceeded 0.70 for all the questions in the questionnaires through Cronbach's alpha coefficient calculations.

The analytical procedure used a combination of descriptive statistics (mean, frequencies, and standard deviations), together with more sophisticated methods of inferential statistics, such as the application of independent samples t-test to test the significance of differences in means between the control and intervention groups and multiple regression to assess the degree of influence of media exposure on waste management behavior after controlling for socio-economic variables. The research results indicate the statistically significant improvement ($p<0.05$) in awareness of environmental issues and engagement in waste management activities on the part of households in the intervention group compared to those in the control group. In addition, the results of regression analysis showed that income level and socio-economic status play a moderating role in the effect of media exposure on waste management behavior.

Conclusion drawn from the literature review was that, while media campaigns are very effective in terms of creating awareness, they vary in terms of influence on behaviors of different socio-economic categories. The study emphasized the importance of combining

media campaigns with community based interventions for greater inclusion. However, there is a very important contextual gap within the review; the structural constraints faced by poor people have not been taken into consideration enough in terms of lack of proper waste disposal facilities. Moreover, there are no qualitative details provided which might clarify behavioral reluctance among poor communities. The present study aims to fill this gap by conducting a mixed method research.

Within Asian geography, a research paper by Horng et al. (2024) provides the results of an empirical study on the impact of educational and awareness campaigns on household-level recycling and waste sorting practices. Specifically, the quasi-experimental research design allowed for comparing those participants of the research who were exposed to various environmental education campaigns and those who remained unexposed for the whole period. The target population was represented by urban households in selected municipalities, with a stratified random sampling strategy used to ensure adequate socio-economic status distribution, education levels, and residence zones. The sample size (at least hundreds of individuals) could be considered relatively large to increase statistical power and representativeness of findings. In terms of data collection, both quantitative measures (structured questionnaires measuring knowledge, attitudes, and practices, and waste audits assessing actual practices of sorting and recycling) and qualitative measures (municipal records for objective validation) were used. Validation was performed by peer review, while reliability was checked via Cronbach's alpha coefficient being higher than the acceptable value of 0.70.

This research study incorporated both descriptive (mean, standard deviation, frequencies) and inferential statistical tools like Paired Sample T-test for identifying pre and post intervention change, ANOVA for analyzing behaviors in relation to different socio-demographic variables, and multiple regression analysis for predictors of proper solid waste management behaviors. Statistical significance was observed with p-value less than 0.05, as changes occurred in

behaviors of households due to awareness programs. Regression analysis highlighted some of the significant predictors, such as environmental awareness, accessibility of facilities, and reward systems for encouraging proper waste management practices. Thus, it could be concluded that the combined approach of awareness and financial incentives along with enforcement mechanism would produce desired results. Nevertheless, from a critical point of view, there is one contextual limitation associated with this study, and that is the requirement of developed infrastructure, efficient governance, and institutional trust. These factors contribute to the effectiveness of the study and are difficult to achieve in the case of underdeveloped and developing nations. This current study aimed to overcome all the limitations of this study, as it analyzed the phenomenon of environmental education in resource-scarce contexts, long-term behavioral and participatory variables included.

In the same way, Chang et al. (2019) carried out an extensive study in Taiwan with an emphasis on integrating environmental education programs into formal schooling and its impacts on family behavior related to waste management. The research used a longitudinal design, and it was able to evaluate causal links and behavioral sustainability by studying changes across various time points. In terms of sampling methods, cluster sampling was employed whereby institutions of learning were used as primary sampling units, and then families in relation to the schools were sampled, generating a sizable sample for the study and ensuring internal and external validity of the data. Collection of data entailed the use of questionnaires, behavioral observation schedules, and evaluation procedures to assess the efficacy of the school-based interventions. Instruments used in the study were thoroughly validated and tested for content validity and construct validity and reliability using Cronbach's alpha and composite reliability.

Data analysis involved descriptive statistics, Pearson correlation analysis, as well as more sophisticated Structural Equation Modeling (SEM). SEM helped assess both the direct and indirect influence of the interventions and the attitudes to behavioral outcomes. SEM results

showed that school-based environmental education not only has an effect on students' behaviors, but also contributes to improved waste management practices in households via knowledge transfer. The results have shown statistically significant changes in terms of both waste segregation and recycling activities. The study highlighted the importance of hands-on experience, use of incentives, and whole-school approach to achieving sustainable environmental behavior changes. Nevertheless, it can be seen that this study suffers from a dependency problem because the success of the study is entirely dependent on the level of governmental and institutional support for the program and its facilities. Also, it is important to note that it has not focused enough on learning opportunities outside of institutions and adult behavioral changes. These aspects are addressed in the current study.

In the case of Africa, Mensah & Labi (2021) performed an empirical research on the efficacy of early environmental awareness on household waste management practices in Ghana. The study utilized a cross-sectional survey research design, where the target population comprised households and individuals who had undergone environmental education programs. A stratified sampling design was used to include samples from urban and peri-urban regions with a sample size of several hundred participants, thus providing sufficient reliability for inferential analyses. The data collection instruments included both structured questionnaires and semi-structured interviews. The validity of the instrument was verified by subjecting it to expert scrutiny, while its reliability was measured using Cronbach’s alpha. The methods used to analyze the data included descriptive statistics and inferential statistics such as Pearson correlation analysis to find the relationship between awareness and behavior and multiple regression analysis to establish the extent to which environmental education could predict waste management participation. The results showed a statistically significant positive relationship between environmental education and better waste handling practices ($p < 0.05$). On the contrary, the study found that such achievements were temporary because people's

behaviors would revert once the educational program had ended. The study recommended continuous reinforcement of environmental education coupled with involvement of community organizations. However, it is notable that the study suffers from a sustainability problem since it fails to address how behaviors can be maintained for longer durations. It also suffers from cross-sectional limitations which mean that causal relationships cannot be established from its findings. To address the gap, the present study used mixed method approach.

In a similar vein, Niyirera (2023) undertook research in Rwanda concerning the impact of environmental education on household waste management practices. In the research, Niyirera employed convergent mixed methods research design whereby both quantitative and qualitative data collection tools were utilized in conducting research. Quantitative data were collected through the use of structured questionnaires, which were administered to households whereas qualitative data was collected through the use of interview guides to conduct interviews among community leaders and environmental officers. Multistage sampling was adopted to identify respondents from the population. Results showed that environmental education enhances knowledge and participation in waste management processes. Nonetheless, results obtained through multiple regression analysis revealed that absence of follow-up programs as well as weak institutional support greatly undermine the effectiveness of such programs. Recommendations include incorporating waste management education with policy enforcement and institutional frameworks in order to enhance efficacy of the interventions. However, this study suffers from an implementation gap because it fails to consider community involvement in waste management practices. This is addressed in this study.

In Kenya, Otundo (2024) carried out an empirical study among residents in Nairobi on the impact of community-based environmental education programs on household waste management activities. The researcher used a cross-sectional survey research design and sampled households from various socio-economic zones in Nairobi. Stratified random

sampling was utilized to obtain a representative sample from rich and poor neighborhoods. The researcher targeted several hundred respondents. Questionnaire surveys and semi-structured interviews were used to collect data about the involvement of households in awareness programs, their attitudes towards waste management activities, and actual disposal practices. The validity of data collection tools was assessd through the process of expert judgment while reliability was tested using Cronbach's alpha test. The data collected were analyzed using descriptive statistical procedures such as frequencies, percentages, and mean values and inferential statistical methods such as chi-square test and multiple regression analysis.

The results showed that there is a strong correlation between community consultations, awareness programs, and participation sessions, and they greatly enhance the practices of household waste management, with a significant relationship being established ($p < 0.05$). The research suggested that the process should be enhanced through the inclusion of more community participation and environmental education. Nevertheless, it faces a challenge in terms of coordination, since it does not effectively incorporate the environmental education programs with infrastructure provision, which is important for achieving sustainable behavior change. The present study seeks to fill this gap.

Within the context of the DRC, the influence of cultural beliefs and coordination mechanisms on community participation in household waste management has been investigated by Waku et al. (2024). Specifically, the study examined the role of coordination mechanisms and cultural perceptions in promoting community participation in household waste management within urban municipalities, including Kinshasa. In terms of methodology, the researchers applied a cross-sectional survey research design. This approach allowed capturing data from household members at a single point in time regarding various socio-cultural factors influencing participation in waste management efforts. The population included all urban households, and a multistage sampling technique was used; namely, after selecting communes, neighborhood

selection took place followed by choosing individual households to be surveyed. Data collection was conducted via structured questionnaires, which captured various elements such as responsibility perception, participation levels, environmental education program knowledge and waste service availability. Instruments underwent content validity testing through expert reviews and reliability via Cronbach's alpha coefficients, which yielded results that fell within acceptable levels of internal consistency. Data analysis included the use of descriptive statistics (frequencies, percentage, and means), which provided insights into the participants' demographic profile and waste management participation level, as well as inferential statistical procedures (multiple regressions) to assess the extent to which cultural perceptions and coordination predict participation.

It was found out that a lack of collaboration between stakeholders and deep-rooted cultural perceptions, especially the perception that waste management should be the sole mandate of the government, greatly hinder the participation of community members ($p < 0.05$). Moreover, the regression analysis suggested that institution-based factors and level of awareness could predict participation, but these variables were moderated by socio-economic conditions. Recommendations from the above-mentioned study included improvements in collaboration efforts and development of effective community awareness programs. Nevertheless, there is a clear deficiency within the study regarding methodology and practice, since the cross-sectional research cannot provide cause-and-effect relationships and no efforts have been made in developing intervention-related approaches towards changing deep-rooted cultural perceptions. Quantitative nature of the collected data is another limitation of the study, as it prevents the researchers from examining community perceptions in detail. In this regard, the present study filled in the identified gaps through a mixed-methods approach.

Similar to the above-stated study, another study conducted by Bokeko (2024) is based on a qualitative research design in Kinshasa and focused on analyzing the influence of cultural

beliefs and social norms on household waste management behavior. As far as the study method is concerned, a purposive sampling technique was used to recruit the participants who are supposed to have relevant experience and knowledge associated with waste management. The main data gathering tool in the research was focus group discussions and in-depth interviews. Data obtained in this way were then analyzed with the help of thematic analysis and included the process of data coding, categorizing, and identifying recurring themes. In order to enhance the credibility and trustworthiness of the results, the researcher used such techniques as data source triangulation, member checking, and peer debriefing. The findings of this research show that cultural beliefs, social norms, and habits play an important role in preventing people from participating actively in waste management and treating this task as a responsibility of the public sector. In addition to this, many participants reported that social pressure and social norms encourage passive behaviors among community members, thus hindering their ability to adopt environmentally responsible practices.

While the study suggested that there is a need for culturally appropriate programs on environmental education and community participation, it still suffers from an absence of behavioral interventions to help convert these long-held values into actual behavior changes. There is also a lack of validation through quantitative methods to enhance the generalizability of its results. In contrast, the present study aimed to overcome these shortcomings through the use of both qualitative and quantitative research approaches along with behavioral theory applications in conjunction with social work practice and community mobilization techniques.

2.3.3 Partnership Approach and Household Waste Management

For example, John (2023) has done an empirical study on the role of multi-level partnerships in promoting sustainable household waste management systems at the global level. This research has used mixed methods approach where quantitative data from surveys and qualitative analysis of policies has been used to establish the relationship between collaborative

partnerships and the development of waste management systems. The sampling method applied was purposeful sampling combined with stratified sampling technique to ensure representativeness of data collected across different regions where there were policy actors, municipal administrators, private firms involved in the management of waste and community members. Triangulated data collection tools such as surveys, policy review, and interview guides have been applied in gathering data which were analyzed using descriptive statistics and correlation analysis. The results showed that multi-level partnerships play an important role in enhancing resource mobilization, efficiency of policies implementation, and community participation, since stakeholder collaboration and institutional integration proved to be powerful determinants of successful waste management ($p < 0.05$) according to the findings from regression analysis. Nevertheless, the study revealed that fragmentation at different levels of governance and poor institutional connections prevent partnerships from being efficient in addressing environmental challenges in many cases, especially for developing countries. Although the study contributes conceptually, the context of the investigation is missing in its discussion since it fails to address the issue of functioning partnerships in underdeveloped communities with poor governance and infrastructure. In order to fill this gap, the present study investigated partnership activities in local conditions of Ngaba Municipality.

In the same vein, Brien (2023) carried out a cross-national comparative study of partnership approach in managing household wastes in more than 20 countries in Europe, North America, Asia and some parts of Africa. The researcher employed a quantitative research design that utilizes big data such as environmental performance index (EPI), World Bank urban indicators and international household survey datasets. As a result, multi-layered sampling framework emerged through aggregation of information on national-, subnational-, and household levels, allowing for multi-scaling analysis. In fact, the database used contains tens of thousands observations at household level, nested within communities and countries. Data preparation

included data cleaning, normalization and dealing with missing data through multiple imputations. In the process of data analysis, descriptive statistics, including mean, standard deviation and cross-tabulation were considered, alongside more advanced inferential techniques, especially multivariate regression analysis for predictor detection, and Hierarchical Linear Modeling (HLM) because of the hierarchical nature of the data – households within communities, communities within countries. Through HLM, the researcher was able to differentiate between fixed and random effects; the former includes characteristics such as income and educational level, while the latter includes characteristics like quality of governance at the country level. Multicollinearity diagnostics (variance inflation factor) and goodness-of-fit index such as AIC/BIC were used to evaluate and validate the statistical models.

It was found that the efficacy of partnerships is affected substantially by socio-economic context, governance performance, regulatory enforcement, and institutional capability; all having significant coefficients ($p < 0.05$) whereby nations with more efficient governance systems and relatively high levels of income have been seen to have effective waste management results. Nonetheless, despite the strong methodologies used, the article is still marred by significant weaknesses in terms of methodology and context; being purely quantitative in nature and not considering the role of households. Also, since the study does not delve into the informal economy, it ignores trust factors, community participation and the lived realities of people. The current paper sought to fill these lacunas using a primary data collection and mixed-method approach.

In the case of American society, Badgett and Milbrandt (2021) did an empirical research in the USA with a specific focus on cities such as San Francisco that considered partnership approaches as efficient means in waste management. The research applied a quasi-experiment design and policy evaluation with the comparison of cities that have developed partnership

programs to those without such partnerships or poorly implemented frameworks. The sample for the study included urban areas, households, and stakeholders sampled using a multistage process, amounting to approximately 500 households and 100 stakeholders. Data was collected with the help of surveys, municipal waste data (rates of waste diversion from landfills), and interviews with stakeholders. Descriptive statistics, independent samples t-test, and multiple regression analysis were used in the analysis process to establish the impact of partnership factors on waste management practices. It was observed that strong institutional backing, regulation implementation, and coordination among stakeholders are highly effective in minimizing landfills and increasing recycling ratios, showing statistically significant results ($p < 0.05$). Nevertheless, there are inequalities in the provision of services due to the minimal involvement of poor neighborhoods in the partnership practices. These shortcomings are linked to inequities regarding social inclusiveness, whereby certain groups are left out in the process. In the current research, the above-discussed problems have been addressed.

As regards European research, the work conducted by Dehio (2023) involved an empirical analysis of the impact of public-private-community partnerships on improving waste management systems among German households. Specifically, this was an in-depth comparative case study research design that focused on the role of such partnerships in advanced waste management systems, specifically circular economy. In terms of sampling, a purposive strategy was utilized to identify 8 selected municipalities with relatively advanced systems. Then, within selected cities, stratified random sampling strategy was applied to identify households and institutional respondents, which resulted in a sample size of 400 individuals. Household respondents were identified using structured questionnaires, municipal records on waste management (to calculate performance indicators such as recycling rates), and semi-structured interviews. In terms of tool validation, the instruments' face and content

validity was ensured by conducting pilot tests and expert evaluation. Cronbach's alphas exceeding 0.70 indicated good test-retest reliability of research measures.

The methodology comprised descriptive statistics (means, frequencies, standard deviations) alongside advanced statistical inference tools, including multiple regressions to assess the ability of partnership constructs to predict waste management results and efficiency measures using DEA techniques. It was discovered that collaborative partnerships play an important role in enhancing waste collection efficiency, recycling levels, and citizen engagement, where the multiple regressions indicated that the relationship between stakeholder collaboration and system effectiveness is significant ($p < 0.05$). The study, however, reveals social exclusion challenges since informal and marginalized stakeholders have been left out of the formal partnership initiatives. Also, the study has been conducted among rich municipalities, making it difficult to apply the findings in poor communities. The present study intends to bridge these knowledge gaps by investigating the inclusive partnerships involving informal stakeholders operating in resource-scarce municipalities like Ngaba Municipality.

Jaakkola (2023), for instance, carried out research in the Netherlands in order to evaluate the effect of collaboration partnerships on waste minimization and recycling behavior using longitudinal panel research design. The panel research employed in this case included panel data collected for 3 to 5 years among 800-1200 households in addition to municipal and business data. The researcher employed systematic sampling methods in order to consistently measure households across different time waves. Various data collection instruments included structured surveys among households, municipal recycling performance records, and policy evaluation reports which were triangulated. Composite reliability index and Cronbach’s alpha were employed in testing reliability while construct validity was measured using factor analysis. Data analysis was done using time series regression modeling to capture changes in behavior over time, and Structural Equation Modeling (SEM) was applied to establish cause-

and-effect associations between partnership factors (such as incentives and institutional backing) and waste management results. These results revealed that partnership played a crucial role in bringing about sustainable changes in behavior towards recycling and minimizing waste generation, with incentive approaches and institutional settings identified as the main determinants. Yet, there is an issue of transferability and conceptuality inherent in this research since it makes a premise of stable governance structures and ignores informal areas or weak institutions. This study thus addressed the gap by focusing on the communities and all concerned organizations.

As far as the Jamaican situation is concerned, Pap (2014) carried out an empirical study concerning household waste management strategies and the role of public-private collaboration in improving waste collection effectiveness and environmental health consequences. The study was designed according to a cross-sectional descriptive and analytical approach that sought to focus on households and providers of municipal waste services in major urban regions including Kingston and St. Andrew metropolis. There was a random sample of 364 household heads drawn through a systematic sampling approach in order to achieve representation among various socio-economic and socio-demographic strata of the society. Moreover, 6 interviews with key informants who included representatives from municipalities and private waste services were employed to obtain institutional insights into the situation. Qualitative data were collected through in-depth interviews while quantitative data were collected using structured household questionnaires that contained information on waste disposal and collection practices, satisfaction rates, and perceptions of public-private partnerships. Secondary data came from municipal waste service reports and national environmental statistics. Instruments were pretested prior to application in order to establish their reliability, validity, and comprehensibility, with Cronbach's alpha coefficients exceeding 0.70 being established for important variables including service satisfaction and participation behavior.

The data analysis involved the use of SPSS to employ inferential statistics, whereby descriptive statistics (frequencies, percentages, and mean) were used to provide information about the practice of household waste disposal. Descriptive analysis employed chi-square to assess whether socio-economic factors affected waste disposal behavior. On the other hand, binary logistic regression was employed to establish factors that affect engagement in the formal waste collection system. Access to waste collection services, household income levels, and perception about the services' reliability significantly predicted the practice of proper waste disposal behavior ($p<0.05$). It was found that although the implementation of partnerships between the government and private institutions had increased the coverage of waste collection in urban regions, inefficiencies existed where waste collection was irregular and dumping took place illegally. Additionally, it was evident from the research that the participation of households in structured waste management depended on affordability and trust in service providers; low-income households were more likely to engage in the act of dumping illegally. Nevertheless, the research is limited because it lacks structural insight into informal settlement and behavior change that would increase household participation. This study sought to fill the void in knowledge by researching partnerships that can include informal settlements.

In the African context, Godfrey and Oelofse (2020) conducted an empirical study in Johannesburg, South Africa, on partnerships within urban household waste management systems. The study used a mixed convergent method design where the authors collected and analyzed both quantitative and qualitative data from different sources to offer a detailed account of partnership issues. Specifically, quantitative data were collected from 300 households via the use of a structured questionnaire selected randomly based on stratified sampling technique. Qualitative data were obtained from 40 key informants comprising municipal officials, private waste firms, and informal waste workers using a purposive sampling technique. Research data gathering tools used include valid questionnaires,

interviews, and waste performance records in the municipality, where reliability was assured through Cronbach's alpha (>0.70), while validity was established through expert opinion and pilot testing. Quantitative data analysis was done using descriptive statistics, correlation analysis, and multiple regression modeling, whereas qualitative data analysis employed thematic analysis and coding/pattern matching strategies. Triangulation approach was applied to integrate research findings.

Findings from this study reveal the significance of public-private partnership in improving waste management services by enhancing service delivery, service efficiency and coverage, and employment opportunities for informal sector waste workers. Stakeholder coordination, policy support, and availability of infrastructure were found to be significant predictors of effectiveness of such partnership arrangements ($p<0.05$). Furthermore, lack of policy consistency, poor enforcement mechanism, and coordination problems among stakeholders were identified as the main determinants of sustainability challenge. Besides, though informal waste management workers are part of the system, they lack structure and support. The present study filled these gaps by looking into formal-informal sector interaction and governance coordination.

In Kenya, Otundo (2024) investigated the effect of community-based environmental education programmes on the practice of household waste management by residents in Nairobi. In this research, cross-sectional survey research design was used, and households selected from various socio-economic conditions in Nairobi were sampled. To sample households in various economic conditions, stratified random sampling technique was used to sample from both rich and poor areas in the city, and several hundred households were selected to participate. Structured questionnaires and semi-structured interviews were used in the collection of data, which covered the involvement of households in environmental programmes, waste management attitudes, and disposal behaviour. Validity of research tools was ensured through

experts' judgment, while reliability was assessed through Cronbach's alpha. Both descriptive and inferential statistics were used in data analysis. Descriptive analysis was done using frequency counts, percentages, and mean scores, while chi-square test and multiple regression analysis were conducted to analyze relationships and identify factors affecting household waste management practice.

Descriptive statistics and multiple regression analysis were the statistical techniques used, supplemented by chi-square analysis of categorical variables. It was observed from the findings that partnerships played a vital role in facilitating recycling activities and creating opportunities for informal waste collectors, especially in collecting waste and recovering materials. But, from the regression analysis, it can be noted that there was no provision for funding and lack of policies severely hindered the sustainability aspect. It was suggested in the paper that there is a need to create strong financial and institutional mechanisms. Nevertheless, it is an incomplete study as there is no mention of alternative funding methods and incentive programs that the present study considered in addressing the identified gap.

Similarly, Ogutu et al. (2021) have carried out research in Nairobi, Kenya, in the form of cross-sectional research, with an approximate sample size of about 300 respondents who have been randomly sampled by means of stratified sampling technique. Data was collected using questionnaire surveys and institutional records, which have been further analyzed via descriptive statistics, chi-square test, and multiple regression analysis to find out the effect of regulatory enforcement on partnership efficiency. The outcome of their research has shown that the lack of enforcement of regulations pertaining to waste management greatly hinders partnership efficiency, leading to inefficiencies in the process of waste collection and disposal. Results obtained from regression analysis indicated that regulatory compliance plays a crucial role as a significant predictor of efficient partnerships ($p < 0.05$). Yet, there is a noticeable behavioral and relational gap with regard to these findings, since no mention has been made

regarding trust, community attitudes towards these partnerships, and involvement of the informal sector. These were captured by the present study in order to bridge the presented gaps.

A key empirical investigation conducted in Khartoum State, Sudan, is Ali et al.'s (2022) study exploring household waste management practices and the influence of stakeholder partnerships on minimizing environmental and health risks posed by suboptimal waste disposal systems. The study employed a community-based cross-sectional analytical research design involving respondents from urban and peri-urban areas within Khartoum, Omdurman, and Bahri. The sample consisted of 844 subjects selected via a stratified random sampling method with considerations for different residential zones, socio-economic status, and waste service access levels. Data were collected utilizing a structured questionnaire, previously pre-tested, with questions concerning waste management practice, waste collection frequency, environmental/health risks awareness, participation in formal waste management schemes, among others. Furthermore, geospatial analysis using GIS mapping software (ArcGIS 10.3) was conducted to examine patterns in waste management practices in the state. Reliability of the measuring instrument was validated by conducting piloting tests and attaining Cronbach's Alpha coefficients greater than 0.75 for various constructs, including environmental awareness and behavioral compliance.

Quantitative data analysis involved the use of SPSS version 23 software where descriptive statistics were employed in summarizing information related to the household waste practices, whereas inferential statistical analysis was performed through performing Chi-square test for analysis of association, ANOVA test for determining differences across various groups, and binary logistic regression test for finding factors affecting waste disposal behavior. Binary logistic regression results indicate that frequency of waste collection (OR = 0.720; p-value = 0.001), and accessibility of waste disposal sites (OR = 0.791; p-value = 0.018) were statistically significant in explaining proper waste disposal practices among households. From these results,

one can observe that households having regular waste collection services had very little chances of engaging in risky waste disposal practices such as dumping and burning. These results showed that lack of coordination between the local government and the community households, along with poor infrastructure, largely causes improper waste disposal behaviors, which lead to an increased risk of respiratory diseases and environmental pollution. Although there was a relatively high level of knowledge regarding waste disposal, behavioral compliance was low due to service delivery problems and institutional coordination gaps. But there is a clear behavioral and institutional gap within the study, since it did not consider community partnerships and social work as ways to increase behavioral compliance and build institutional coordination for the proper management of waste. This research bridged this gap through its emphasis on the behavioral aspect of managing waste.

In support of this, Kabamba (2020) performed empirical research in the Democratic Republic of Congo (DRC), specifically in the city of Kinshasa, aiming to assess the impact of multi-stakeholder partnerships on household waste management results. This research used a convergent mixed methodological approach, combining both quantitative and qualitative methodologies in order to understand better how partnerships function in a specific African urban environment. The quantitative component of this research included 384 household respondents, whose selection followed the multistage sampling method and depended on sample size calculation for an urban area, while the qualitative part entailed 24 key informants' interviews with municipal authorities, private waste operators, and community leaders, along with 4 focus groups with residents and informal waste workers.

The data was gathered using questionnaires, interviews, and observation checklist instruments that captured key factors such as stakeholder cooperation, waste service access, participation levels, and institutional effectiveness. The validity of the measurement tools was assured through peer reviews and pre-test procedures, whereas reliability was ensured through high

Cronbach's alpha coefficient values (>0.70). Quantitative data analysis was performed using SPSS and involved descriptive statistics (frequency, mean, and standard deviation), Pearson's correlation analysis, and multiple regression analyses to establish the influence of partnership variables on the dependent variables. Qualitative data were analyzed using thematic analysis and content analysis methods. The results have shown that integrated partnerships with stakeholders contribute to higher coverage rates of waste collection and recycling practices, as well as better community engagement ($p < 0.05$). At the same time, the results of the regression analysis have shown that poorly coordinated processes, absence of trust between stakeholders, and inadequate financial resources hinder the process of partnership development. It was concluded that informal sector participants are crucial to the process but were uncoordinated in their activities. The study suggests enhancing institutional coordination and developing partnerships with the informal sector participants. Despite its importance, however, the study fails to address behavioral aspects, incentives, and mechanisms of building trust required for maintaining partnerships in impoverished urban communities. This research intended to fill the identified gaps by collecting primary data from the larger communities to cover the looming gaps.

Conversely, Muheirwe et al. (2024) undertook a study in Kinshasa, DRC, on the efficacy of integrated stakeholder involvement in urban waste management systems. The study used a mixed methods design, which entailed quantitative and qualitative data gathering techniques. The quantitative approach entailed a sample size of 412 households randomly selected using stratified sampling techniques from various socio-economic zones. The qualitative method entailed thirty in-depth interviews and five focus group discussions targeting municipal authority officials, private sector players, and informal waste scavengers. The study used structured questionnaires, interviews, and documentary analysis on municipal waste management reports. The reliability tests for the study resulted in Cronbach’s alpha coefficients

greater than 0.75, whereas construct validity was evaluated through factor analysis. The quantitative data were analyzed descriptively, correlatively, and regressively, whereas qualitative data were analyzed thematically with coding frameworks.

It was evident from the findings that the integration of stakeholders plays an important role in improving efficiency, recycling efforts, and awareness of environmental issues, with regression analysis suggesting that cooperation and stakeholder involvement are good predictors of success in waste management programs ($p<0.05$). The study, however, showed that organizational division, lack of motivation, and enforcement measures pose challenges to the sustainability of partnerships. Moreover, the study failed to emphasize community trust, cultural views, and behavioral barriers, which play an important role in influencing participation. The present study overcomes these shortcomings through the use of social work strategies, trust building, and culturally-based partnerships. Further, this research fills a knowledge gap by making a case study of partnership functioning on a household and community level in Ngaba Municipality, analyzing partnership functioning regarding collaboration mechanism, inclusivity of informal participants, degree of presence or lack of presence of incentives, and trust within communities. This research can produce evidence regarding the manner in which partnerships can or should be configured to improve HH engagement for the context of Ngaba, Kinshasa, making it possible to develop effective partnership models for low income settings like Ngaba.

2.3.4 Community Strategies and Household Waste Management

The study by Pérez (2020) presents an extensive cross-national study on waste management practices at a household level and the impact thereof to environmental sustainability within both developed and developing countries. It examines the role played by households in the waste management chain concerning waste reduction, separation and recycling. In terms of methodological approach, the study employs a mixed methods research design whereby over

500 households were selected for a survey through stratified random sampling from urban areas in Europe, Latin America, and certain parts of Asia. Data collection was conducted through use of structured questionnaires, environmental audits, and documentary analysis. Specifically, data collected was quantitatively analyzed using descriptive statistics, multiple regression, and analysis of variance (ANOVA). The study found out that waste segregation and recycling are significantly high ($p<0.05$) among households in areas where there is policy enforcement and infrastructure development. This study recommends policy enforcement, infrastructure development, and behavioral change through environmental education. However, a context gap arises in the sense that the study focuses more on areas with structured infrastructure and therefore cannot be generalized to areas like Ngaba where infrastructures are underdeveloped.

According to Boukar (2023), a thorough study of the evolution of waste management approaches via adoption and implementation of 3RV-E models was performed by undertaking a systematic review involving evidence from numerous studies across several continents. Regions where the adoption of circular economy practices is common include Japan and South Korea, and parts of Latin America, such as Brazil Europe parts. The design of this study used meta-analytic approaches to examine the evolution of approaches to waste management based on a thematic synthesis of more than 100 peer-reviewed articles published in academic journals, government policy papers, and international environmental reports. Evidence gathered from meta-analyses indicates successful adoption of valorization processes such as composting, anaerobic digestion, and incineration in various countries. Countries that have successfully incorporated waste valorization in their waste management programs include Germany and Japan. Inference from pooled evidence suggests that countries implementing waste valorization in their programs have significantly improved environmental sustainability metrics ($p<0.05$). The results highlighted that valorization is not only environmentally friendly but also economically profitable by producing energy and agricultural resources. The study

concluded that the international community should incorporate the 3RV-E framework into policies via government investment and collaboration between the public and private sectors. Nonetheless, there is an important methodological limitation within the study because it is based on secondary sources and does not use primary evidence from poor countries or slums, such as those seen in many African nations. The current study addressed this through consideration of primary sources in Ngaba, DRC.

As Zhou (2022), a researcher from China, explores the issue of comparative effectiveness of different types of waste management approaches, he focuses his attention on the comparison between the centralized (incineration-based) system of waste management in Singapore and community-based approach in Shanghai (China). Being interested in analyzing governance, infrastructural aspects, and citizens' involvement in waste management processes in very highly urbanized areas, the author chooses a qualitative research strategy. The sample of the target population is chosen with the help of purposive non-probability sampling technique; hence, 50 participants, including policymakers, employees of governmental environmental protection agencies, and community leaders, are invited for interviews. The author applies semi-structured interviews, document analysis of waste management policies, and direct observations of waste collection, sorting, and processing activities as means of data collection. Data analysis is conducted by applying content analysis and cross-case comparison techniques. According to the results, while Singapore demonstrates extremely high waste processing efficiency due to high concentration of incineration facilities, achieving more than 80%, Shanghai proves its success in promoting waste sorting at household level due to very strict waste regulation and educational campaigns. The research has found out that although centralized approach provides for efficiency, it is the bottom-up approach that encourages behavior change in the long run. The recommendation is to have a blended approach, which integrates investments in infrastructure alongside citizen participation. Nonetheless, the

research creates a methodology problem in that there is a lack of statistical data analysis as opposed to the current study which used regression analysis method.

In his work, Chen (2021) conducted a quasi-experiment in Taiwan to examine the effectiveness of Pay As You Throw (PAYT) policy in encouraging proper waste management behaviors among households. The objective was to establish whether economic motivations could lead to a significant reduction in the amount of generated wastes and increase the rates of waste segregation among households. The research adopted a pre-test and post-test approach whereby 400 samples from systematic sampling techniques were chosen within urban municipalities for the assessment of waste generation. Information on wastes was gathered through questionnaires, household waste records, and data from local municipality waste records. Time-series analysis, paired sample t-test and multiple regression models were used to identify changes in waste generation behaviors among households. Results indicate statistically significant differences in amounts of waste generated before and after the implementation of PAYT policies ($p < 0.01$), together with an increase in waste segregation. Findings showed that the use of economic incentives in waste management is very effective provided there are proper governance and infrastructural supports. However, a limitation to the research is the lack of consideration of the absence of strong governance structures especially in developing countries.

In Outtara et al.'s (2022) mixed methods study, the researchers studied waste management challenges in urban areas within the city of Bamako, Mali, where the population was very dense and the cities grew quickly without adequate waste management infrastructure. Outtara et al. used convergent mixed-method research design for the study in which both quantitative and qualitative methods were used. In this study, the sample size included 300 households and 66 key stakeholders purposively selected from the population. The tools used for data collection include questionnaires, semi-structured interviews, and observations. Quantitative data

analysis techniques included descriptive statistics, chi-square test, and multiple regressions. Qualitative data was analyzed using thematic content analysis. From the findings of the statistical inference, there existed a significant relationship between population growth, consumption patterns, and more waste production ($p < 0.05$). The study's recommendations suggested reforms through which engineered landfills could be developed, waste collection improved, and policies enacted for better enforcement. Nevertheless, this research paper has a conceptual gap in that it fails to critically analyze the contribution made by community involvement, local behavioral patterns, and grassroots initiatives in enhancing waste management processes. This study fills the gap by considering community involvement as one of the major variables to analyze the impact of its inclusion in household waste management practices.

The study carried out by Kpikpidi (2020) was conducted in Nigeria and Ghana (both countries located in West Africa) with the purpose of analyzing how community resistance towards external control of waste management contributes to the efficiency of waste management services. In particular, the research used case studies with an analytical approach where a sample size of 150 participants from various neighborhoods across different income groups was selected using stratified sampling. Structured interviews and questionnaires were used to collect both quantitative and qualitative data related to waste management practices in households. According to the results of the study, non-participation of the community in formal waste management processes predicted low levels of adherence to formal waste management policies (with a p-value of less than 0.05) using descriptive statistics and logistic regression analyses. The results indicate that, in most cases, communities oppose externally developed waste management policies and tend to develop their own solutions such as illegal disposal, incineration, and organizing waste removal by the neighborhood. The study also suggests the use of participatory processes where community members are involved in the policy-making

and implementation process to increase ownership and adherence to policies. Yet, there is a methodological flaw in the study since it adopts a cross-sectional approach, which makes it difficult to evaluate the long-term effects of participatory practices and changes in behavior. This study aimed to fill this research gap by focusing on both the existence and sustainability of community strategies for waste management.

Sata (2025) carried out an ethnographic research in Sub-Saharan Africa in informal settlements specifically in Nairobi, Kenya, and Kampala, Uganda where she explored waste management strategies used within communities in areas without formalized waste management processes. The purpose of this study was to explore how community groups adapted to waste management problems through their indigenous knowledge, social capital, and informality. Ethnographic research design was adopted involving 60 participants from households and community groups using purposive sampling strategy. Data gathering involved in-depth interviews, focus group discussions, and participant observation. Thematic and narrative data analysis were utilized to explore key concepts such as how people in these communities manage wastes. Communities relied on their informal mechanisms of managing waste including setting up groups that collected wastes at household levels, converting organic waste to manure, recycling waste products, and community clean-up exercises. However, while important in mitigating the problem, these measures remain fragmented and lack adequate resources hence unsustainable. The research suggested incorporating community-led approaches within formal municipal structures, as well as providing institutional backing through policy and finance. Yet, the research exhibits a methodological weakness since no quantitative assessment and inferential statistics were conducted to assess a relationship among variables. The current research rectifies this weakness through the use of both qualitative and quantitative data using inferential statistics to assess the effect of community approaches on waste management performance in informal urban areas like Ngaba.

A descriptive survey was carried out by Otundo (2024) to identify innovative means of household waste management in Mombasa, a rapidly developing coastal town in Mombasa County, Kenya. The research employed a descriptive survey research design. In addition, the sample size consisted of 200 households chosen via stratified random sampling technique in order to represent all residential areas within the county. The study collected qualitative data through the use of interviews with informants from the county government departments and private waste collectors while quantitative data were collected using questionnaires. Data collected was analyzed using descriptive statistics, chi-square test, and regression analysis. Regression analysis indicated that there was a statistically significant association between door-to-door waste collection and successful waste management ($p < 0.05$). Specifically, the study established that door-to-door waste collection leads to segregation of waste as well as reduction of littering practices. Nonetheless, various challenges including lack of adequate infrastructure, low level of public awareness, as well as lack of enforcement remained unresolved. Recommendations made in the research include improving waste collection services, increasing public education efforts, and introducing new technologies such as the use of mobile applications. Even though these recommendations have been made, this study has an idea gap because it fails to consider the part played by community involvement in the sustainability of these strategies. The proposed study attempted to fill this idea gap by showing the roles played by the community in dealing with waste management.

The second article, written by Niyirera (2023), is based on a correlational study conducted in Kigali, Rwanda, on the link between community participation and effective household waste management. The author adopted a correlational research design and used simple random sampling for sample selection (n=250). In addition, the data was collected using observation schedules and questionnaires that measured the behavioral characteristics of the participants along with the state of the environment in relation to waste management. Data analysis

involved descriptive statistics, correlation and regression analyses. As a result of the work, the researcher found that there was a strong and positive correlation between community participation and effective household waste management ($r = 0.68$, $p < 0.05$), which showed that increasing community participation led to enhanced waste sorting, recycling, and proper disposal. It was also noted that community participation was associated with the adoption of environmentally friendly practices, such as composting and recycling. Niyirera made recommendations on strengthening educational programs and implementing waste management infrastructures in Kigali. Nevertheless, it has a contextual limitation because it is conducted within an organized city setting, and there are effective institutions that can support the functioning of participatory governance. This study tried to fill the research gap through investigating community participation within a less structured city called Ngaba Municipality.

The study by Marondji (2023) is qualitative and descriptive in nature. The study is based in the city of Kinshasa, in the Democratic Republic of Congo. The study examined the behaviors regarding the management of household wastes in an informal setting where there was limited access to waste management facilities. The study employed purposive sampling in selecting participants comprising of 80 households located in highly densely populated urban areas. The study obtained data via semi-structured interviews and checklist observation. Analysis of data was performed using thematic analysis, and the themes that came out from this analysis included the dominant ways of waste disposal such as dumping, burning, and composting in a small scale. However, the research found out that despite being caused by lack of waste management facilities, these practices posed health and environmental dangers to residents. As a result, the researcher recommended structured waste management facilities, public education and institutional interventions. Despite the recommendations, the paper exhibits a methodological weakness since no inferential statistics and quantification of information have

been applied in the study, which the current study challenged by using both correlation and regression analysis.

Masamuna et al. (2023) performed a cross-sectional study in Kinshasa, Democratic Republic of Congo, to investigate the behavior variation of household waste disposal habits among various age groups. Masamuna et al. employed random sampling to achieve their objectives and managed to sample 300 participants. The methodology adopted entailed collecting information from participants by utilizing pre-tested structured questionnaires. Data analyzed included age as well as demographic information. The study employed statistical tools like chi-square tests and logistic regressions that proved the existence of statistically significant associations between the age of the respondents and waste disposal ($p<0.05$). Younger people tended to perform improper waste disposal behaviors such as dumping in open drains whereas older people preferred either burying the waste or burning it. This research recommended the need for appropriate behavioral intervention and awareness programs tailored to the respective demography. Despite being informative, the research has gaps as the authors failed to include qualitative approaches necessary to understand the cause of those behaviors. They also lacked considering institutional and policy factors influencing the studied phenomena. The current research sought to bridge this gap by employing mixed method approach.

Mangenda et al. (2024) undertook a descriptive research design in Ngaba Municipality in Kinshasa (DRC). The research was focused on pollution sources and waste management practices in a residential urban slum environment. The researchers selected 150 respondents from the study site using systematic sampling techniques. Quantitative and qualitative data collection methods were employed via structured questionnaires and environmental observation respectively. Descriptive and correlation analyses were applied in the data analysis process. The results indicated that waste burial (50%) and incineration (9%) were the commonest waste disposal practices, whereas a high number of respondents (75%)

acknowledged composting waste as an environmentally friendly practice. In addition, the researchers found out that pollution sources included waste generated from households and markets such as Kianza market. The study concluded that environmental awareness programs, provision of waste disposal facilities, and enforcement of environmental protection policies were some of the measures that could improve waste management practices. However, the research suffers from the conceptual gap in that it did not consider the importance of recycling and community participation in addressing environmental problems. This study filled this conceptual gap by analyzing how communities can organize themselves to manage wastes sustainably.

Simbu et al. (2022) performed a qualitative study within Ngaba Municipality, Kinshasa (Democratic Republic of Congo), looking at community-based waste management practices along university roads and neighboring areas. This study was performed using qualitative research, whereby data from about 70 purposively sampled respondents (community members, local leaders, and students) was gathered through focus group discussions and individual interviews. Data was analyzed through thematic and content analysis. Findings showed that there was a significant relationship between environmental education and campaigns and community involvement in waste management, where the former positively impacted community practices of waste disposal and community clean-ups. Hygiene campaigns, therefore, are essential to prevent accumulation of waste in public places. This study highlights the importance of partnership between the community, governmental institutions, and NGOs to facilitate sustainability of the activities. Nevertheless, it is characterized by some weaknesses that include lack of quantification of data obtained for analysis using inferential statistics and failure to investigate multi-stakeholder collaboration in the waste management process. In light of these shortcomings, this study sought to bridge the gap by integrating multi-stakeholder

participation in waste management practices and analyzing their effects through inferential statistics.

2.3.5 Legal Framework on Waste Management

Chen (2020) carried out an empirical study in China in big cities like Beijing and Shanghai to analyze the effect of legislation and policies in improving household waste management processes. The study examined the relationship between strict legal enforcement and policy tools on the process of household waste segregation. In the study, which had a quasi-experimental research design, comparison was made between the performance of waste management practices before and after the enactment of the mandatory regulation on waste sorting in the city. In the study, a sample of 400 households was selected through systematic sampling procedures. Data collection methods involved household questionnaires, records from municipal wastes, and policy documents. Quantitative analysis included paired sample t-test, regression analysis, and difference-in-differences (DiD) analysis to assess the effectiveness of legal interventions. The results demonstrated that strict enforcement of legal measures had a significant effect on waste sorting practices, with increased participation by more than 60% ($p<0.01$). Nevertheless, the research identifies a context gap since it is conducted in an urban setting characterized by structure, resources, and institutional capability, which renders it inapplicable to informal settlements with poor enforcement capability. This study intended to fill that gap through the analysis of the functioning of the legal regime within limited-resource informal environments and the role of community involvement in augmenting poor enforcement capability.

On the global front, recent empirical evidence from Canada highlights the role played by the international legal framework for managing hazardous waste. According to Smith and Brown (2022), the study undertaken in Ontario, Canada, investigated the implementation of international hazardous waste regulations within the country's policies. Specifically, the study

assessed the extent to which the legal framework impacts the tracking, recycling, and disposal of hazardous waste. Employing a mixed-method research design, the sample comprised 420 participants drawn from environmental officers, waste management firms, and households using stratified sampling techniques. The data collection tools included questionnaires, compliance audits, and policy document analysis. For quantitative data, the researchers used descriptive statistics, Pearson correlation, and multiple regression analysis, while thematic analysis was adopted for qualitative data. The results indicated that effective enforcement, waste tracking technology, and stiff penalties improve compliance with international conventions ($p<0.01$). Nevertheless, the study found that although the system in place was efficient, there was a lack of involvement of the public in household settings in Canada. However, the study found out that even in highly developed systems, there was still a weakness in the areas of public involvement and awareness at the household level. The study therefore suggested combining community involvement with legal frameworks to enhance sustainability. The gap identified is the underutilization of grassroots involvement within the highly structured system. This study bridges the gap by studying the role of grassroots strategies within non-structured settings like Ngaba.

According to Sharma & Gupta (2023), the impact of international waste management agreements, including the Stockholm and Basel Conventions, is assessed in a highly urbanized setting of Delhi and Mumbai in India. In particular, Sharma & Gupta (2023) aim at assessing the ways in which international legal norms are domesticated into local policies and household behaviors in waste management. Thus, Sharma & Gupta (2023) adopt a convergent mixed-methodological approach involving both quantitative and qualitative components of data collection and analysis. A total of 380 households are randomly selected using a stratified random sampling procedure, and another 40 municipal and environmental regulation officials are purposely selected because of their role in implementing relevant policies. Questionnaires,

interview guides, and environmental monitoring reports serve as tools of data collection. The use of chi-square tests and multiple regression models allows the researchers to assess whether associations between variables and the predictors of compliance with waste management regulations exist, whereas thematic analysis helps identify key institutional and behavioral trends. It was noted that while considerable progress is being made by the nation regarding conformity to the global conventions, there have been issues of inconsistency in enforcing these laws because of rapid urbanization, dominance of informal waste handling processes, and inadequate institutional strength ($p<0.05$). It was shown in the study that environmental awareness programs and education significantly affect compliance with regulations, whereby households engaged in awareness activities had higher levels of conformity to waste segregation and disposal rules. Moreover, it is important to note the role played by informal waste handlers in the process of recycling, which has largely remained unexplored. Some of the recommendations included involving informal waste handling agents in legal and policy instruments, developing effective mechanisms for enforcing the law, and increasing awareness programs among communities. In essence, it has become clear that a conceptual and contextual gap exists in this case. While the study clearly shows the significance of linking community practices to formal legal frameworks, no adequate attempt was made to show this relationship. The current study intended to bridge this gap by exploring community-based approaches to link with legal frameworks in informal setups like Ngaba Municipality.

In a global perspective, Oluwagbayide et al. (2024) performed a research to assess the impact of legislation and regulation in improving the effectiveness of waste management policies in developing countries, particularly Nigeria and some Sub-Saharan African nations. This research aimed to identify the impact of legal framework in waste management and environmental sustainability in the country under study. The research adopted the mixed methods research approach, where the study combined both qualitative and quantitative

research approaches for holistic research purposes. In this study, a stratified and purposive sampling technique was used, whereby a sample size of 350 respondents was selected, including households, environmental officers, and municipal governments. Questionnaire surveys, interview guide for key informants, and content analysis were used to collect the data. On the other hand, descriptive analysis, chi-sqaure test, and multiple regressions were used to analyze the quantitative data collected in the study. Thematic analysis method was used in analyzing the qualitative data. Inferentially, the research found a statistically significant relationship between the effectiveness of enforcement of environmental legislation and improvement in waste management practice ($p< 0.05$). But it is also apparent that there is some theoretical and contextual gap in this study since the research emphasizes more about national enforcement rather than the relationship between community involvement and legal framework. This gap was considered in this study whereby it seeks to examine the impact of legal framework in combination with community approaches in managing waste in informal areas like Ngaba Municipality.

In the empirical work carried out by Al Mansoori et al. (2021), the authors studied the effectiveness of legislation in improving waste management sustainability in a modernized urban area of Dubai, United Arab Emirates. The purpose of the research was to analyze how the implementation of stringent environmental legislation, along with infrastructure and technology development, affected the outcomes of waste management at institutional and household levels. For this study, a quantitative design was chosen; specifically, a stratified random sampling technique was utilized for selecting a sample of 300 households, while purposeful sampling was used to select another sample of 50 stakeholders, comprising of policymakers, officials from the relevant agencies, and representatives of private companies engaged in managing waste production and recycling. For collecting data, the authors employed two sources: first, structured questionnaires to collect household information, and

second, secondary data from government reports on waste management. The data were analyzed using descriptive statistics to describe observed trends, regression analysis to establish the correlation between environmental laws and waste management results, and ANOVA to compare different demographic groups. It was found that stringent law enforcement along with modern waste management technology such as automated waste collection and waste energy conversion technology can significantly increase the levels of waste segregation and recycling ($p < 0.01$). Nevertheless, the results have shown that sustainable waste management cannot be achieved through legal enforcement alone; rather, continuous community engagement is required. Although Dubai has an excellent model, it is characterized mainly by top-down governance, which lacks consideration of community engagement. In line with the results of this study, it is recommended that legal enforcement and community engagement are considered together to promote behavioral compliance. The main limitation of previous studies is that they consider only a top-down approach for the implementation of laws without adequate attention to community-level waste management techniques. This limitation has been addressed in the present research.

The study by El Amrani et al. (2022) presents a wide-ranging examination of regional frameworks and their impact on waste management in Morocco. In particular, the study seeks to evaluate the extent to which regional frameworks like the African Charter on Solid Waste Management have affected waste management practices in Morocco through their relationship with national waste management policies. To conduct their research, the authors applied a mixed-method approach, allowing for both descriptive analyses of statistical trends and evaluation of institutional contexts and issues. As part of their sampling strategy, the authors used stratified sampling to choose 260 households from both urban and peri-urban areas while purposeful sampling was employed to select 30 municipal authorities involved in waste management planning and execution. Data collection was performed using questionnaires,

semi-structured interviews, and policy documents' review, thus allowing for data triangulation and a more reliable set of results. While quantitative data analysis entailed the use of descriptive statistics to find any trends present as well as regression analysis to estimate the role played by legal frameworks in waste management outcomes, qualitative analysis was conducted by way of thematic coding of interview data.

According to the results of the study, Morocco is on the right track when it comes to implementing policies for effective management of wastes in accordance with regional and international initiatives, especially in urban environments where there are formal structures in place. There are still many issues that need to be sorted out such as lack of funding, inefficient enforcement, and infrastructural inadequacies ($p < 0.05$). However, what the study revealed was that community participation played a vital role in improving the effectiveness of waste management policies, especially in locations where municipal facilities were not available. The scholars suggested developing closer relationships between municipalities and local communities, investing more money in infrastructure, and incorporating community engagement as a policy in laws. The main limitation in the study is lack of community participation in legislation processes, which limits the effectiveness of policy implementation. The current study addressed this issue by analyzing ways through which communities can become involved in legal processes.

The study was carried out in Djibouti by Hassan and Ali (2024) with the aim of examining how international frameworks for waste management such as the Basel and Bamako Conventions have been implemented in the nation. In doing so, the study sought to explore the extent to which the legal frameworks have been adopted in national laws as well as assess the impact that has been realized in the communities. The research used a descriptive survey design whereby samples of 210 households were randomly chosen while 25 environmental officials were purposively chosen. Questionnaires were used to collect data from households, whereas

interviews with the officials and environmental inspections were undertaken to obtain data objectively. Analysis of the data collected involved descriptive statistics as well as correlation analysis. The results indicated that despite the adoption of several international conventions by Djibouti, the implementation process has been very poor due to the scarcity of funds, lack of infrastructure, inadequate institutional structure, and insufficient legal awareness among the population. It was also found out that households whose members were aware of environmental laws exhibited appropriate waste management practices, implying that community participation is important. Recommendations for action include increased investments in waste infrastructure, development of institutional capacities, and public awareness campaigns. The critical gap highlighted in the literature is the absence of an alignment between the formal and legal frameworks of waste management and their actual implementation at the community level, which affects the efficacy of these frameworks. This study fills that gap by studying community participation and its effect on the success of legal frameworks.

In their investigation, Mukendi et al. (2023) undertook a detailed study of the effectiveness of Law No. 11/009 of 2011 within the context of waste management in Kinshasa, Democratic Republic of Congo. This law regulates waste collection, transportation, and disposal in the wake of urban development. The purpose of the study was to establish how legal provisions on the subject matter have been implemented within a highly urbanized area. For instance, it sought to identify the impact of legal provisions in waste management within an environment where there is rapid urbanization and weak institutional capabilities. The research approach employed included qualitative and quantitative methodologies, thus offering opportunities to capture various dimensions of the study. To collect primary data, the authors used structured questionnaires and semi-structured interviews among others while document analysis helped obtain secondary data. A total of 280 respondents comprising of residents in urban and rural areas were selected using stratified random sampling technique, while 35 municipal officials

and other stakeholder organizations were selected using purposive sampling. Quantitative data obtained from the sample was subjected to statistical tests such as descriptive analysis and regression analysis to ascertain the influence of legal frameworks. The study revealed that there is poor public knowledge of the legal framework for waste management, thus lowering compliance. They suggested developing institutional capacity, fostering interagency collaboration, and conducting more public awareness programs. Nevertheless, this study has one major drawback, which is that it did not examine how community involvement can contribute to compliance with the legal framework. This study willed the gap by investigating how community involvement can help improve compliance with the legal framework.

Kabeya and Tshibangu (2024) explored the impact of sanitation law and other measures, such as the introduction of a tax on sanitary measures like Law No. 003/2013 in the Democratic Republic of Congo in Kinshasa and Lubumbashi. They assessed the effectiveness of such strategies in relation to household contributions in terms of waste disposal and sanitation. Their research followed a quantitative cross-sectional approach in which they sampled 320 households from simple random sampling to obtain generalized results. Their data was based on information obtained from structured questionnaires that examined household involvement and contributions in relation to the payment of the sanitation tax and management. Financial records for the city council provided data on the collection and expenditure of such a tax. Data analysis entailed the use of descriptive statistics to assess any trends and the chi-square test to explore relationships while multiple regression analysis helped in identifying predictors. Results showed that a low level of compliance with such sanitation taxes and weak enforcement mechanisms significantly reduced effectiveness of waste management ($p<0.05$). The study also revealed that inadequate community participation and low levels of trust in the governmental bodies are the reasons for the inefficient implementation of waste management programs. As a solution to the problem, the authors recommend reinforcing the mechanisms of

accountability, making the process of using the sanitation budget more transparent, and encouraging community participation initiatives. One of the most critical deficiencies of the study is its lack of focus on the integration of community participation into the financial and legal infrastructure, the present study had put into consideration purposely to bridge the gap.

2.3.6 Challenges Related to Implementation of Existing Legislation

In the international arena, Ivanov & Petrov (2022) explored issues related to the implementation of environmental legislation regulating the management of solid wastes in Russia as part of the country's waste reform initiative. Specifically, the study sought to evaluate the effectiveness of the legal framework for the regulation of such matters through mechanisms of the circular economy. This was achieved through a combination of quantitative survey and institutional analysis research design. The researchers selected 350 participants who were regarded as key stakeholders in waste management including municipal officials, private waste management firms and householders. Participants were chosen using stratified and purposive sampling techniques from urban areas including Moscow and St. Petersburg. Data collection involved the use of questionnaires, semi-structured interviews and government policy documents and waste management reports. Quantitative data were analyzed using descriptive statistics, correlation analysis and multiple regression analysis. On the other hand, the qualitative data were analyzed using thematic analysis in order to find institutional and governance related issues that may be posing problems in the implementation of waste management policies. These results indicate that while the Russian government had formulated an elaborate waste management policy strategy that focused on encouraging recycling and minimizing the use of landfills for waste disposal, its implementation had varied greatly from one region to another ($p < 0.05$). Lack of adequate infrastructure, inadequate involvement of the local population in setting up waste management facilities, poor enforcement of environmental laws, and inadequate public education were some of the major causes of failure

in implementing the waste management policy effectively. Funding of different regions was identified as an important factor affecting the results of the intervention. Recommendations included improving decentralized waste management policies, investing more in infrastructure, and increasing public participation in the formulation and implementation of waste management policies. In spite of this contribution, the researchers failed to focus on the importance of involvement of the local population in implementing the environmental laws. The present study attempts to fill this gap through involving members of the community.

Trinh (2021) examined implementation challenges within municipal solid waste management systems in Vietnam with regard to environmental policy. This research sought to assess the influence of policy enforcement, institutional capacity, and stakeholder engagement on the success of waste management laws in the rapidly urbanizing economic context. To achieve this, the researcher utilized a mixed-methods approach by combining both quantitative survey and qualitative policy analysis methods. The study used a stratified and purposive sampling method to select 410 respondents drawn from households, municipal authorities, and waste service contractors. Data collection was done through structured interviews and survey questionnaires, while content analysis involved qualitative analysis of existing policies and regulations. Descriptive statistics, correlation analysis, and multiple regressions were employed in analyzing quantitative data, while thematic analysis was used for qualitative data. The inferential findings showed that strong enforcement processes and well-developed infrastructure played a significant role in determining successful implementation of waste management measures ($p < 0.05$). Nonetheless, some important challenges were observed to include lack of adequate financing, poor coordination among institutions, and insufficient public participation, especially in peri-urban areas. Some recommendations were made concerning improvement of governance mechanisms, increased budget allocation, and better cooperation among stakeholders. Even though the study was exhaustive in terms of scope, it

exhibits a major gap because it concentrates on more institutionalized governance mechanisms and neglects the issue of enforcement in informal settlements. This is the gap that the current study fulfilled through analyzing implementation challenges and coping mechanisms in poor urban neighborhoods like Ngaba.

Considering the African setting specifically, a research carried out by Bolaana and Ali (2020) involved studying the effect of institutional coordination on waste management policy implementation. The authors explored the influence of collaboration between governmental departments, the private sector, and communities in achieving better results in implementing waste management policies in Sudan and Ethiopia. In order to achieve the research objective, the study used a comparative case study research design where researchers chose two largest urban areas in each country. Purposive sampling technique was applied to select 200 participants who represented municipal staff members, private waste collectors, and community members. Data was gathered using semi-structured interviews, focus group discussions, and document analysis of policy instruments. Both qualitative and limited quantitative data was analyzed with the help of content analysis. It was shown that lack of coordination among the actors of the process results in duplication of work, inefficiency, and poor law enforcement. The study showed that exclusion of community participation in the planning process undermines the success of waste management programs. Other factors included in the study include corruption and the mismanagement of funds as other possible challenges to the process. It was suggested that there should be an incorporation of governance structures and coordination between agencies along with participatory methods to ensure success. However, it is important to note that the study has an evident methodological problem in the lack of quantitative and inferential analysis. Therefore, the current research helped to fill in that gap by using inferential analysis such as regression and correlation.

Further, Osei and Mensah (2023) examined the factors that affect the implementation of waste management laws in rapidly urbanizing African cities through a study carried out in Accra and Kumasi, Ghana. The study sought to evaluate the effects of institutional capacity, stakeholder coordination, and community participation on the enforcement of environmental laws regulating solid waste management. The research design used was convergent mixed-methods research design, which allowed for the combination of qualitative and quantitative data collection and analysis techniques. A total of 300 households were selected using stratified random sampling to represent various socio-economic strata, whereas 45 key stakeholders consisting of municipal authorities, private waste services, and community representatives were purposively sampled. The study employed structured questionnaires, interviews with key informants, focus group discussion sessions, and document review for data collection. The quantitative data collected was subjected to descriptive analysis, chi-square test, and logistic regression analysis, whereas the qualitative data were subjected to thematic content analysis. Findings from the study indicate that although legal frameworks regulating waste management have been developed, they are largely under-implemented due to insufficient funding, poor enforcement of environmental laws, lack of coordination among stakeholders, and rapid urban population growth ($p < 0.05$). Furthermore, lack of awareness within the community and their poor level of participation contributes to non-compliance with waste management laws, and therefore practices like illegal dumping and burning are common. In addition, the study found that the informal waste collection groups' contributions towards the formal system of waste management were poorly regulated.

The study recommended that the coordination of institutional efforts should be improved along with the provision of more financial investment for development of waste management structures and public awareness campaigns. However, one of the flaws in the study is that it fails to analyze how community-based approaches can be incorporated into the legislative

system. The present study addressed this flaw through analyzing the impact of community organization on the implementation of waste management policies in informal settlements like Ngaba Municipality.

The national-level study conducted in Kinshasa, DRC by Mbemba (2020) focuses on evaluating the challenges that inhibit the implementation of waste management legislation in informal urban areas such as Ngaba. Specifically, the study evaluates how financial constraints, poor infrastructure, and inadequate institutional frameworks impact the enactment of laws regarding waste management practices. To investigate this topic, a qualitative descriptive design is used whereby 120 households and 20 officials from the local government are selected based on purposive sampling. Data is collected using qualitative methods including in-depth interviews, observation checklists, and documentary reviews on waste management policies in municipalities. Data analysis is done using thematic approach where repeated patterns and challenges are highlighted in the data. Findings show that financial inadequacies constrain waste management processes because local governments lack sufficient resources to offer adequate waste management infrastructure including waste collection, treatment plants, and disposal sites. Further findings indicate that a lack of adequate treatment plants means that accumulated waste has no place and is dumped in unauthorized places. This poses great danger to the environment and public health. Moreover, poor enforcement mechanisms, poor awareness among the masses, and poor community involvement emerged as key obstacles. The research recommends increased monetary investments, increased institutional capabilities, and public awareness campaigns. Nonetheless, this research suffers from methodology limitations because no inferential statistics is used. The limitation arises from a lack of quantifiable data. This means there is no clear explanation of causal linkages between the aforementioned obstacles and the performance of waste management laws. This study intended to bridge this

gap by integrating qualitative and quantitative analysis of how these obstacles affect waste management policies.

In the DRC, corruption hinders effective implementation of policies related to the environment. According to Mbemba (2020), corruption has also been established as a significant factor that adversely impacts the waste management system. This is due to the fact that funds allocated towards environmental management efforts are misused, reducing the ability of authorities to perform their obligations. The study has also indicated the inability of communities to participate in the waste management activities due to lack of trust. However, this study does not provide quantitative measures to establish the level of effect of corruption on waste management results. It leaves an important theoretical gap for the current study to address in order to assess governance elements like accountability and transparency and their effects on community participation and legal compliance. In all the literature reviewed, a common theme stands out emphasizing the various difficulties associated with the implementation of waste management legislation, especially in developing nations. Such challenges range from insufficient financing to inadequate institutional cooperation, corruption, lack of infrastructure, among others. Although these previous investigations have provided substantial information regarding these challenges, the approaches adopted are limited to a single problem at a time without an overarching perspective. There is no integration of the various facets that come into play during the implementation process, including legal, institutional, and community aspects. In addition, these previous researches lack context because they are limited to formal urban areas without considering informal regions, such as Ngaba Municipality, which present different socio-economic and political characteristics.

Therefore, this investigation seeks to address these limitations by taking a broader view of the situation to establish an overview of the interaction of the three factors (legal, institutional, and community) during the implementation of waste management legislation. Through this

analysis, the study intended to develop an innovative perspective on implementing the regulations while integrating the unique attributes of informal settlements, such as Ngaba Municipality.

Table 2: Matrix of Study Gaps

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Mutobe (2021)	Residents' participation in solid waste management in Solwezi	Solwezi, Zambia	Only 35% of residents engaging in formal waste management practices, primarily through waste separation, reuse, and the use of formal collectors. Lack of awareness, limited formal collection services, and high costs hinder broader participation. The study recommends awareness campaigns and incentives to boost engagement.	Although Mutobe explored community participation, the interplay between partnerships approaches and government policies on collective waste management initiatives not articulated.
Kafula (2024)	Exploring the role of community participation in Sustainable Solid Waste Management: A case study of Moses//Garoeb and Samora Machel informal settlements in Windhoek, Namibia	Windhoek, Namibia	Participation is considered ineffective due to insufficient infrastructure and equipment for waste collection and disposal, as well as inadequate awareness efforts.	The social dynamics of communities such as cultural belief and social disparities regarding waste management were not adequately addressed in Kafula's work.
Kubanza, S. & Simatele, M. (2019)	Solid Waste Management and Environmental Injustice in Poor Communities in Kinshasa: A Cultural Theory and Systems Approach	Kinshasa, DRC	Poor communities are the most affected by the inefficiency of waste management. Kubanza proposes a systemic and cultural approach to understand how different actors influence waste management and foster cooperation among stakeholders.	Influence of community initiatives and effectiveness of collective action not discussed.
Muheirwe et al. (2024)	Solid Waste Collection in the Informal Settlements of African Cities: A Regulatory Dilemma for Actor's Participation and Collaboration in Kampala	Kampala, Uganda	Collaboration between formal and informal actors is not supported by legal framework. Integrating informal actors into official planning is essential to enhance waste collection coverage.	Socio-economic barriers and community participation interface not well articulated.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Kabamba Tshipepele, P. (2021)	Politique publique environnementale : Vers un partenariat public-privé de gestion des déchets solides dans la ville de Kinshasa	Kinshasa, DRC	The implementation of mixed-economy companies for waste management and recycling. Advocates for improved management of public landfills and a recycling approach to address resource scarcity while creating jobs through waste valorization.	Kabamba's study focuses primarily on infrastructure-based approaches, but participatory approaches through community initiatives not addressed.
Olivier Lokango et al. (2024)	Essai de gestion et voies de valorisation des déchets ménagers solides pour la salubrité durable de la ville de Kinshasa	Lemba, Kinshasa	Poor waste management is attributed to a lack of evaluation and monitoring by government authorities. The study proposes a framework for sustainable waste management, including the establishment of a sanitation tax.	The study did not examine how the interaction between actors and community initiatives contributes to the sustainability of waste management systems.
Rumpala, Y. (1999)	Le réajustement du rôle des populations dans la gestion des déchets ménagers : Du développement des politiques de collecte sélective à l'hétérorégulation de la sphère domestique	N/A	Analyzes the growing role of households in the management of municipal waste. Explores how selective policies modify household behaviors and their relationships with institutional and economic spheres. Also examines challenges related to the rationalization of waste management.	The study emphasizes the role of citizens in waste management, but its analysis remains largely confined to the waste collection stage. There is a lack of clarity regarding the broader measures that communities can undertake to participate actively in the waste management process; critical aspects such as the community partnership approach and the role of environmental education were not addressed.
Boukar (2023)	Gestion des déchets dans les villes d'Afrique : Réduire, recycler, réutiliser (3R)	Africa	Examines waste management in African cities, particularly through reduction, reuse, and recycling (3R). Proposes various technical solutions for waste management, including waste valorization for electricity production.	While the study primarily focuses on the 3R approach, it overlooks the critical interface between socioeconomic barriers, environmental education, government policies and effective waste management.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
World Bank (2022)	What a Waste 2.0: A Global Snapshot of Solid Waste Management	Global (200+ countries)	Rising global waste production driven by urbanization, population growth, and consumer behavior; strong positive correlation between income levels and waste generation; projections point to further increases by 2050. Recommends integrated waste management (recycling, reduction, policy enforcement, infrastructure development).	Heavily reliant on aggregated secondary macro-level data; lacks context on slums and participation dynamics in developing countries; omits behavioral and sociological factors.
UNEP (2022)	Sustainable Waste Management Practices: A Multi-Country Policy and Indicator Analysis	Multi-country case studies	Sustainable waste management requires integration of collection, recycling, and public awareness strategies; effectiveness significantly shaped by governance systems.	Findings rest mainly on policymakers' perceptions with little grassroots representation; limited attention to low-income urban contexts.
Bundhoo (2021)	Governance Frameworks in Waste Management: A Comparative Study of Developing Countries	Selected cities in Africa, Asia and Latin America	Significant correlation between governance quality and waste management efficiency; poor infrastructure, weak monitoring, and low community involvement hinder efficiency.	Generalization bias from synthesizing diverse settings without examining unique informal-settlement characteristics; no regression-based inferential analysis of cause-and-effect relationships.
Chen et al. (2020)	Citizen Participation and the Pay-As-You-Throw (PAYT) Policy in Waste Governance	Singapore and Taiwan	PAYT policy decreased waste generation and increased recycling, with significant differences across income groups.	Conducted in developed economies with institutionalized governance; ignores informal waste systems and cultural effects common in developing countries.
Gümüş and Dursun (2024)	Household Behaviors, Attitudes and Knowledge on Solid Waste Management	Mamak district, Ankara, Turkey	Environmental consciousness, educational qualification, and personal attitudes significantly predict household participation in waste management ($p < 0.05$); awareness was high but sorting/recycling participation only average.	Convenience sampling limits generalizability; omits trust, incentives, and socio-cultural predictors; lack of qualitative data leaves the awareness-action gap unexplained.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Nzeadibe et al. (2021)	Household Waste Management Practices in Rapidly Developing Nigerian Cities	Metropolitan areas, Nigeria	Inadequate infrastructure, irregular collection services, and lack of community participation are major barriers to effective waste management.	Predominantly quantitative approach; excludes informal settlements where improper waste management persists.
Mensah et al. (2022)	Public Awareness, Education and Household Participation in Waste Management	Urban and peri-urban Ghana	High level of association between environmental awareness and participation in waste management activities.	Does not consider trust, culture, or social factors; no behavioral model linking awareness to participation.
Temesgen et al. (2025)	Systematic Review and Meta-Analysis of Household Waste Management Practices	Urban Ethiopia (national synthesis)	Only 32.06% of households practice proper waste management; higher education (AOR = 6.01), positive environmental attitudes, income, service availability, and community participation are significant predictors.	Meta-analytic reliance on secondary sources limits analysis of local socio-cultural dynamics; no attention to incentive- or trust-building mechanisms.
Holenu et al. (2022)	Waste Management Infrastructure Assessment	Kinshasa, DRC	Less than 30% of waste gets collected because of poor infrastructure and ineffective municipal services.	No inferential statistics applied; no behavioral or participatory analysis.
Sata (2025a)	Inequalities in the Provision of Waste Management Services	Ngaba Municipality, Kinshasa, DRC	Significant disparities where waste management services are inconsistent and inadequate in low-income zones compared to high-income zones.	Apparent conceptual gap in the lack of participatory practices and approaches.
Hossain et al. (2025)	Trust and Community Participation in Waste Management	Household survey (unspecified urban context)	Low trust in local government officials greatly decreases participation in waste management programs; recommends increased transparency and accountability.	No analysis of possible interventions to restore trust.
McCabe (2020)	The Significance of Social Work in Improving Community Participation	N/A (qualitative)	Social work is significant in mobilizing, educating, and advocating for communities; recommends incorporating social work methods into community development projects.	Methodological flaw: does not quantitatively validate the results generated.
Kubanza (2021)	Community-Level Environmental Education and	Selected urban municipalities	Significant positive correlation between environmental education and waste management practices; households	Environmental education programs in developing nations lack coherence,

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
	Household Waste Management Practices		in education programs showed greater segregation, recycling, and proper disposal.	coordination, and institutional support; more dependent on quantitative than qualitative behavioral understanding.
Brien (2023a)	Socio-Economic Differences, Environmental Education and Participation in Waste Management	North America, Asia and Europe	Socio-economic differences (income, education) significantly affect participation in waste management practices.	Relies on secondary data; ignores localized cultural, behavioral, and attitudinal dimensions of household waste behavior.
Badgett and Milbrandt (2021a)	Effectiveness of Media-Based Environmental Education Campaigns on Waste Behavior	Urban/semi-urban USA	Statistically significant improvement in awareness and engagement in the intervention group versus control ($p < 0.05$); income moderates the effect of media exposure.	Structural constraints faced by the poor (lack of disposal facilities) not sufficiently considered; no qualitative insight into behavioral reluctance among poor communities.
Horng et al. (2024)	Educational and Awareness Campaigns and Household-Level Recycling and Waste Sorting	Urban municipalities, Asia	Environmental awareness, facility accessibility, and reward systems are significant predictors of proper solid waste management behaviors.	Assumes developed infrastructure, efficient governance, and institutional trust, which are difficult to achieve in underdeveloped/developing contexts.
Chang et al. (2019)	Integrating Environmental Education into Formal Schooling and Household Waste Behavior	Taiwan	School-based environmental education affects student behavior and improves household waste management via knowledge transfer, with statistically significant changes in segregation and recycling (SEM).	Success depends heavily on governmental/institutional support; insufficient attention to adult behavioral change and learning outside institutions.
Mensah & Labi (2021)	Early Environmental Awareness and Household Waste Management Practices	Urban and peri-urban Ghana	Statistically significant positive relationship between environmental education and better waste handling practices ($p < 0.05$), but effects were temporary once programs ended.	Sustainability problem: no strategy for maintaining behaviors long-term; cross-sectional design precludes causal claims.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Niyirera (2023a)	The Impact of Environmental Education on Household Waste Management Practices	Rwanda	Environmental education enhances knowledge and participation, but absence of follow-up programs and weak institutional support undermine effectiveness.	Implementation gap: fails to consider community involvement in waste management practices.
Otundo (2024a)	Community-Based Environmental Education Programs and Household Waste Management	Nairobi, Kenya	Strong, significant correlation between community consultations, awareness programs, and household waste management practices ($p < 0.05$).	Coordination challenge: does not effectively link environmental education programs with infrastructure provision needed for sustainable behavior change.
Waku et al. (2024)	Cultural Beliefs, Coordination Mechanisms and Community Participation in Household Waste Management	Urban municipalities including Kinshasa, DRC	Deep-rooted cultural perceptions (waste as sole government mandate) and lack of stakeholder collaboration significantly hinder participation ($p < 0.05$); institutional factors and awareness predict participation, moderated by socio-economic conditions.	Cross-sectional design cannot establish cause-and-effect; no intervention approaches for changing deep-rooted cultural perceptions; quantitative focus limits depth on community perceptions.
Bokeko (2024)	Cultural Beliefs, Social Norms and Household Waste Management Behavior	Kinshasa, DRC	Cultural beliefs, social norms, and habits discourage active participation and reinforce reliance on the public sector; social pressure encourages passive behaviors.	No behavioral interventions tested to convert values into behavior change; lacks quantitative validation for generalizability.
John (2023)	Multi-Level Partnerships and Sustainable Household Waste Management Systems	Global (multiple regions)	Multi-level partnerships enhance resource mobilization, policy implementation efficiency, and community participation ($p < 0.05$); fragmentation across governance levels limits effectiveness in developing countries.	Missing discussion of functioning partnerships in underdeveloped communities with poor governance and infrastructure.
Brien (2023b)	Cross-National Comparative Study of Partnership Approaches in Household Waste Management	20+ countries: Europe, North America, Asia and parts of Africa	Efficacy of partnerships substantially affected by socio-economic context, governance performance, and regulatory enforcement ($p < 0.05$).	Purely quantitative; excludes the informal economy, trust factors, community participation, and households' lived realities.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Badgett and Milbrandt (2021b)	Partnership Approaches to Waste Management: Evidence from San Francisco	USA	Strong institutional backing, regulation, and stakeholder coordination significantly reduce landfill use and increase recycling ratios ($p < 0.05$).	Inequalities in service provision linked to minimal inclusion of poor neighborhoods in partnership practices.
Dehio (2023)	Public-Private-Community Partnerships and Waste Management Systems	Germany	Collaborative partnerships significantly enhance waste collection efficiency, recycling levels, and citizen engagement ($p < 0.05$).	Excludes informal and marginalized stakeholders from formal partnerships; findings limited to relatively wealthy municipalities.
Jaakkola (2023)	Collaboration Partnerships, Waste Minimization and Recycling Behavior	Netherlands	Partnerships play a crucial role in sustainable behavior change toward recycling and waste minimization, driven by incentives and institutional support.	Assumes stable governance structures; ignores informal areas and weak institutions, limiting transferability.
Pap (2014)	Household Waste Management Strategies and Public-Private Collaboration	Kingston and St. Andrew, Jamaica	Access to services, income levels, and perceived reliability significantly predict proper disposal ($p < 0.05$); low-income households more likely to dump illegally due to affordability and trust issues.	Lacks structural insight into informal settlements and behavior-change strategies to increase household participation.
Godfrey and Oelofse (2020)	Partnerships within Urban Household Waste Management Systems	Johannesburg, South Africa	Stakeholder coordination, policy support, and infrastructure availability significantly predict partnership effectiveness ($p < 0.05$); informal waste workers included but lack structure/support.	Formal-informal sector interaction and governance coordination not fully addressed.
Mungambi et al. (2020)	The Role of Partnership in Improving Household Waste Management	Nairobi City County, Kenya	Partnerships facilitate recycling activities and create opportunities for informal waste collectors; lack of funding and policy severely hinder sustainability.	No mention of alternative funding methods or incentive programs to sustain partnerships.
Ogutu et al. (2021)	Regulatory Enforcement and Partnership Efficiency in Waste Management	Nairobi, Kenya	Lack of regulatory enforcement significantly hinders partnership efficiency; regulatory compliance is a significant predictor of efficient partnerships ($p < 0.05$).	Behavioral and relational gap: no attention to trust, community attitudes toward partnerships, or informal-sector involvement.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Ali et al. (2022)	Household Waste Management Practices and Stakeholder Partnerships	Khartoum, Omdurman and Bahri, Sudan	Collection frequency (OR = 0.720) and disposal-site accessibility (OR = 0.791) significantly predict proper disposal practices; poor local government-community coordination worsens outcomes.	Behavioral and institutional gap: does not consider community partnerships and social work as mechanisms to improve behavioral compliance and coordination.
Kabamba (2020)	Multi-Stakeholder Partnerships and Household Waste Management Outcomes	Kinshasa, DRC	Integrated stakeholder partnerships improve collection coverage, recycling, and community engagement ($p < 0.05$); poor coordination, low trust, and inadequate financing hinder partnership development.	Fails to address behavioral aspects, incentives, and trust-building mechanisms needed to sustain partnerships in impoverished urban communities.
Muheirwe et al. (2024b)	Efficacy of Integrated Stakeholder Involvement in Urban Waste Management Systems	Kinshasa, DRC	Stakeholder integration improves efficiency, recycling efforts, and environmental awareness ($p < 0.05$); organizational division and weak enforcement threaten sustainability.	Community trust, cultural views, and behavioral barriers to participation not emphasized.
Pérez (2020)	Household Waste Management Practices and Environmental Sustainability: A Cross-National Study	Urban Europe, Latin America, and parts of Asia	Waste segregation and recycling significantly higher ($p < 0.05$) where policy enforcement and infrastructure development exist.	Context gap: focuses on areas with structured infrastructure, not generalizable to underdeveloped settings such as Ngaba.
Zhou (2022)	Comparative Effectiveness of Centralized versus Community-Based Waste Management	Singapore and Shanghai, China	Centralized (incineration-based) systems achieve high processing efficiency (>80%); community-based approaches promote sustained behavior change through regulation and education.	Lacks statistical/inferential data analysis compared to regression-based approaches.
Chen (2021)	Effectiveness of the Pay-As-You-Throw (PAYT) Policy on Household Waste Behavior	Urban municipalities, Taiwan	Statistically significant reduction in waste generation and increase in waste segregation after PAYT implementation ($p < 0.01$).	Does not consider the absence of strong governance and infrastructural support typical of developing countries.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Outtara et al. (2022)	Waste Management Challenges in Rapidly Growing Urban Areas	Bamako, Mali	Significant relationship between population growth, consumption patterns, and increased waste production ($p < 0.05$).	Conceptual gap: fails to critically analyze the contribution of community involvement, local behavioral patterns, and grassroots initiatives.
Kpikpidi (2020)	Community Resistance to External Control of Waste Management	Nigeria and Ghana	Non-participation in formal waste management processes predicts low adherence to formal policies ($p < 0.05$); communities develop informal alternatives (illegal disposal, incineration, neighborhood collection).	Cross-sectional design cannot evaluate long-term effects of participatory practices and behavioral change or the sustainability of community strategies.
Sata (2025b)	Indigenous Knowledge, Social Capital and Informal Waste Management Strategies (Ethnographic Study)	Nairobi, Kenya and Kampala, Uganda	Communities rely on informal mechanisms — household collection groups, composting, recycling, and clean-up exercises — that remain fragmented and under-resourced.	Methodological weakness: no quantitative assessment or inferential statistics used to assess relationships among variables.
Otundo (2024b)	Innovative Means of Household Waste Management	Mombasa County, Kenya	Statistically significant association between door-to-door waste collection and successful waste management ($p < 0.05$); reduces littering and improves segregation.	Idea gap: fails to consider the role played by community involvement in the sustainability of waste management strategies.
Niyirera (2023b)	Community Participation and Effective Household Waste Management (Correlational Study)	Kigali, Rwanda	Strong positive correlation between community participation and effective household waste management ($r = 0.68$, $p < 0.05$), including composting and recycling adoption.	Contextual limitation: conducted within an organized city with effective supporting institutions; not generalizable to less structured settings.
Marondji (2023)	Household Waste Management Behaviors in an Informal Setting	Kinshasa, DRC	Dominant disposal practices include dumping, burning, and small-scale composting; these pose health and environmental dangers due to limited access to waste facilities.	Methodological weakness: no inferential statistics or quantification of information applied.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Masamuna et al. (2023)	Age-Related Variation in Household Waste Disposal Behavior	Kinshasa, DRC	Statistically significant association between respondent age and disposal behavior ($p < 0.05$); younger residents dispose improperly (e.g., open drains) more than older residents.	No qualitative approach to understand the causes of behaviors; institutional and policy factors not considered.
Mangenda et al. (2024)	Pollution Sources and Waste Management Practices in a Residential Urban Slum	Ngaba Municipality, Kinshasa, DRC	Waste burial (50%) and incineration (9%) are the commonest disposal practices; 75% of respondents view composting as environmentally friendly; household/market waste (e.g., Kianza market) identified as pollution sources.	Conceptual gap: did not consider the importance of recycling and community participation in addressing environmental problems.
Simbu et al. (2022)	Community-Based Waste Management Practices along University Roads and Neighboring Areas	Ngaba Municipality, Kinshasa, DRC	Significant relationship between environmental education/campaigns and community involvement in waste disposal and clean-ups; hygiene campaigns essential to prevent public waste accumulation.	No quantification of data using inferential statistics; multi-stakeholder collaboration in waste management not investigated.
Chen (2020)	Legislation, Policy, and Household Waste Segregation	Beijing and Shanghai, China	Strict legal enforcement significantly increased waste sorting participation, by more than 60% ($p < 0.01$).	Context gap: conducted in structured urban settings with strong institutional capability, inapplicable to informal settlements with poor enforcement capacity.
Smith and Brown (2022)	Implementation of International Hazardous Waste Regulations	Ontario, Canada	Effective enforcement, waste tracking technology, and stiff penalties significantly improve compliance with international conventions ($p < 0.01$); public involvement at household level remains weak.	Underutilization of grassroots household involvement even within a highly structured legal system.
Sharma & Gupta (2023)	Domestication of International Waste Management Agreements (Stockholm and Basel Conventions)	Delhi and Mumbai, India	Environmental awareness programs significantly affect regulatory compliance ($p < 0.05$); informal waste handlers' role in recycling remains largely unexplored.	Conceptual and contextual gap: no adequate attempt to link community practices with formal legal frameworks.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Oluwagbayide et al. (2024)	Legislation, Regulation and the Effectiveness of Waste Management Policies	Nigeria and Sub-Saharan Africa	Statistically significant relationship between enforcement effectiveness of environmental legislation and improved waste management practice ($p < 0.05$).	Theoretical and contextual gap: emphasizes national enforcement rather than the relationship between community involvement and the legal framework.
Al Mansoori et al. (2021)	Legislation, Infrastructure and Waste Management Sustainability	Dubai, United Arab Emirates	Stringent law enforcement combined with modern waste technology significantly increases segregation and recycling ($p < 0.01$); sustainable outcomes require continuous community engagement, not legal enforcement alone.	Predominantly top-down governance model lacking consideration of community-level engagement.
El Amrani et al. (2022)	Regional Frameworks and Waste Management in Morocco	Urban and peri-urban Morocco	Community participation plays a vital role in improving policy effectiveness, particularly where municipal facilities are unavailable ($p < 0.05$); funding, enforcement, and infrastructure gaps persist.	Limited community participation in legislation processes constrains the effectiveness of policy implementation.
Hassan and Ali (2024)	Implementation of International Waste Management Frameworks (Basel and Bamako Conventions)	Djibouti	Poor implementation due to scarcity of funds, infrastructure, institutional structure, and legal awareness; households aware of environmental laws exhibit more appropriate practices.	Critical gap: absence of alignment between formal legal frameworks and their actual implementation at the community level.
Mukendi et al. (2023)	Effectiveness of Law No. 11/009 of 2011 on Waste Management	Kinshasa, DRC	Poor public knowledge of the legal framework lowers compliance; recommends institutional capacity building, interagency collaboration, and public awareness programs.	Did not examine how community involvement can contribute to compliance with the legal framework.
Kabeya and Tshibangu (2024)	Sanitation Law (Law No. 003/2013) and Household Contributions to Waste Disposal and Sanitation	Kinshasa and Lubumbashi, DRC	Low compliance with sanitation taxes and weak enforcement mechanisms significantly reduce effectiveness ($p < 0.05$); low community participation and trust in government worsen implementation.	Lack of focus on integrating community participation into the financial and legal infrastructure of waste management.

Author/Year	Title of Study	Population/Location	Findings	Gap Identified
Ivanov and Petrov (2022)	Implementation of Circular-Economy-Based Waste Legislation and Reform	Moscow and St. Petersburg, Russia	Despite a comprehensive national waste policy, inconsistent regional application persists ($p < 0.05$); infrastructure, community cooperation, enforcement, and funding disparities remain challenges.	Insufficient attention to the contribution of community-level involvement toward legislative implementation.
Trinh (2021)	Implementation Challenges within Municipal Solid Waste Management Systems	Vietnam (urbanizing municipalities)	Strong enforcement and well-developed infrastructure significantly determine successful implementation ($p < 0.05$); financing, coordination, and participation gaps persist, especially in peri-urban areas.	Concentrates on institutionalized governance mechanisms; neglects enforcement challenges and coping mechanisms in informal settlements.
Bolaana and Ali (2020)	Institutional Coordination and Waste Management Policy Implementation	Sudan and Ethiopia	Lack of coordination among actors results in duplication of work, inefficiency, and poor law enforcement; exclusion of community participation undermines program success.	Methodological problem: lack of quantitative and inferential analysis to test relationships among variables.
Osei and Mensah (2023)	Factors Affecting the Implementation of Waste Management Laws in Rapidly Urbanizing African Cities	Accra and Kumasi, Ghana	Legal frameworks are largely under-implemented due to insufficient funding, poor enforcement, lack of stakeholder coordination, and rapid urban growth ($p < 0.05$); informal waste groups poorly regulated.	Fails to analyze how community-based approaches can be incorporated into the legislative system.
Mbemba (2020)	Challenges Inhibiting the Implementation of Waste Management Legislation in Informal Urban Areas	Ngaba, Kinshasa, DRC	Financial inadequacies, poor treatment infrastructure, weak enforcement, low public awareness, and corruption constrain waste management legislation and its implementation.	Methodological limitation: no inferential statistics used, leaving no clear explanation of causal linkages between obstacles (including corruption/trust deficits) and legislative performance.

2.4 Research Gaps

The analyzed literature shows that the topic of household waste management has been studied extensively around the world and is mainly related to environmental laws, institutions, technology development, and local service provision. Research in Asia, Europe and certain regions in Africa has contributed to the understanding of the waste collection systems, recycling programmes, waste awareness and policy measures. Yet a detailed study of the literature shows that some important research gaps still exist, particularly in informal urban settlements like the Ngaba Municipality of the city of Kinshasa. The gaps can be classified as geographical gaps, contextual gaps, methodological gaps, population gaps, knowledge gaps, and empirical gaps, which in accordance with the study gap matrix justify the present study. The first gap is geographical gap. Most of the current research has been carried out in urban areas where institutional structures, infrastructure and waste management systems are more developed and organized. The research conducted in Vietnam, India, and Ghana, among others, has primarily targeted cities where city structures are working and waste services are comparatively developed.

The institutional capacity and infrastructure are a crucial factor in implementing environmental policies (Trinh 2021), and the existence of formal institutions also plays an important role in compliance with waste management policies (Sharma and Gupta 2023). On the other hand, there is little work that has specifically focused on household waste management practices in Ngaba Municipality, which is an informal city where governance is weak, infrastructure is inadequate and public services are limited. This geographical imbalance gives rise to a need for evidence that is local and which reflects the reality of informal settlements in Kinshasa. The second gap is the contextual gap. While participation is often recognised as a key element of sustainable waste management, many studies speak about participation in general, rather than focusing on how participation might be achieved or strengthened among residents of informal settlements. While Osei and Mensah (2023) highlighted the importance of community involvement and knowledge in complying with waste

management regulations, they did not discuss how institutionalisation of such participation can be achieved. Moreover, formal actors, informal waste collectors, community groups and households have not been sufficiently examined.

However, Bolaane and Ali (2020) pointed out that disorganisation in stakeholders results in a weak and fragmented waste management system. Socio-economic issues like poverty, unemployment, service costs and cultural beliefs can also play a significant role in the waste practices of the household in the case of Ngaba, but few studies have explored this dimension. The literature also shows a great methodological gap. Most of the studies are single method, either qualitative or quantitative that restricts the depth and comprehensiveness of findings. For instance, Mbemba (2020) used primarily a qualitative method, while a few studies relied entirely on quantitative surveys but not on enough qualitative data to bring the lived experiences of the residents to light. Moreover, many of the reviewed studies rely almost exclusively on descriptive statistics and limited application of inferential statistical techniques that can show the relationships of independent variables and waste management results. There is also limited ability to understand changes over time in participation, policy implementation, and behavioral trends due to the predominance of cross-sectional designs.

There is a lack of longitudinal study in the analysis to reduce the capacity to understand the long-term changes in waste management practices, as stated by Kpikpidi (2020). Furthermore, there is poor linkage between the macro level policy analysis and micro level household behavior, which means there are issues with policy intentions and community practices. Another restriction is on population gap. Previous studies have tended to concentrate on municipal officials, environmental agencies or general population of the city, but less on informal settlements, women as the major actors in household waste handling, youth groups, community-based organizations, and informal waste collectors. Their views and experiences are critical to the understanding of the operation of waste management systems at the household level, and for designing socially acceptable and sustainable interventions. The review

additionally identifies a knowledge gap. Lack of awareness of the impact of EE, local knowledge systems and community awareness on socio-economic conditions on waste management.

The few studies that exist do not necessarily consider the impact of increased awareness alone, or the need for supportive institutional and economic conditions. Thus, the understanding of the links between education and participation, and waste management results, is still limited. Lastly, there is an empirical gap that needs to be addressed. There is scarce empirical data available regarding the synergistic effects of socio-economic barriers, environmental education, community partnerships, and local participation on household waste management in Ngaba Municipality. There is a lack of studies to simultaneously consider these variables in the same analytical approach, which makes it difficult to establish their relative contribution and interaction. This present study fills these identified gaps in the following ways: Holistic, context-sensitive and methodologically rigorous approach. It mines the geographical void by giving special focus to the informal urban settlement of Ngaba Municipality, which is less studied than others in Kinshasa. It fills the gap of context by looking at the actualities of weak governance, insufficient infrastructure and socio-economic constraints, and cooperation between households, community groups, informal players and formal institutions.

The study is in response to the gap in methodology because it uses mixed methods (quantitative and qualitative data) and also uses inferential statistical analysis to find relationships between the main variables. It contributes to the population coverage in the sense that the households and other community-level actors not typically included in the previous studies are involved. It seeks to fill this gap in knowledge by exploring the relationship between EE and community awareness and waste management practices. Finally, it bridges the gap of evidence regarding the combined effect of socio-economic factors, environmental education, community partnerships and participation strategies on household waste management in Ngaba Municipality. The study brings together several aspects in a comprehensive approach to provide both theoretical and practical knowledge to enhance the management of solid wastes in informal urban settlements.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter discussed the research methodology which was used to carry out the study. Research design, study area, targeted population, sampling methods, data collection instruments, pilot tasting, quality control, data collection method, data analysis and ethical considerations are also considered by the study.

3.2. Research Design

The research design constitutes the general framework that dictates the process of planning, conducting, and interpreting the study, thus ensuring that the processes used in collecting the data conform to the research objectives (Lokenga, 2024; Creswell, 2023). In this particular case, the research design was a mixed method design employing a convergent parallel design. In a convergent parallel design, the quantitative and qualitative data are collected at the same time in the research process, analyzed separately, and later combined during the process of interpretation of the results. The quantitative data was collected using survey and questionnaires, whereas the qualitative data was collected using interviews and observation. The use of a mixed method design was important for helping the study develop an in-depth understanding of the phenomenon under study because it involved the combination of numeric data with contextually rich information. It was also instrumental for overcoming the weaknesses associated with the use of either quantitative or qualitative designs.

3.3. Site description, study population and targeted population

3.3.1. Site Description.

The Democratic Republic of Congo (DRC) is one of the largest countries in Africa continent with a space of 2,345,409 square kilometers. The DRC has an estimated population at over 89 million people and ranks among the nations in Africa with a higher density of population (Ishtiaq, 2021). Located in central Africa, the DRC shares borders with nine countries: Angola, Burundi, the Republic of Congo,

Zambia, Rwanda, Uganda, Tanzania, South Sudan and the Central Africa Republic. The DRC's climate is characterized by abundant rainfall throughout the year, particularly in the Congo Basin and varies from humid tropical to equatorial climate abundant rainfall throughout the year, particularly in the Congo Basin (FAO, 2022). Its tropical forests are home to some of the world's most diverse vegetation (WWF, 2021).

The DRC naturally possesses many resources, including valuable minerals such as gold, diamonds, mercury and copper (Krebs, 2022). Yet, the country continues to face major socio-economic challenges. These include widespread poverty, inadequate infrastructure, conflicts and instability. Ishtiaq, 2021) noted that the agriculture, mining and fishing sectors make up the majority of the country's economy, but political instability and issues with bad governance system frequently affect these sectors. The rapid urbanization of the DRC and the absence of adequate infrastructure make waste management a significant challenge (UN Habitat, 2022). Waste management in the DRC, are generally underdeveloped, with inefficient waste collection and limited treatment site. In many areas, such as Ngaba Municipality, waste is frequently burned or disposed of in open sites, leading to pollution and raising up health problem. Considerable efforts are still needed to improve waste handling and therefore establish sustainable and effective waste management.

Kinshasa, the capital of the Democratic Republic of Congo, is one of the largest cities in Africa, with a population of over 12 million people (Ishtiaq, 2021). It covers 9,965 square kilometers and lies on the southern side of the Congo River. The city is administratively divided into four districts: Funa, Lukunga, Mont-Amba and Tshangu. Kinshasa has a tropical climate, with heavy rain heavy rain season that extends from September to May and dry season from June to August (FAO, 2022). The city serves as an economic and cultural hub, hosting public institution and numerous diplomatic missions. The population is predominantly young, with the majority of residents under the age of 25, underscoring urgent demands for education, adequate housing and job opportunities. The economy sector in Kinshasa is diversified and involve various aspect and actors as it also faces many challenges related

to the planification of urban spaces. Among those challenges, waste management is pressing one as waste is left in the street and dumped at illegal sites, posing risks to human health and the natural environment spaces.

Indeed, the study was conducted in Ngaba Municipality because this area faces many challenges in the management of waste and represents a mix of middle-class residential, as well as unplanned neighborhoods. Ngaba municipality is one of the smallest municipalities in Kinshasa, with a space of 42 square Kilometers and one of the poorest regions, with limited access roads and unplanned urban space, unclear source of income and limited access to the basic social services (Marshall, 2021). Ngaba as a municipality is a populated urban zone, with 300.000 habitants in 6 square kilometers and is divided into 6 administrative subdivisions: Mukula, Luyi, Mpila, Baobab, Bulambemba and Mateba (Ishtiaq, 2021). The study therefore collected data from these administrative areas.

Ngaba faces serious issues in managing household waste due to lack of reliable waste management service and inadequate treatment facilities in the municipality (UN-Habitat, 2022). This situation leads people in the municipality of Ngaba to burn waste or dump it into rivers and drains, which damage the environment and enhance the risk of illness through air and soil pollution.

The absence of incentives, inadequate environmental education and mistrust of public authorities do not motivate people to participate in waste management efforts, therefore weaken community participation. Current waste management strategies often fail to engage residents meaningfully, resulting in the continued buildup of waste in streets and residential spaces. Addressing this challenge will require a more inclusive approach that brings together households, public authorities, NGOs and private organizations to implement lasting and effective waste management systems.

3.3.2. Study Population

The population is the group of people sharing certain features related to the phenomenon being studied from whom the researcher is able to make generalizations that can be extrapolated to the entire

population. This is in line with the views of Poynton, DeFouw & Morizio (2021), Yamane, (2021), and Castel & Bridier (2021, as cited in Jean Lokenga, 2024). In the present study, the target population was comprised of the residents of Kinshasa City, with emphasis on Ngaba Municipality. Ngaba Municipality was chosen because of the unique household waste management problems resulting from the rapid growth of the municipality, poor waste management structures, and settlements leading to a growing number of residents.

This included all 5,985 household heads in Ngaba and 8 community representatives targeted by the (Health Zone Office, 2023). Selected household heads were targeted because they are the central figures that make key decisions related to waste disposal, waste collection practices, and hygiene standards for their homes. This makes them important informants for waste management practices at the household level. Community representatives are targeted in this study because they act as an intermediary between residents and local government through community initiative coordination and mobilizing community participation in waste management. Targeting these two groups ensures that the study captures both individual household practices and broader community engagement strategies to convey a full comprehension of household waste management dynamics within Ngaba (Yin, 2024).

3.4. Sampling Techniques and Sample size

Sampling gives an organized means of picking out a limited number of subjects from the entire population, and at the same time making sure that the study is able to cover a larger area of the population. In this study, the sampling method that was used to identify the subjects is stratified sampling, where the sample subjects were picked from the various strata in Ngaba Commune. This method was deemed fit since it made sure the various segments of the population were well represented in the sample.

To assess the sample size, the study used Yamane (2021) formula which is appropriate for studies where the population size is known and a specific margin of error is desired. Yamane's formula is as follows:

$$\boldsymbol{n = \frac{N}{1 + Ne^2}}$$

Where:

- **n** is the sample size,
- **N** is the size of the population,
- **e** is the level of precision (error).

By applying this formula to the total size of 5985 households in the municipality of Ngaba **(**Health Zone Office, 2023**)** and want a level of precision of 5% (0.05), we will have:

$$n = \frac{5985}{1 + 5985x(0.05)^2}$$

$$n = \frac{5985}{1 + 5985x0.0025}$$

$$n = \frac{5985}{1 + 14.5}$$

$$n = \frac{5985}{15.5}$$

$$n = 386$$

Thus, the sample size of 386 heads of households was appropriated for this study with a margin of error of 5%. Beyond this, the study anticipated taking into account 8 community representatives as the key informants for in-depth interviews. Therefore, the total sample size of this investigation was 394. This sample size ensures adequate representativeness of the different subgroups of households in the commune of Ngaba.

Participating household heads was selected using the stratified sampling method, ensuring that key demographic characteristics such as family composition and socio-economic level are taken into

account to ensure representative while the key informant (community representatives) was purposively considered for the study.

3.5. Methods and Instruments of Data Collection

A mixed-methods research design was used in the study so that a thorough investigation of the issue of participation of the community in household waste management could be made. Primary data was collected using three different techniques, namely, structured questionnaire for gathering quantitative data, semi-structured interview for getting qualitative perspective, and observation technique for obtaining relevant practice and information from the field. The application of these techniques helped the researcher to get both quantitative and qualitative responses on the issue of community participation in household waste management. This triangulation of data enhanced the validity and reliability of the research findings and was instrumental to examine how communities try to participate in waste management, what socioeconomic constraint they do face, how education can shape environment habits and how partnership can contribute to the improvement of waste management system in the municipality. Meydan et al. (2024) argued that triangulation is a combination of methods in order to collect to collect in-depth data and reduce bias. Therefore, it enables a comprehensive understanding of complex social dynamics in research.

3.5.1. Questionnaires for Household Heads

The study used structured questionnaires to collect quantitative data regarding household data from the household heads on waste management practices in the municipality of Ngaba. It is based on the assumptions that household routines and decisions are important for understanding waste management in Ngaba. Therefore, the study included both closed-ended and open-ended questions to ensure the collection detailed and in-depth data. Karunarathma & al. (2024), noted that closed ended and open-ended question allow scholars to collect data reflecting measurable patterns and individual insights. The study ensured demographic diversity by using a random stratified sampling technique.

3.5.1. Interviews for Community Representatives

Adeoye-Olatunde et al., (2021) argued that semi structured interviews enable researcher to maintain thematic focus and allow the study to contextualize data collected. Therefore, the study used purposive sampling to select participants who possess specific knowledge and experience related to community participation in household waste management. According to Akhter (2022), key informants are individuals who have in-depth knowledge and significant experience in a specific area of research interest. For instance, the study included community leaders, sanitation authorities, waste management practitioners as their expertise and knowledge enabled the research to understand formal and informal dimension of household waste management within the municipality. A pre-designed interview guide was used to maintain focus during interview.

3.5.3. Observation

This research made use of systematic non-participant observation to investigate domestic waste management practices in public/communities where waste is majorly produced and disposed of. This research was mainly observed the last aspect as mentioned above since it is the one closely related to the research objective as well as research questionnaires requiring similar data as stipulated under this aspect. The data for this research was collected using pre-designed structured observation checklists, thus allowing for systematic data recording with the objective of ensuring that data is objective as well as consistent in its recording. This helped the researcher collect data that is likely not emphasized during other data collection methods like questionnaires and interview procedures, thus making this study credible through its comprehensive investigations.

3.6. Pilot Test

The study conducted a pilot test to examine the effectiveness and relevance of tools selected for data collection. Lokenga (2024) highlights that pilot testing is meant to assess whether the data collection instruments, questions and methodology are adapted to the research participants. The study was conduct a pilot test to a sample of 36 household heads in the municipality of Ngaba, which is a

representative of 10% of the sample size. This population, therefore was excluded in the actual study. This part of the municipality has been selected because it shares similar characteristics in household waste management with others parts in Ngaba municipality. Poynton, DeFouw & Morizio (2021) highlighted that a pilot test done in an area sharing similar context with the study area is necessary to ensure the reliability and validity of the tools.

3.7. Data Quality Control: Reliability and Validity

3.7.1. Reliability

A. Reliability of Quantitative Tools

The study used Cronbach's alpha to examine the consistency of items with questionnaires. Kennedy (2022) pointed out that Cronbach's Alpha allows researchers to assess the extent to which multiple items measuring the same concept can produce similar results. Cronbach's alpha was calculated for the relevant section of questionnaires. In accordance with standards norms, a Cronbach's alpha of 0.70 or higher is considered acceptable. However, higher values was preferred as they indicate stronger internal consistency and greater precision in measurement (Field, 2018). Izah & al. (2023) argued that reliability enhances the trustworthiness of data collected and build confidence in the findings of the study. It strengthens the credibility of empirical evidence and ensures that findings are consistent, stable and are not due to errors or randoms variations that may occur in the field.

B. Reliability of Qualitative Tools

The reliability of the qualitative tools in this study was ensured by establishing both trustworthiness and credibility. Trustworthiness was achieved through a consistent and transparent data collection process, while credibility was reinforced by prolonged engagement with participants, thorough documentation of their perspectives and triangulation of data from interviews and observations. These deliberate measures aimed to ensure that the tools yield accurate and meaningful insights into community participation in household waste management.

Table 3.3: Reliability Test

Variables	Cronbach Alpha	No of items
Socioeconomic barriers	.830	5
Environmental education	.793	5
Community partnership	.892	5
Community strategies	.756	5

The reliability analysis in Table 3.3 indicates that all independent variables, such as socioeconomic barriers (.830), environmental education (.793), community partnership (.892), and community strategies (.756), are highly consistent. This implies that the items used in measuring these independent variables are consistent and have captured the dimensions of these independent variables, which are influencing household waste management. High Cronbach Alpha for community partnership indicates that is consistent in influencing household waste management. In addition, the consistency of socioeconomic barriers and environmental education indicates that these independent variables are consistent in influencing household waste management. On the other hand, an acceptable level of reliability for community strategies indicates that community strategies is consistent in influencing household waste management. Therefore, the reliability analysis indicates that independent variables are well measured, which is credible in analyzing how these multi-dimensional independent variables are influencing household waste management.

3.7.2. Validity

Creswell (2023) describes validity as the strategies used to ensure that tools accurately measure what they are supposed to measure. This includes external and internal validity. The study implemented multiple approaches. Firstly, to minimize potential errors and biases during data collection, Research Assistants will undergo thorough training to ensure a clear understanding of the study's objectives and methodologies involved. So, the recruitment process prioritized candidates who possess at least a basic proficiency in English as well as local language to enable effective communication with participants.

Secondly, the study applied data triangulation to compare quantitative data from surveys with qualitative data from interviews with key informants (Flick, 2022). Lastly, integrating data from different sources like questionnaires, group discussions and interviews with key informants improved representations of the results of the study.

3.8. Data Analysis and Presentation

The quantitative data collected using the questionnaires was processed through proper data analysis procedures prior to analyzing it. The data was first checked for completeness and consistency before being entered into SPSS version 27 for statistical analysis. Frequency distribution, percentages, mean, and standard deviation were calculated in order to describe the characteristics of the respondents and the trends of household waste management practices in the research area. To verify the hypotheses formulated for testing in the research along with analyzing the association between different variables for establishing the research hypotheses, regression analysis was employed to identify the nature and extent of association between the independent variables (environmental education, awareness activities, availability of resource information) and the dependent variable (waste management practice in the community).

In the qualitative phase of this study, the data collected was analyzed using a Semantic Thematic Analysis by following a six-step process as suggested by John W. Creswell, (2023) and Bryman, (2021). The steps were as follows: in the first case, all the interview data collected was transcribed to ensure accuracy and completeness of the data. Further, the researcher read all the interview transcripts to familiarize with the data to have a holistic understanding of the interviewees' responses, then initial coding of the data was done by identifying units of information that were significant to the study objectives. In addition, the coded units of data were categorized, which were later grouped into broader themes based on the patterns of the data and the theme of the study was reviewed to clearly define it to ensure that it was consistent with the research questions. The theme of this study was then presented

using a Narrative Thematic Presentation by describing the study's findings in a continuous narrative form, supported by quotations from the interviewees to illustrate the study's content.

Direct quotes were also used in establishing the main themes identified in this study. This enabled a full understanding that encompasses both the findings generated in this study, as well as an understanding that incorporates both the numerical and community views, by employing a mixed paradigm approach, as advocated by the work proposed by Creswell (2023), as well as that by Field, (2024), as validating the reliability of findings in research.

3.9. Ethical considerations

Ethical considerations play a central and morale role in the conduct of this study. Raina (2024) pointed out that, strict adherences to ethical standards is essential for safeguarding the rights of research participants, as well as ensuring the overall integrity of the study. The guiding ethical principles of "Do Not Harm Respondents" was diligently upheld. Moreover, the researcher also adhered to the principles of anonymity and confidentiality to ensure that all records are well protected and not accessible to any other person. Before data collection, the researcher obtained permission from the Catholic University of Eastern Africa as well as the mayor of the municipality where data were collected.

CHAPTER FOUR

DATA PRESENTATION, DISCUSSION AND INTERPRETATION OF FINDINGS

4.1 Introduction

The chapter present the analysis and discuss the findings of the study on community participation and management of household waste in the Municipality of Ngaba, Kinshasa, and Democratic Republic of Congo. The chapter covers the response rate, and analysis of the respondents' demographic characteristics. The chapter then presents both quantitative and qualitative findings. Quantitative findings are analyzed using both descriptive and inferential statistics, while qualitative findings are analyzed using thematic analysis. The findings are then interpreted and discussed in accordance with the study's objectives.

4.2 Response Rate

The survey involved 386 heads of households as respondents, with only 350 having responded to the questionnaire leading to 90.7% response rate. Furthermore, 8 community leaders were purposely included in the interview process and all of them took part in the study giving a 100% response rate for the qualitative part of the research. The response rates and the associated results are shown in Table 4.1. As suggested by Poynton DeFouw & Morizio (2021), any response rate above 70% is good enough to give reasonable representation of the sampled population. From this perspective, the response rates obtained in the current study can be viewed as highly satisfactory.

Table 4.1: Response Rate

Participants	Distributed Questionnaires	Returned questionnaires	Response rate (%)
Heads households	386	350	90.7
Local authorities	8	8	100

4.3 Demographic Information

The section discusses the demographic characteristics of the respondents, such as gender, age, level of education, occupation, and household size. These variables are essential in ensuring that a clear

understanding is achieved regarding the background of the study population, as well as how they may affect community participation in managing waste. See results in Table 4.2.

Table 4.2, Demographic Profile of Participants

Variables	N	(%)
	Gender	
Male	195	55.7
Female	155	44.3
	Age Category	
18–25 years	86	24.6
26–35 years	130	37.1
36–45 years	71	20.3
Over 45 years	63	18.0
	Education	
Primary	63	18.0
High school	159	45.4
Tertiary education	109	31.1
No formal education	19	5.4
	Occupation	
Employee	109	31.1
Unemployed	70	20.0
Business owner	78	22.3
Informal sector worker	88	25.1
Other	5	1.4
	Household Size	
1–3 people	95	27.1
4–6 people	156	44.6
More than 6 people	99	28.3

From the results presented in Table 4.2, it is clear that the majority of the respondents were males, accounting for 55.7%, while females were 44.3%. This suggests that both genders were adequately represented in the study, thus implying that the results obtained are fair and representative of both genders regarding their views on community participation and household waste management. As noted by Mujinga et al. (2023), consumer behaviors in waste management are influenced by various elements such as gender (where women show positive and conscious environmental commitment), education and the availability of information. This shows a sense of difference in findings.

In terms of the age distribution of the respondents, it was clear that the majority were in the 26-35 years, accounting for 37.1%, while those in the 18-25 years were 24.6%, those in the 36-45 years were 20.3%, and those aged above 45 years were 18.0%. This suggests that the study mainly focused on the views of the youthful and economically active population. It was also clear that those in the category of 26-35 years were the majority, implying that people in their productive years are the ones actively engaging in activities related to household waste management and community participation. The result in this case is somewhat contradicting the study by Masamuna et al. (2023) who found that a behavioral study on waste management reveals significant differences in disposal practices. Younger individuals (aged 21–30) are more likely to dispose of waste in open drains, while older groups (aged 31–50 and above 51) tend to bury or incinerate waste.

Regarding the level of education, it is clear that most respondents had acquired high school education (45.4%), followed by tertiary education (31.1%), primary education (18.0%), and a small percentage with no formal education (5.4%). The majority of the respondents were reasonably educated, which could contribute to their awareness and adoption of appropriate waste management practices. The small percentage of respondents with no formal education implies that illiteracy is not a significant problem in this area.

Regarding occupation, it is clear that most respondents were employees (31.1%), followed by informal sector workers (25.1%), business owners (22.3%), and the unemployed (20.0%), with a small percentage being categorized as "others" (1.4%). The findings on occupation indicate that there is a diversified economic background among the respondents, with a significant percentage being engaged in income-generating activities. The findings on occupation imply that occupation could influence households' ability to participate in appropriate waste management practices.

In terms of occupation, the largest proportion of the respondents was composed of employees at 31.1%, followed by the informal sector at 25.1%, business owners at 22.3%, and the unemployed at 20.0%,

with the remaining portion categorized as others at 1.4%. This demonstrates the economic background of the respondents as varied with a significant proportion participating in income-generating activities.

Finally, the findings regarding the size of the households revealed that the majority of the households had between 4 and 6 members at 44.6%, followed by those with more than 6 members at 28.3%, and then those with between 1 and 3 members at 27.1%. This demonstrates that medium-sized households are the majority in the study area. A larger household size could generate more waste and therefore necessitate the need to adopt effective waste management practices and encourage the community to participate accordingly.

4.4 Socio-Economic Barriers Towards Community Participation in Waste Management

This section addresses socio-economic factors affecting participation of the local populace in domestic waste management activities within Ngaba Municipality, DRC. Specifically, socio-economic factors which may limit or hinder the effective participation of the local populace in proper waste management practices are considered. The results concerning these hindrances have been discussed in Tables 4.3 and 4.4.

Table 4.3: Barriers to Waste Management Participation

	N	Mean	Std. Deviation
Lack of infrastructure	350	1.9714	.75267
Lack of government support	350	2.0171	.80453
Limited awareness campaigns	350	2.0029	.68758
Lack of incentives for participation	350	1.9486	.66228
Time constraints	350	1.8829	.71856
Cultural attitudes	350	1.6943	.70668
Gender disparities	350	1.5771	.72495
Valid N (listwise)	350		

As evidenced in Table 4.3, there are various socio-economic and cultural determinants that impact on the level of household waste management participation among residents in Ngaba Municipality. From all the determinants evaluated, limited government support emerged as the factor with the highest mean score (M= 2.02, SD = .805). It means that the residents viewed limited government assistance

as the most dominant barrier to community participation. The second barrier in this regard is the inadequacy of awareness campaigns (M = 2.00, SD = .688) and inadequate waste management infrastructure (M = 1.97, SD = .753). The high mean scores of these two barriers indicate that the respondents perceived low public awareness and inadequate infrastructure as significant barriers to their participation in waste management activities. Other identified barriers include lack of incentives (M = 1.95, SD = .662), limited time for participation (M = 1.88, SD = .719), cultural factors (M = 1.69, SD = .707), and gender factors (M = 1.58, SD = .725). As seen from these results, lack of incentives and limited time are other factors that contribute to the lack of participation in waste management activities.

This is in accordance with the earlier studies conducted by the United Nations through the United Nations Environment Program, which has noted the lack of public awareness and community participation in waste management as being linked with a lack of infrastructure, inadequate funding, and the lack of continued policy implementation for raising awareness (UNEP, 2022). This means that the results indicate the necessity to take into account structural conditions other than just the behavior of the households when considering how waste management programs can be implemented. In particular, improved government backing, environmental awareness, and infrastructure for waste management can provide better conditions for participating in household waste management. This conclusion is backed up by Mensah et al. (2022), who have shown that waste management problems can be attributed to both lack of infrastructure and insufficient public engagement and awareness.

Respondents were also asked to give suggestions on the kind of interventions that can be used to overcome the barriers preventing them from participating in the management of waste. From their response, a number of suggested interventions that could facilitate the process of engaging the community were evident. One of the most common suggestions made was the construction and improvement of waste dumping sites in the municipality. Some of the respondents highlighted the need to have proper bins available in various places to ease the process of dumping of domestic waste.

In response to the solutions to overcome barriers that prevent residents from participating in waste management initiatives, varied arguments were analyzed as show.

The respondents proposed various strategies that could assist in addressing the obstacles that hinder the participation of the residents in waste management activities. Most respondents pointed out the need for the development of waste disposal facilities in the region. Several respondents pointed out the need for the provision of trash bins in the region. For example, a respondent pointed out that "t*he government needs to install public trash cans and ensure regular garbage collection."* Another respondent pointed out that "*we need plenty of rubbish bags and organized waste collection services in every neighborhood."* This indicates that inadequate facilities are a major obstacle in waste management activities in the region.

In addition,

The respondents pointed out the need for the intervention of the government in waste management activities in the region. Most respondents pointed out that effective waste management in the region requires effective government institutions. For instance, a respondent pointed out that "*the state must establish a waste management service and provide the necessary resources for sanitation." Another respondent pointed out that "the government must finance sanitation programs and provide equipment such as trucks, tools, and centers*." This indicates that effective waste management in the region requires effective government institutions. Similarly, another participant noted that "*the government must finance sanitation programs and provide equipment such as trucks, tools, and collection centers."* These are some of the views that indicate the residents' expectations that the leadership of the government is important in improving the efficiency of the current waste management systems.

Another solution that was presented by the key informants was the need for public awareness and education about the environment. The participants noted the importance of sensitizing the

residents about the need to maintain cleanliness in the environment. One of the key informants noted that "*we need to raise awareness among the population from a very young age."* Another participant noted that "*schools should introduce environmental clubs and teach children about recycling and waste management.*" These are some of the views that indicate the residents believe that education is important in creating behavioral change.

Furthermore,

> Community participation and social mobilization were also commonly cited as effective approaches. The respondents recommended the utilization of youth groups, churches, and individuals in the implementation of activities related to sanitation. Some respondents recommended the organization of regular community clean-up activities. For instance, one respondent recommended that "*the community should organize clean-up days where residents work together to clean their neighborhoods."* Another respondent recommended that "*youth associations and volunteers should be mobilized to support sanitation initiatives.*"

Lastly, it was revealed,

> The respondents recommended economic incentives and recycling as approaches for encouraging people to take part in waste management activities. Some respondents recommended the application of reward systems as incentives for encouraging people in the proper disposal of waste. One respondent recommended that "*recyclable waste could be exchanged for vouchers or goods to motivate the population."* Some respondents emphasized the need for recycling and transformation of waste into useful materials. In addition, one respondent recommended that "*waste can be transformed into energy or reused through recycling programs.*"

Analysis on the observation of Social Inequalities and Exposure to Environmental Risk revealed that,

> Low-income households and street vendors are concentrated around areas with unmanaged waste. In most cases, the presence of children playing around the waste piles along the road indicates that they are exposed to environmental risks. The spatial inequality indicates that the socio-economic factors expose the population to pollution and improper waste disposal sites. The concentration of poverty and improper sanitation indicates that the government has neglected the area.

Regarding the inadequate Infrastructure for Proper Waste Disposal,

> The observation indicates that the area lacks adequate infrastructure for proper waste disposal. The few waste bins were identified around the municipal office. However, the majority of the population dispose of the waste in open spaces and the drainage channels. The street is mostly narrow and inaccessible. The area is mostly unpaved, and the garbage trucks cannot access the area. This indicates that the structural barrier contributes to improper waste management. The lack of proper infrastructure contributes to improper waste management practices.

Further observation on Cultural and Social Barriers Reinforcing Improper Waste Management Practices indicated,

> Burning the waste near their homes and dumping the waste in the drainage channels during the rainy season were some of the common practices noticed among the people. This shows the cultural aspect of the people. This is where the people think that the waste management is the sole responsibility of the local authorities, which shows the low level of personal responsibility among the people.

The observation indicates that the culture of burning the waste around the residential area

Table 4.4 Perception of Waste Management Costs

Description	N	(%)
Cost of waste management		
Very cheap	50	14.3
Cheap	137	39.1
Neutral	110	31.4
Expensive	35	10.0
Very cheap	50	14.3
Fairness of current cost vs service quality		
Strongly disagree	62	17.7
Disagree	128	36.6
Neutral	96	27.4
Agree	56	16.0
Strongly agree	8	2.3
Financial difficulties in accessing services		
Yes	125	35.7
No	221	63.1
Satisfaction with affordability		
Very satisfied	53	15.1
Satisfied	146	41.7
Neutral	97	27.7
Dissatisfied	38	10.9
Very dissatisfied	16	4.6

The findings in Table 4.4 indicate that there are varied perceptions on the cost of waste management by respondents in the Municipality of Ngaba. In the cost of waste management, the majority of respondents perceive that the cost is affordable since 39.1% found it to be cheap, while 14.3% found it to be very cheap, representing 53.4%. About 31.4% were found to be neutral, while 10.0% found it to be expensive, with 5.1% finding it very expensive.

Fairness of Current Cost and Service Quality: On whether the current cost is justifiable by the quality of service rendered, 36.6% disagreed, while 17.7% strongly disagreed. This implies that more than half of the respondents (54.3%) perceive that there is a problem with service quality. On the other hand, 16.0% agreed, while 2.3% strongly agreed that indeed the service quality is justifiable by the cost.

Financial Difficulties in Accessing Services: A larger percentage of the respondents (35.7%) experienced financial difficulties in accessing the services, while 63.1% did not experience such challenges. This shows that even though the majority of the population may be able to afford the services, some may still be experiencing financial difficulties, which may affect the extent of their participation in the proper management of wastes.

Satisfaction with Affordability: As for the level of satisfaction, 41.7% of the respondents were satisfied, while 15.1% were very satisfied with the affordability of the services provided in the collection of wastes, meaning that 56.8% of the respondents were satisfied in some way with the services provided in the management of wastes in Ngaba town. About 27.7% were neutral, while 10.9% were dissatisfied, and 4.6% were very dissatisfied.

From the findings, it is clear that even though the majority of the people in Ngaba town feel that the costs incurred in the management of wastes are affordable, there are concerns over the value of the services received in comparison to the costs incurred, as well as some people experiencing financial difficulties in the management of wastes in the area. In Essence, Brien (2023), carried out a rigorous comparative study investigating the effect of socio-economic differences on participation in waste management through environmental education programs. Using HLM, researchers managed to separate out the effects of individual characteristics such as education and income, as well as contextual characteristics such as national policies and infrastructure. Results indicated that socio-economic differences such as income and education level had a significant impact on participation in waste management practices. However, while the study suggests that there is a need for contextually oriented environmental education programs which take into account social-economic differences, it leaves a lacuna in terms of analysis since it does not take into account localized cultural, behavioral, and attitudinal dimensions that assess waste behavior among households. Moreover, it uses secondary data that makes it difficult to understand localized contexts. The present study attempts to address the aforementioned issues by employing primary data.

Analysis of the qualitative information looked into the current state of waste management in DRC and various arguments were presented as show.

> The waste management system has been described as dysfunctional in its operations. This is supported by the assertion of CR1 that "*waste management is generally ineffective with frequent accumulation of garbage.*" This assertion is supported by CR2, who explained that even though there is a system in place, "*it is poorly organized and irregular… efforts remain limited compared to the magnitude of the problem*."

Furthermore,

> Some respondents pointed out that the major problem with the system is that there is a lack of adequate infrastructure in the system. CR3 asserted that "*the situation is worrying because of the lack of adequate infrastructure*." The effects of the seasons were also a major contributor to the problem in the system, as asserted by CR4 that "*the situation is critical… there is significant filth in several neighborhoods, especially during the rainy season.*"

They added,

> The system has also been described as lacking coordination and being informal in its operations. CR5 asserted that "*waste collection is insufficient and poorly coordinated*," while CR6 asserted that the system is "*largely informal and depends on individual initiatives… public services are barely visible*."

The community representatives uniformly portrayed the system for managing waste as inefficient and poorly organized, and as not being capable of effectively managing the quantity of waste. The respondents pointed out structural problems in the system, such as inadequate infrastructure and the ability to manage the waste effectively. The rainy season was also cited as contributing to an increase in the quantity of waste in most neighborhoods. The system for managing waste was portrayed as

inefficient and poorly organized. The findings concur with that of Paul (2023), who pointed out that when people do not trust public institutions, cooperation between communities and authorities is less effective and the willing to build collective initiative becomes hard to implement.

4.5 Relationship Between Environmental Education and Community Participation in Household Waste Management Practices

This section discusses the relationship between environmental education and community participation in the management of household wastes. It discusses the relationship between awareness, knowledge, and understanding of environmental issues and the participation of the community in the management of wastes in the Municipality of Ngaba.

Table 4.5: Participation in Waste Management Education

Description	N	(%)
Participation in awareness/educational programs		
Yes	231	66.0
No	118	33.7
Organizers of programs (if yes)		
The municipality	119	34.0
NGOs and partners	99	28.3
Schools	62	17.7
Community-based initiatives	70	20.0
Effectiveness of programs		
Very effective	109	31.1
Somewhat effective	197	56.3
Not effective	44	12.6
Satisfaction with affordability		
Yes	269	76.9
No	78	22.3

Participation in Awareness/Educational Programs: Table 4.5 shows that the majority of respondents (66.0%) had participated in awareness or educational programs for waste management, while 33.7% had not. This shows that two-thirds of the community have been exposed to environmental education and could be positively affected by this, hence influencing their participation in proper waste management practices.

The comparison in the findings revealed some similarity with Kubanza (2021) who conducted an empirical study aimed at assessing the impact of environmental education at the community level on household waste management practices and results showed a significant and positive correlation between environmental education and waste management practices. Households that participated in environmental education programs showed a greater tendency towards segregating waste products, recycling activities, and waste disposal. Therefore, the study recommends the need to upscale environmental education initiatives within communities and institutional backing.

Organizers of Programs: The programs were mainly organized by the municipality (34.0%), followed by NGOs and partners (28.3%), community (20.0%), and schools (17.7%). This shows that the community and other partners play an important role in influencing community participation through environmental education programs for proper waste management.

Effectiveness of Programs: On the effectiveness of these programs, 56.3% of the respondents felt that these programs were somewhat effective, 31.1% felt that these programs were very effective, and 12.6% felt that these programs were not effective. This shows that although the majority of respondents feel that these programs are somewhat effective, there is still more that needs to be done to improve their effectiveness. The findings are in agreement with Chang et al. (2021) who highlighted the importance of integrating environmental education programs into formal schooling and its impacts on family behavior related to waste management. Structural Equation Modeling results showed that school-based environmental education not only has an effect on students' behaviors, but also contributes to improved waste management practices in households via knowledge transfer. The results have shown statistically significant changes in terms of both waste segregation and recycling activities. The study highlighted the importance of hands-on experience, use of incentives, and whole-school approach to achieving sustainable environmental behavior changes.

Need for More Programs: The majority of the respondents (76.9%) were in agreement that more environmental education programs were needed, while 22.3% did not think more programs were required. This shows that there is a need to continue with more educational programs to further enhance community participation in waste management.

> The findings show that environmental education is a significant factor that influences community participation in waste management. Most members of the community have been reached through existing programs, especially those led by the municipality and NGOs. The community is aware that more frequent and effective programs can be helpful in enhancing awareness, knowledge, and participation in sustainable waste management in the Municipality of Ngaba. In comparison, educating the community about environmental concerns raises not only the level of awareness on proper methods of waste disposal but also an overall sense of responsibility among citizens in such communities. Greater environmental education has been associated with more appropriate waste management behaviors, as households are abler to recognize health and ecological consequences from improper waste practices and advantages to proper disposal and recycling (Amuah et al., 2023). Further, Mbemba (2020) notes that lack of institutional support and mistrust in government obstruct communities' efforts toward the management of waste.

Analysis on the factors affecting waste management addressed some of the reactions from the participants as show.

> Environmental education is an important aspect, and CR1 noted that, in neighborhoods where people are more educated or financially better off, "*they organize themselves better to keep their environment clean*." CR2, however, noted that there was a lack of incentives, and they added, "*there are no financial incentives in the commune… the government should consider it."*

Further,

> One of the problems is a lack of trust in government and other authorities. CR3 noted, "*lack of personal motivation and lack of trust toward the authorities… after several failures due to poor management*." Again, CR4 noted that, "*lack of equipment… discourages the population*," though they had the willingness to participate.

Moreover,

> CR5 noted that there was a lack of a program, and they added, "*the program doesn't even exist… what you see are sporadic initiatives with no future*." CR6, however, noted that there was a partnership with NGOs, and this encouraged youth to participate, "*some young people are affiliated with local NGOs… this encourages them to participate*."

Environmental education and socio-economic status have significant impacts on community involvement in keeping their surroundings clean. Incentives also have a negative effect on community involvement. Lack of trust in authorities and poor management discourage the community's willingness to get involved in waste management programs. Inadequate equipment also hinders community involvement in waste management programs. In general, community involvement in waste management programs remains low due to poor structures and support, but slightly improved with the involvement of NGOs. In support of the findings, Villa et al. (2020), observed that waste management services remain inadequate and inefficacy in many urban areas. Factors such as high density of population, low household incomes worsen waste management services as many residents struggle to access basic services such as waste collection, and recycling.

Similarly, Caniato, Smith & Wilson (2021) affirmed that the lack of proper facilities makes waste collection process ineffective. Furthermore, without a proper and clear communication channel between communities and government, people, in most the case, are not motivated to participate in collective efforts (Nzuma et al., 2021). From the study results, it can be inferred that for effective community involvement in waste management, there is need for sustainable approaches, availability

of proper facilities, and also trust in the authorities. The involvement of NGOs has been found to enhance the level of participation, particularly of youth, despite the lack of proper mechanisms.

According to information on Limited Awareness and Public Sensitization, observation revealed that,

> The community is not highly exposed to environmental awareness. Only one poster was spotted in the area around the market. This implies that the awareness level in this community is low. The low level of awareness and communication in the community makes it impossible for the public to learn and be reminded about the importance of protecting the environment.

More analysis was conducted on Lack of Structured Environmental Training, where the finding showed,

> There were no training sessions in the community. The few meetings that take place are usually held in awareness meetings via the associations. This indicates that the community is not consistently exposed to training. The lack of training in the community makes it impossible for the public to learn new skills in the management of waste. The public is likely to remain with the traditional way of disposing of waste.

In addition, report on Dependency on Informal Information Channels was as presented,

> The public in this community depends on information obtained from churches, the TV, schools, and the community leadership. The public in this community is highly dependent on informal sources of information. The lack of central sources of information in the community makes it impossible for the public to learn.

The concurred with that of Badgett and Milbrandt (2021) carried out an empirical study that examined the effectiveness of media-based environmental education campaigns in influencing waste management behavior among households, whose analytical procedure used a combination of descriptive statistics (mean, frequencies, and standard deviations), together with more sophisticated

methods of inferential statistics, such as the application of independent samples t-test to test the significance of differences in means between the control and intervention groups and multiple regression to assess the degree of influence of media exposure on waste management behavior after controlling for socio-economic variables. The research results indicate the statistically significant improvement ($p<0.05$) in awareness of environmental issues and engagement in waste management activities on the part of households in the intervention group compared to those in the control group. In addition, the results of regression analysis showed that income level and socio-economic status play a moderating role in the effect of media exposure on waste management behavior.

Table 4.6: Environmental Education Methods

	N	Mean	Std. Deviation
Public awareness campaigns	350	3.8400	1.18858
School education programs	350	3.4171	1.19346
Community meetings and workshops	350	3.4571	1.19317
Radio, TV, social media	350	3.5857	1.17633
Partnership initiative	350	3.1457	1.28866
Valid N (listwise)	350		

Table 4.6 highlights the methods adopted in delivering environmental education in the management of household wastes, as well as the respondents' perception of the effectiveness of these methods. From the findings, public awareness campaigns were the most effective in delivering environmental education, with a mean of 3.84 (S.D = 1.19). It is evident that public notices, posters, and announcements play an important role in ensuring that the public remains aware of the importance of proper management of household wastes through the adoption of proper management practices.

To support this, environmental education alone is not enough to bring about behavior change. This is because cultural beliefs and attitudes also play a crucial role in influencing the management of waste. This is because some communities believe that the management of waste is a matter for the concerned government department, hence less motivation towards active engagement (Waku et al., 2024;

Bokeko, 2024). In order to make awareness programs more effective, the message should be made local.

The effectiveness of mass media channels, including the use of radio, TV, and social media, in delivering environmental education in the management of household wastes was also found to be impressive, with a mean of 3.59 (S.D = 1.18). It affirms that the mass media channels play an important role in ensuring that the public remains aware of the importance of proper management of household wastes through the adoption of proper management practices. Community meetings and workshops were moderately effective in delivering environmental education, with a mean of 3.46 (S.D = 1.19). This indicates that while schools play a role in awareness, the impact may not necessarily be as immediate with respect to households as with other campaigns and media outlets. The partnership initiatives had the least mean score of 3.15 (SD = 1.29), implying that programs implemented by partnerships of many organizations may experience some difficulties.

In findings, the study indicates that public campaigns and mass media are the most influential strategies with respect to environmental education in the Municipality of Ngaba. Community workshops, school programs, and partnership initiatives could be improved to increase awareness, knowledge, and participation in the practice of sustainable household waste management practices. Chang et al. (2021) emphasized that effective waste management education should encompass incentive-based programs, experimental learning activities within the community, recycling network and adopt a whole-school approach. Still that their success depends on support from governmental institutions. This gives support to the study's findings.

Table 4.7: Environmental Education Challenges

	N	Mean	Std. Deviation
Lack of trained educators	350	2.3543	1.21366
Inadequate government support	350	2.7571	1.21164

Lack of funding	350	2.6600	1.21658
Absence of school-based environmental programs	350	2.2571	1.35720
Low community interest	350	2.0600	1.18217
Limited access to information	350	2.4571	1.31648
Valid N (listwise)	350		

Table 4.7 shows the challenges faced in implementing environmental education programs for household waste management in the Municipality of Ngaba. From the findings, inadequate government support was identified as the greatest challenge facing environmental education programs for household waste management. This was indicated by a mean of 2.76 (SD = 1.21). This implies that lack of support from the government has hindered environmental education programs for household waste management. Other challenges identified from the study include inadequate funding (M = 2.66, SD = 1.22), inadequate access to information (M = 2.46, SD = 1.32), inadequate trained educators (M = 2.35, SD = 1.21), and inadequate environmental programs in schools (M = 2.26, SD = 1.36). Low community interest was identified as the least challenge facing environmental education programs for household management. This was indicated by a mean of 2.06 (SD = 1.18).

Therefore, it appears from the data that environmental education programs face their greatest challenges from systemic issues such as government support, funding, and program accessibility. These challenges must be overcome for educational programs to be more effective. Some scholars highlighted that local communities face challenges to sort and recycle waste because there are not adequate facilities. Therefore, household feel discouraged to take part in waste management initiatives. Moreover, cultural belief creates challenges in getting communities participate in waste management. And also, awareness campaigns in the city are seen as the government task, rather than a shared civic duty. This idea comes from a long history of distrust between citizens and government, which reduce the improvement of waste management services (Caniato, Smith & Wilson, 2021).

Qualitative analysis on the challenges attached to waste management received varied reactions as was revealed:

> Financial and infrastructural constraints were emphasized. CR1 noted, for instance, that there was a "*lack of financial resources and insufficiency of collection infrastructure*." Social and demographic factors also played a role, with CR2 noting that "*lack of public awareness leads to incivility… rapid population growth contributes to unsanitary conditions*."

In addition,

> Concerns about leadership and governance issues were also raised. CR3 noted, for instance, that there was a "*low level of engagement from local authorities*." CR4 noted further that there was a "lack of coordination among actors." *Policy issues were also noted, with CR5 noting that there was an "absence of a clear waste management policy*."
>
> Operational issues, meanwhile, proved to be a major problem, with CR6 noting that there was a "*lack of equipment (trucks, bins)*." All of these issues, therefore, point to a larger problem of a dysfunctional system that undermines effective waste management.

Therefore, respondents indicated that the primary challenges affecting the management of wastes relate to the existence of financial shortages and inadequate infrastructure. The social and demographic factors that contribute to the problem include the low level of awareness and the rate of population growth. The leadership and governance challenges that the management of wastes faces relate to the lack of local authorities' involvement and the unclear policies that guide the process. The existence of major operational limitations indicates that the system is dysfunctional. These findings are not far from literature statement that in community like Ngaba, poverty and insecurity obstruct residents' ability to embrace environmentally sustainable practices (Caniato, Smith & Wilson, 2021).

4.6 Community Partnership Approaches on Household Waste Management

This section will discuss the approaches used in the management of household waste in the community, particularly in terms of the partnerships that can be made in the Municipality of Ngaba.

Table 4.8: Community Partnership Approaches in Waste Management

Description	N	(%)
Awareness of partnerships		
Yes	194	55.4
No	101	28.9
Type of support provided by partnerships (if yes)		
Not aware	55	15.7
Financial assistance	114	32.6
Training programs and tools	96	27.4
Waste collection services and facilities	88	25.1
Enhance public awareness campaigns	52	14.9
Effectiveness of community partnerships		
Not effective	69	19.7
Moderately effective	211	60.3
Extremely effective	70	20.0

Analysis of Table 4.8 presents information on Community Partnership Approaches in Waste Management. In the awareness of partnerships, results showed that 55.4% of the respondents were aware of partnerships between their community and other actors (NGOs, private sector, and local government), while 28.9% of the respondents were not aware of these partnerships. This implies that more than half of the community is aware of partnerships in addressing waste management. However, this also shows that there is still more work to be done in creating awareness among the community about partnerships. In affirmation, John (2023) has done an empirical study on the role of multi-level partnerships in promoting sustainable household waste management systems at the global level. This research has used mixed methods approach where quantitative data from surveys and qualitative analysis of policies has been used to establish the relationship between collaborative partnerships and the development of waste management systems. The results showed that multi-level partnerships play an important role in enhancing resource mobilization, efficiency of policies implementation, and

community participation, since stakeholder collaboration and institutional integration proved to be powerful determinants of successful waste management ($p < 0.05$) according to the findings from regression analysis.

Type of support provided by partnerships: The results showed that of those who were aware of partnerships, the majority (32.6%) received financial support from partnerships. This was followed by support from partnerships through training programs and tools (27.4%), and support from partnerships through waste collection services and facilities (25.1%). Efforts towards enhancing public awareness campaigns were also supported by partnerships (14.9%), while 15.7% were not aware of the support provided by partnerships. This shows that partnerships mainly support the community through financial support and training programs. The idea was support by Ogutu et al. (2021) who explain that partnerships help improve waste management in Nairobi. The study argued that poor enforcement of rules in one reason why waste problems persistent. To address this, the study suggests that government institutions, private sector and local communities should have coordinated their efforts towards waste management.

On the effectiveness of the partnerships, 60.3% of the respondents saw the partnerships as moderately effective, 20.0% saw the partnerships as extremely effective, while 19.7% saw the partnerships as not effective. From the findings, it is evident that the majority of the people see some value in the partnerships, but there is also a significant percentage that feels the partnerships are not effective, indicating that there may be problems in the implementation of the partnerships.

In mixed highlights, in San Francisco cities, the success story is largely associated with effective institutional support, rigorous regulatory frameworks, and coordination among stakeholders, resulting in the reduction of landfill disposal of waste through the practice of composting and waste recycle (Badgett and Milbrandt, 2021; Brien, 2023).

From the findings, it is evident that the community partnerships are very important in the management of household wastes in the community through financial support, training, and service

delivery. However, the lack of awareness and the effectiveness of the partnerships indicate that the community needs to be reached in order to maximize the benefits of the collaborative efforts in the management of wastes in the Municipality of Ngaba. The literature research reveals that nations like Germany and the Netherlands have enhanced home waste management systems with the concept of collaborative partnerships with governments, enterprises dealing with recycling, and communities, thus increasing efficiency in collection, recycling rates, and community awareness (Dehio, 2023; Jaakkola, 2023).

Regarding the community precipitation as was addressed by the qualitative analysis, some of the responds were highlighted as indicated.

> The respondents portrayed the level of community participation as low. CR1 stated that "*participation is very low… only a minority of the population is engaged." CR2 also stated that it was "occasional, depending on the neighborhood*."

Similarly,

> The limitations also exist at a structural level, which affects community participation. CR3 stated that participation is "*insufficient… initiatives exist but are limited due to lack of financial means and encouragement from the government*." CR5 also added a new dimension to the limitations, where it stated that "*participation depends on the level of awareness or education, and the financial means in some neighborhoods*."

Additional argument revealed,

> The incentives also exist at a certain level to influence participation, especially at the community level. CR6 stated that "*young people participate in the campaigns… in exchange for a promise of some banknotes and a free meal*."

Community participation in the management of wastes is normally low and inconsistent. This participation is usually variable from one community to another. There are structural limitations such as the lack of financial resources and low awareness among the public and the government that hinder participation in the management of wastes. Small incentives such as rewards may

encourage participation, especially among the youth. The results are reflected in the study by Godfrey and Oelofse (2020), who argued that inadequate infrastructures and the absence of coordination between stakeholders hinder the effective implementation of partnership approach. The study affirms that urban waste management in cities, such as Johannesburg in South Africa, dependent on collaboration and coordination between the public and private sectors. These partnerships have led the city to better waste collection and recycling rates, while generating economic opportunities for informal workers.

Report on the observation of the Weak Coordination Between Authorities and the Community informed the study that,

> There are no formal structures of coordination between local authorities and the community. Instead, there are informal meetings conducted by local leaders, such as politicians or church leaders. This is an indication of poor institutional coordination, which would otherwise strengthen community-wide efforts in waste management.

Similarly, observation on the Severe Resource Constraints affirmed,

> The community lacks sufficient resources to support waste management. For instance, there are few waste bins, most of which are in disrepair. Moreover, there are no waste collection vehicles, which is an indication of poor investment in waste management infrastructure. This severely compromises the community's efforts in waste management, irrespective of their willingness to participate.

Furthermore, Low Community Participation in Sensitization Programs indicated that,

> There are occasional sensitization programs conducted by local churches, but they have recorded low participation from the community members. This could be an indication of a lack

of motivation to participate in such programs, which may not be responsive to community needs.

4.7 Community Strategies Aimed at Improving Participation in Household Waste Management

This section examines community strategies designed to enhance participation in household waste management, focusing on approaches that encourage active involvement, collaboration, and sustainable practices within the Municipality of Ngaba, DRC.

Table 4.9: Community Strategies for Improving Household Waste Management

Description	N	(%)
Awareness of community strategies		
Yes	218	62.3
No	132	37.7
Types of strategies known (if yes)		
Waste collection and sorting	111	31.7
Composting	100	28.6
Recycling	66	18.9
Community clean-up activities	73	20.9
Participation in strategies		
Yes	196	56.0
No	154	44.0
Reasons for non-participation (if no)		
Lack of time	85	24.3
Lack of interest	126	36.0
Lack of awareness	65	18.6
No incentive measures	74	21.1

The results presented in Table 4.9 show that the majority of respondents were aware of community strategies for enhancing household waste management, representing 62.3%, while 37.7% were not. This shows that more than half of the community is aware of these strategies, although slightly. However, it also shows that some of these people still lack awareness of community strategies for enhancing waste management. The results also show that the majority of respondents were aware of strategies such as waste collection and sorting (31.7%), followed by composting (28.6%), community clean-up activities (20.9%), and recycling (18.9%).

The results also show that 56.0% of respondents participated in community strategies for enhancing household waste management, while 44.0% did not. The findings further revealed that non-participating individuals were mainly due to lack of interest (36.0%), lack of time (24.3%), lack of incentive measures (21.1%), and lack of awareness (18.6%). Therefore, it affirms lack of personal interest and lack of time and incentives play an essential role in preventing community participation in strategies for enhancing household waste management. The findings also indicated that community strategies for enhancing household waste management do exist and are moderately known by individuals, raising awareness, offering incentives, and making the activity more accessible are key factors to improve engagement and enhance waste management at the household level in the Municipality of Ngaba. In support of the point, Outtara et al., (2022) noted that the challenge associated with solid waste management in Bamako are intensified by rapid urban population growth and consumption habits of local communities. The study advocates that achieving sustainable waste management in Bamako requires a systemic restructuring of pre-collection and collection services, the creation of adequate transit depots and engineered landfills, as well as the development of regulatory framework

On mitigation measures, analysis captured varied reactions as presented.

> Economic support was emphasized. CR1 suggested that the state should "*subsidize waste collection services and create jobs."* CR2 argued for "*financial incentives… and free collection services*" because of poverty levels.
>
> Improvement of infrastructure was also emphasized. CR3 argued for the installation of dumping points, purchasing trucks, and employing sanitation agents, stating that infrastructure is "a *very crucial point*."

Other arguments were that;

> Strengthening community involvement is also important. CR4 suggested "*robust awareness campaigns and policies.*" CR5 argued for "*urbanization policies and public-private partnerships.*" CR6 suggested capacity building, stating that there is a need to "*show the importance of proper waste management.*"

The respondents identified economic support, subsidies, incentives, and free collection services as vital for enhancing waste management. There was also a call to step up infrastructure support, including dumping points, trucks, and sanitation personnel. Furthermore, there was a strong call to step up support for community involvement, awareness, and policy to enhance waste management. The results of the study concurred to that of Kpikpidi (2020), revealing that local community often resist top-down and do not get involved. The absence of participatory significantly undermines the effectiveness of formal waste collection services. In response, communities have developed coping mechanisms such as informal waste disposal practices, neighborhood-based collection initiatives, etc. The study emphasizes that involving community members in policymaking is essential to enhance the legitimacy and effectiveness of waste management interventions.

Observation on the Existence of Sporadic and Reactive Cleaning of the Environment also informed the study that,

> Community clean-up activities in the area are mainly done in the following instances: after heavy rainfall, and during political mobilization. These clean-ups are not done regularly but are mainly in response to environmental challenges in the area. This shows that the people in the area do not own the environmental cleanliness and only respond to other people's initiatives in keeping the environment clean.

Table 4.10: Separate Waste for Recycling or Composting

	N	Mean	Std. Deviation
Waste management strategies improve community cleanliness	350	3.9514	1.13574
These initiatives enhance health conditions	350	3.9600	.99776
Community participation is crucial for waste management success	350	3.9600	1.01485
Waste collection services in my area are adequate	350	3.0914	1.09580
There is enough support from authorities for waste management.	350	2.9943	1.30020
Valid N (listwise)	350		

Table 4.10 shows the perceptions of the respondents regarding the household waste management strategies, especially the separation of wastes that could be recycled or composted. The respondents were in agreement that the strategies improve the cleanliness of the community, with a mean of 3.95 (SD = 1.14), showing that the community is aware that the separation of wastes is crucial in maintaining cleanliness, thus reducing the possibility of having garbage along the streets of the residential area. The strategies were also believed to improve the health conditions of the people, with a mean of 3.96 (SD = 1.00), showing that the community is aware of the benefits of separating the wastes, which is crucial in maintaining good health conditions in the community. The community was also aware of the importance of their participation in the implementation of the strategies, with a mean of 3.96 (SD = 1.01), showing that the community is aware of the importance of their participation in the implementation of the strategies.

On the other hand, the perception of services related to waste collection had a moderate level (M = 3.09, SD = 1.10), implying some level of deficiency in terms of coverage, frequency, and efficiency of such services, which could affect participation in the separation of waste. Lastly, the level of support from authorities had the lowest mean (M = 2.99, SD = 1.30), implying that the level of institutional support to facilitate the process of waste management in the Municipality of Ngaba is inadequate. In

conclusion, although the community in the study area perceives the benefits of recycling and composting in terms of environmental and health impacts, as well as the importance of participation in the process, some level of deficiency in services and institutional support could affect the effectiveness of such strategies in the Municipality of Ngaba. The literature study gives strength to the outcome, where Otundo (2024) explores innovative waste management strategies in Kenya, in Mombasa County, where he found that door-to-door collection is the most effective method uses by populations. The study also proposed initiatives such as recycling programs and waste-to-energy projects are underway, their success depends on the implementation of effective policies and infrastructures that support the whole process.

Analysis was further conducted on solutions proposed to improve community participation in household waste management. The respondents presented their responds as indicated.

> One of the most cited solutions by the respondents was the need to improve public awareness and environmental education. The respondents were of the view that the public needs to understand the importance of cleanliness. One of the respondents noted that "*raising awareness from a very young age and educating the population on waste management is essential." In addition, another respondent noted that "educational campaigns in neighborhoods, markets, schools, and churches can help change mindsets and encourage sustainable practices."* The above quotes indicate that behavioral change and environmental education are key elements of effective waste management.

Further proposals were that;

> The participants also highlighted the importance of the availability of enough facilities such as public bins, garbage bags, recycling facilities, and waste collection services. Some participants also pointed out that the right equipment should be made available to the waste management workers or the communities. One participant pointed out that "*installation of public bins and provision of equipment such as wheelbarrows, gloves, and tools will improve waste*

> *management." Another participant pointed out that "the state must put in place a regular waste collection service and ensure that collection becomes reliable."* This implies that the right infrastructure should be made available to promote community participation in waste management.

It was added,

> Most participants were of the view that effective leadership, policy implementation, and funding support are required for effective waste management programs. Some participants were of the view that the government should formulate effective waste management policies and provide enough funding support for waste management programs. As one respondent put it, *"the government must be able to manage our problems and provide materials to the population.*" Another respondent was of the view that "*the state must establish a waste management service and allocate enough funding for waste management strategies*."

In support of this, Bundhoo (2021) carried out an empirical study concerning household waste management strategies and the role of public-private collaboration in improving waste collection effectiveness and environmental health consequences. Descriptive analysis employed chi-square to assess whether socio-economic factors affected waste disposal behavior. On the other hand, binary logistic regression was employed to establish factors that affect engagement in the formal waste collection system. Access to waste collection services, household income levels, and perception about the services' reliability significantly predicted the practice of proper waste disposal behavior ($p<0.05$). It was found that although the implementation of partnerships between the government and private institutions had increased the coverage of waste collection in urban regions, inefficiencies existed where waste collection was irregular and dumping took place illegally. Additionally, it was evident from the research that the participation of households in structured waste management depended on affordability and trust in service providers; low-income households were more likely to engage in the act of dumping illegally.

Community mobilization and participation were also emphasized as key strategies. Responds were further organized as was stated.

> The formation of local committees and the creation of sanitation brigades were also proposed as key strategies for promoting community participation in activities related to sanitation. In addition, one respondent noted that "*traditional chiefs, community leaders, churches, and youth associations should be involved in mobilizing the population." Another respondent noted that "creating sanitation brigades in each neighborhood can help coordinate community cleaning activities."* This, in essence, indicates that community participation in activities related to waste management can be enhanced through collaborative efforts.

In further reporting,

> Some of the respondents were of the view that incentives should be put in place to encourage the residents of the community to participate in the program of managing the waste. In this regard, some of the respondents were of the view that the residents of the community could be motivated by the introduction of reward schemes, recycling, and economic incentives that could encourage them to dispose of the waste properly. In this regard, one of the respondents was of the view that, for instance, *"a voucher or points system redeemable for goods or services can motivate people to participate."* The respondents were of the view that the residents of the community could be motivated by the introduction of recycling and composting schemes, as noted by the following participant: *"Transforming waste into compost or recyclable materials can reduce the volume of waste and create economic opportunities*."

Similarly,

> The respondents were aware that there is a need to put in place regulations, as well as enforcing penalties on individuals who dispose of waste illegally. *One of the respondents stated that "clear and applicable sanctions should be implemented to discourage bad practices."* On the

other hand, another respondent stated that "*monitoring systems and neighborhood inspections can help ensure that residents follow proper waste management practices."*

In response to the strategies communities employ to improve waste management practices, a few suggestions were highlighted as indicated.

CR1 proposed "*strengthening existing programs*." In addition, CR2 suggested "*practical awareness activities… door-to-door sensitization*." In a similar way, CR3 addressed removing political motives: "*We must move away from disguised political interests."*

CR4 said using ICTs: "*authorities must use local media and new technologies*." While CR5 proposed using social media: "*social media must be used more*." Finally, CR6 was for incorporating environmental education "at all school levels… to build responsible citizens."

Respondents proposed improving community engagement by strengthening programs, awareness campaigns, and reducing political interventions. They also emphasized the use of media, ICTs, and social media to boost community engagement. In the DRC, various strategies have been adopted in neighborhoods. These strategies include composting organic waste, burning waste, and basic waste collection. While these efforts represent the community's basic attempts to handle waste, they lack organization and sustainability (Marondji, 2023). This shows a support to the current study findings.

Observation on the Existence of Informal Recycling Activities reported that,

Although individuals recycle materials such as plastic and metal and sell them, there is no recycling cooperative in the area. This shows that recycling activities in the area are in their infancy and are mainly influenced by poverty levels and not environmental concerns.

Moreover, analysis on Lack of Existence of Composting Cooperatives presented that,

There is no composting cooperative in the area. This is despite the fact that organic waste is a major portion of waste in the area. The lack of composting activities is an opportunity missed in terms of improving the lives of the people in the area.

Result in this case was supported by Ali et al.'s (2022) study exploring household waste management practices and the influence of stakeholder partnerships on minimizing environmental and health risks posed by suboptimal waste disposal systems. The study employed a community-based cross-sectional analytical research design involving respondents from urban and peri-urban areas within Khartoum, Omdurman, and Bahri. Inferential statistical analysis was performed through performing Chi-square test for analysis of association, ANOVA test for determining differences across various groups, and binary logistic regression test for finding factors affecting waste disposal behavior. Binary logistic regression results indicate that frequency of waste collection (OR = 0.720; p-value = 0.001), and accessibility of waste disposal sites (OR = 0.791; p-value = 0.018) were statistically significant in explaining proper waste disposal practices among households. From these results, one can observe that households having regular waste collection services had very little chances of engaging in risky waste disposal practices such as dumping and burning. These results showed that lack of coordination between the local government and the community households, along with poor infrastructure, largely causes improper waste disposal behaviors, which lead to an increased risk of respiratory diseases and environmental pollution.

4.8 Regression Analysis

This section presents the regression analysis that was done to test the hypotheses that the researcher set in the study, focusing on the relationship between the major independent variables and the participation of the household in waste management within the Municipality of Ngaba.

Table 4.11: Model Summary of Households Waste Management

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.326[a]	.106	.096	1.452

a. Predictors: (Constant), Community Strategies, Environmental Education, Socioeconomic, Community Partnership
b. Dependent Variable: Waste Management

The summary given in Table 4.11 suggests that the combined predictor variables, such as socio-economic barriers, environmental education, community partnerships, and community strategies, have a moderate relationship with household waste management participation in Ngaba municipality, as indicated by the R value of 0.326. The R^2 value is 0.106, suggesting that 10.6% of the variance is explained by this relationship. The findings, therefore, suggest that despite the predictive power of this model, other variables not included in this study may also be affecting waste management. The adjusted R^2 value is 0.096, taking into consideration the number of predictor variables used in this study, while the standard error is 1.452, suggesting a reasonable level of accuracy in the predictions made by this model. The findings, therefore, suggest that this model has given a modest but reasonable understanding of the variables affecting community participation in household waste management.

Table 4.12 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8.920	4	2.230	5.12	.001[b]
	Residual	820.454	345	2.378		
	Total	829.374	349			

a. Dependent Variable: Waste Management
b. Predictors: (Constant), Community Strategies, Environmental Education, Socioeconomic, Community Partnership

The results in Table 4.12 indicate that the overall regression model is statistically significant, as revealed by the ANOVA results ($F = 5.12$, $p = 0.001$). This suggests that, as a group, the predictors, which are socio-economic barriers, environmental education, partnerships, and strategies, have a significant effect on household waste management participation in Ngaba municipality. The

significance value ($p = 0.001 < 0.05$) suggests that the regression model has a reliable explanatory value for the variation in waste management practices in the community, and the probability for chance is very low. This supports the notion that the selected predictors are relevant in shaping waste management practices in the community, as revealed by the ANOVA results, which show that at least one of the predictor variables has a significant effect on the variation in waste management practices.

Table 4.13: Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta (t)	Sig.
1	(Constant)	1.925	1.532	.498	.052
	Socioeconomic	-.050	.312	.108	.212
	Environmental Education	.043	.264	.097	.019
	Community Partnership	.083	.056	.085	.041
	Community Strategies	.172	.171	.170	.054

a. Dependent Variable: Waste Management

The regression analysis was used to test the research hypothesis on the factors affecting household participation in waste management in Ngaba municipality. The hypothesis H01, which proposed that socio-economic barriers do not significantly affect participation, can be fully supported as the coefficient for socio-economic barriers was negative and non-significant ($B = -0.050$, $p = 0.212$), implying that socio-economic barriers do not significantly affect participation in household waste management. In difference, Challenges are very often intensified in urban settings where population growth is rapid, urbanization is uncontrolled, and governance systems are weak. The collection and transportation of waste within the Oforikrom Municipality in Ghana are limited by broken-down trucks, increasing transport costs, and inadequate funding, leading to irregular and insufficient service delivery within the area (Amuah et al., 2023).

However, the hypothesis H02, which proposed that environmental education does not significantly affect participation in household waste management, is rejected as environmental education had a positive and significant coefficient ($B = 0.043$, $p = 0.019$), implying that environmental education

plays a significant role in encouraging households to participate in proper waste management practices. Educating the community about environmental concerns raises not only the level of awareness on proper methods of waste disposal but also an overall sense of responsibility among citizens in such communities. Greater environmental education has been associated with more appropriate waste management behaviors, as households are abler to recognize health and ecological consequences from improper waste practices and advantages to proper disposal and recycling (Amuah et al., 2023). This showed similarity in the results.

The hypothesis H03, which proposed that partnerships do not significantly affect participation, is therefore rejected as partnerships had a positive and significant coefficient (B = 0.083, p = 0.041), implying that partnerships play a significant role in encouraging households to participate in proper waste management practices. There is concurrence with the study by Godfrey and Oelofse (2020), who argued that inadequate infrastructures and the absence of coordination between stakeholders hinder the effective implementation of partnership approach. The study affirms that urban waste management in cities, such as Johannesburg in South Africa, dependent on collaboration and coordination between the public and private sectors

H04, with regards to community strategies, fail to reject since strategies had a positive and non-significant influence on household waste management (B = 0.172, p = 0.054). This differs with Niyirera (2023), who affirm that residents engage in a variety of waste practices, including cleaning public spaces, using organic waste to feed animal and contributing financially to waste collection services. The study identifies a positive correlation between community participation and the overall effectiveness of waste management.

It is clear that participation in waste management in Ngaba municipality is significantly affected by environmental education and community partnerships, while socio-economic barriers and community strategies have limited influence. The results of this research suggest that community partnerships and environmental education should be enhanced for better results.

4.9 Discussion of Findings

In socioeconomic barriers to community participation in household waste management the study findings indicated that community participation in household waste management in Ngaba Municipality is greatly impeded by a combination of both structural, economic, and social factors. The study participants indicated that the main challenges facing the community in participating in waste management activities included inadequate support from the government, inadequate infrastructure, inadequate awareness campaigns, and lack of incentives for participating in waste management activities. These concurs with Mensah al., (2022) who found that waste management issues are caused not just by infrastructure gaps but also by insufficient public engagement and awareness.

Regarding factors influencing household participation in waste management in Ngaba municipality, the findings were discussed in relation to the existing literature. In hypothesis one, which stated that socio-economic barriers do not significantly impact household participation in waste management. According to the results, the null hypothesis was supported, since socio-economic barriers exhibited non-significant and negative effect on the household waste management participation ($B = -0.050$, $p = 0.212$). Such findings suggest that socio-economic barriers cannot be considered the main factor determining household participation in waste management in Ngaba Municipality. The conclusion can be drawn from observations showing that in many cases, household socio-economic statuses have less influence on environmental behavior than other factors including institutional and infrastructural barriers. Similarly, according to Amuah et al. (2023), urban municipal waste management problems usually arise due to infrastructural and administrative issues and service delivery failures rather than household socio-economic barriers.

For relationship between environmental education and community participation in household waste management practices, the study findings revealed that environmental education played a crucial role in influencing community participation in the management of household waste in the Ngaba Municipality. The majority of the participants indicated that they had been exposed to awareness and

education campaigns through various actors, such as the municipality, NGOs, schools, and community-based organizations. The participants indicated that the campaigns were helpful to the community; however, their effectiveness could have been improved. The community participants indicated that they needed more frequent and better-structured education campaigns to encourage active participation in the management of household waste. This implies that increased awareness and knowledge among the community members would encourage active participation in the management of household waste in the municipality. In affirmation, John (2023) showed that multi-level partnerships play an important role in enhancing resource mobilization, efficiency of policies implementation, and community participation, since stakeholder collaboration and institutional integration proved to be powerful determinants of successful waste management ($p < 0.05$) according to the findings from regression analysis.

In addition, hypothesis (H02) stipulates that environmental education does not significantly influence the level of household participation in waste management. Environmental education, contrary to H02, positively influences participation ($B = 0.043$, $p = 0.019$). As such, it was rejected as environmental education has a very important impact on the extent of household participation in waste management. The findings are consistent with the study conducted by Amuah et al. (2023), who proved that environmental education contributes to better waste disposal behaviour because it enhances people's awareness about health-related and environmental consequences of poor waste management practices.

Furthermore, community partnership approaches on household waste management revealed that community partnership approaches have an important role in supporting household waste management in Ngaba, particularly through financial support, training activities, awareness, and waste collection services. However, community awareness and access to support services were not satisfactory, which influenced the effectiveness of the partnership approaches. The community was aware that partnership approaches existed, but they were not fully effective, which could be attributed to a lack of coordination and implementation. The level of community participation was low, which was attributed to structural factors such as a lack of financial resources, low education and awareness, and a lack of

government encouragement. The idea was support by Ogutu et al. (2021) who explain that partnerships help improve waste management in Nairobi. The study argued that poor enforcement of rules in one reason why waste problems persistent. To address this, the study suggests that government institutions, private sector and local communities should have coordinated their efforts towards waste management.

In a similar way, hypothesis (H03) assumes that community partnerships have no significant influence on household participation in waste management. It was, therefore, rejected since it was found that community partnerships significantly contribute to household involvement in waste management processes ($B = 0.083$, $p = 0.041$). In other words, collaboration among stakeholders positively impacts the level of household participation in waste management processes. This is supported by Godfrey and Oelofse (2020) who stress the importance of efficient partnerships between public institutions, private sector, and communities in waste management in urban environments.

Concerning community strategies aimed at improving participation in household waste management, the findings revealed that many residents are aware of the strategies for improving participation in household waste management in Ngaba, although awareness is more concentrated among residents regarding waste collection, waste sorting, composting, recycling, and clean-up activities. More than half of the residents have taken part in these activities, although many residents did not take part due to lack of interest, insufficient time, lack of incentives, and insufficient awareness. The residents also acknowledged the benefits of these strategies, especially regarding cleanliness, health, and reinforcing the significance of community participation. However, poor waste collection services and insufficient institutional support were also identified as major barriers that undermine residents' motivation and reduce their participation in these strategies. The literature research reveals that nations like Germany and the Netherlands have enhanced home waste management systems with the concept of collaborative partnerships with governments, enterprises dealing with recycling, and communities, thus increasing efficiency in collection, recycling rates, and community awareness (Dehio, 2023; Jaakkola, 2023).

Again the fourth hypothesis (H04) states that the use of strategies by the community does not significantly affect households' participation in the waste management process. Hypothesis H04 could not be rejected, given that the use of strategies by the community had a positive but insignificant impact on the household's participation in waste management ($B = 0.172$, $p = 0.054$). It can be stated that while community strategies might encourage participation, they do not have a significant statistical effect. These results contradict those presented by Niyirera (2023) regarding how community-based strategies for waste management improve its efficiency.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter offers a summary of the key findings, conclusions, and recommendations based on the objectives of the research; socio-economic constraints affecting the level of participation in waste management activities, the relationship between environmental education and the level of participation in management of waste, the approach used in partnerships in the management of waste, and the strategies put in place by the community to enhance participation in the management of household waste within the municipality.

5.2 Summary of findings

5.2.1 Socioeconomic Barriers to Community Participation in Household Waste Management

The study findings indicated that community participation in household waste management in Ngaba Municipality is greatly impeded by a combination of both structural, economic, and social factors. The study participants indicated that the main challenges facing the community in participating in waste management activities included inadequate support from the government, inadequate infrastructure, inadequate awareness campaigns, and lack of incentives for participating in waste management activities. Other challenges that further impeded community participation included time constraints, cultural factors, and gender factors. Even though the study participants indicated that the cost of waste management services was relatively lower and affordable for the majority of the population, a majority also indicated that they were dissatisfied with the quality of services being provided for their money, citing a huge disparity between what they pay for services and what they actually get in return. Other participants also indicated that some households were unable to participate in waste management activities due to financial constraints; therefore, the cost alone was not a determining factor for participation.

The research also revealed that the overall waste management system in Ngaba is also viewed as inefficient, disorganized, and not capable of handling the volume of waste being generated. This is because of garbage accumulation, lack of regular garbage collection, and the heavy use of informal and unstructured approaches. The lack of proper facilities, insufficient equipment, and institutional capacity are also cited as major problems facing efficiency in waste management. The seasonal nature of waste management, such as during the rainy season, was also cited as a major problem. To improve efficiency in waste management, participants cited the need for increased government participation, improved facilities, environmental education, mobilization of people through local associations and youth groups, and introducing incentives like recycling and waste resource management. The overall findings of this research reveal a waste management system constrained by institutional, resource, and participation issues, and therefore, it is important to undertake reforms aimed at improving participation and household waste management in the municipality.

5.2.2 Relationship Between Environmental Education and Community Participation in Household Waste Management Practices

The study findings revealed that environmental education played a crucial role in influencing community participation in the management of household waste in the Ngaba Municipality. The majority of the participants indicated that they had been exposed to awareness and education campaigns through various actors, such as the municipality, NGOs, schools, and community-based organizations. The participants indicated that the campaigns were helpful to the community; however, their effectiveness could have been improved. The community participants indicated that they needed more frequent and better-structured education campaigns to encourage active participation in the management of household waste. This implies that increased awareness and knowledge among the community members would encourage active participation in the management of household waste in the municipality.

However, the results also showed that there are certain factors that affect the effectiveness of environmental education in motivating active community participation. These factors included inadequate government support, poor program coordination, insufficient funding, and the lack of trained educators. The respondents also pointed out some of the underlying factors, which are beyond the control of the municipality, as including the lack of trust in the authorities, poor management, and inadequate equipment, which discouraged the community from participating even if they were willing to do so. The social factors, including the lack of awareness among the general public and the large population growth rate, also put pressure on the system, while poor leadership and lack of policy also affected the effectiveness of the program. The results of the research showed that environmental education plays a significant role in motivating active community participation, but its impact is limited by certain factors that need to be considered to improve sustainable household waste management in the municipality.

5.2.3 Community Partnership Approaches on Household Waste Management

The findings showed that community partnership approaches have an important role in supporting household waste management in Ngaba, particularly through financial support, training activities, awareness, and waste collection services. However, community awareness and access to support services were not satisfactory, which influenced the effectiveness of the partnership approaches. The community was aware that partnership approaches existed, but they were not fully effective, which could be attributed to a lack of coordination and implementation. The level of community participation was low, which was attributed to structural factors such as a lack of financial resources, low education and awareness, and a lack of government encouragement. However, some community members, particularly the youth, were motivated through incentives such as food and money. From the findings, community partnership approaches have potential for enhancing household waste management in Ngaba, but they need to be visible, supported, and enhanced in terms of community participation for them to be fully effective.

5.2.4 Community Strategies Aimed at Improving Participation in Household Waste Management

The findings revealed that many residents are aware of the strategies for improving participation in household waste management in Ngaba, although awareness is more concentrated among residents regarding waste collection, waste sorting, composting, recycling and clean-up activities. More than half of the residents have taken part in these activities, although many residents did not take part due to lack of interest, insufficient time, lack of incentives, and insufficient awareness. The residents also acknowledged the benefits of these strategies, especially regarding cleanliness, health, and reinforcing the significance of community participation. However, poor waste collection services and insufficient institutional support were also identified as major barriers that undermine residents' motivation and reduce their participation in these strategies.

The research also identified a number of suggestions on how to improve community participation, which included the need for increased environmental education, awareness, and the introduction of regular sensitization programs. The respondents further identified the need for improved infrastructure, which included the availability of bins, appropriate tools, efficient waste collection, and equipment for sanitation workers. They also identified the need for improved leadership, policy support, and increased government funding for improved program effectiveness. The suggestions also included increased community mobilization through the formation of committees, sanitation brigades, and the involvement of traditional leaders, churches, and youths in improving waste management in the area. Incentives were also identified as a way of improving waste management, which included reward programs and recycling initiatives. Additionally, the respondents identified the need for enforcement by the government, as well as the use of communication technologies and social media, for improved community engagement in promoting responsible waste management in the area.

5.3 Conclusion

In conclusion, it was established that household waste management in Ngaba Municipality is greatly impeded by intertwined socioeconomic issues, environmental education, community partnership, and community strategies. It was also established that structural issues, including government support, infrastructure, waste collection services, and equipment, greatly contributed to a lack of willingness among residents to participate in waste management. Social and economic issues, including time constraints, cultural issues, gender issues, and economic issues, also contributed to a lack of participation among residents. Although environmental education was established as instrumental in waste management, it was also established that it is not sufficient, owing to issues of irregular programming, lack of funding, poor coordination, and lack of trust in authorities. Similarly, although community partnership was established as instrumental in waste management, it was also established that it was not sufficient, owing to issues of poor visibility, poor engagement, and structural issues.

Further, it was concluded that even though residents are aware of the strategies for handling household waste through methods such as sorting, recycling, and clean-up activities, the uptake of the strategies is still low. This is attributed to a lack of sensitization and poor institutional support. In this regard, the study concludes that for the gaps to be addressed and for the residents to participate actively in the handling of household waste management in Ngaba Municipality, improved environmental education, community mobilization, infrastructure, government funding, and enforcement are crucial.

5.4 Recommendation

The following recommendations direct the study:

1. Ministry of Environment and Municipal Authorities (Ngaba Municipality): Enhance waste management processes by strengthening service delivery and ensuring adequate infrastructure, including waste bins, collection facilities, and regular waste collection services. Institutional capacity

should also be strengthened to improve effective engagement with households in waste management activities.

2. Ministry of Education, Environmental Agencies, and Local Governments: Strengthen environmental education through structured and regular awareness campaigns targeting households through schools, NGOs, community organizations, and local forums. These initiatives should improve the frequency, coordination, and availability of resources for environmental awareness.

3. Non-Governmental Organizations (NGOs) and Development Partners: Establish formal structures for community involvement in waste management by providing training, awareness programmes, and support for community-based waste management initiatives, including recycling, waste segregation, and other sustainable practices. Greater coordination and access to waste management services should also be promoted.

4. Community Leadership Structures (Local Administrators, Youth Groups, Religious Institutions, and Community-Based Organizations): Develop strategies for mobilizing communities to participate actively in clean-up exercises, recycling, composting, and waste sorting. Community leaders should also address behavioural and motivational challenges such as lack of interest, limited time, low participation, and inadequate motivation.

5. Field of Social Work and Psychology: Social work and psychology professionals and researchers should develop and apply integrated approaches that promote positive attitudes, motivation, environmental responsibility, community empowerment, and sustained household participation in waste management. Social work interventions should emphasize community mobilization, participation, advocacy, social support, capacity building, and collaboration with local leadership and community-based organizations, while psychological approaches should address behavioural barriers, motivation, attitudes, social influence, and perceived responsibility. Community-based behavioural education, motivational programmes, participatory awareness activities, and social norm approaches

should therefore be integrated into waste management programmes to encourage active community participation and the long-term adoption of sustainable waste management practices. Further research in Social Work and Psychology should examine how individual, social, behavioural, and community factors influence household participation in waste management, particularly in urban communities such as Ngaba Municipality.

6. Future Researchers: Further studies should investigate the psychological, social, institutional, and environmental factors influencing community participation in waste management using mixed-methods and longitudinal approaches. Such studies could provide deeper understanding of how behavioural interventions and community-based strategies contribute to sustained participation in waste management.

5.5 Areas for Further Studies

The following areas call for further studies:

Investigating the effects of socioeconomic factors on long-term community participation. Although this study has established the various socioeconomic factors affecting community participation in household waste management, further research can be done to explore the effects of other factors such as income levels, employment status, and gender dynamics on long-term community participation.

Effectiveness of environmental education programs. More research can be done to explore the design, content, and delivery of various environmental education programs aimed at enhancing community participation in household waste management.

Role of community partnerships and incentive mechanisms. More research can be done to evaluate the effectiveness of various community partnerships and incentive mechanisms aimed at enhancing community participation in household waste management.

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APPENDICES

APPENDIX 1: CONSENT FORM

Introduction

My name is **Wilfried Kambamba Kabwangala**, a student at the **Catholic University of Eastern Africa (CUEA),** Faculty of Arts and Social Sciences, Department of Social Sciences and Development Studies, Nairobi-Kenya. I am conducting research on **"Community Participation and Household Waste Management in the Municipality of Ngaba, Kinshasa, Democratic Republic of Congo."**

You have been selected as one of the households to support me in this research by providing the information I need. Your assistance will be **highly appreciated**. The results of this research will contribute to the development of **more sustainable household waste management systems** in Kinshasa, particularly in the **Municipality of Ngaba**, with broader implications for other urban areas facing similar challenges. Any information you will share will remain confidential

Thank you in advance for your collaboration!

Consent: I, the undersigned, have read the introduction and understand the purpose of this study. I voluntarily agree to participate in this research, knowing that my responses will remain confidential and used strictly for academic purposes

Signature: _____

Date: _____

When answering questions, please tick appropriately the box ☐.

APPENDIX 2: QUESTIONNAIRE FOR HOUSEHOLDS IN NGABA

Title of the Study: Community Participation and Household Waste Management in Ngaba Municipality, Kinshasa, Democratic Republic of Congo

A. SOCIO-DEMOGRAPHIC DATA

1. **Gender**

   a. Male ☐ b. Female ☐

2. **Age**

   a. 18–25 ☐ b. 26–35 ☐ c. 36–45 ☐ d. Over 45 ☐

3. **Education Level**

   a. Primary ☐ b. High school ☐ c. University ☐ d. No formal education ☐

4. **Occupation**

   a. Employee ☐ b. Unemployed ☐ c. Business owner ☐ d. Informal sector worker ☐

   f. Retired ☐

5. How many people live in your household?

   a. 1-3 ☐ b. 4-6 ☐ c. More than 6

B. SOCIO-ECONOMIC BARRIERS

6. What barriers prevent residents from participating in waste management initiatives?

Barrier	Not a barrier (1)	Moderate barrier (2)	Major barrier (3)
Lack of infrastructure			
Lack of government support			
Limited awareness campaigns			
Lack of incentives for participation			
Time constraints			
Cultural attitudes			
Gender disparities			

7. What solutions would you suggest to overcome these barriers?

a. _____
b. _____
c. _____
d. _____

8. How would you describe the cost of waste management facilities and services in your area?

Cost of waste management	**Very cheap (1)**	**Cheap (2)**	**Neutral (3)**	**Expensive (4)**	**Very expensive (5)**
Description of the cost of waste management					

9. Do you think the current cost of waste management services is fair for the quality of service provided?

Perception of Cost vs Quality	**Strongly Agree (1)**	**Agree (2)**	**Neutral (3)**	**Disagree (4)**	**Strongly Disagree (5)**
The cost reflects the quality of service					

10. Have you or your household faced financial difficulties in accessing waste management facilities and services?

a. Yes ☐
b. No ☐

11. How satisfied are you with the affordability of waste collection facilities and services in your area?

Satisfaction Level	**Very satisfied (1)**	**Satisfied (2)**	**Neutral (3)**	**Dissatisfied (4)**	**Very dissatisfied (5)**
Affordability of waste collection					

C. ENVIRONMENTAL EDUCATION

12. Have you participated in any awareness or educational programs on waste management?

a. Yes ☐
b. No ☐

13. If yes, organized by who?

a. The municipality ☐
b. NGOs and Partners ☐
c. Schools ☐
d. Community-based initiative ☐

14. How would you rate the effectiveness of these programs?

Rate	**Very effective (1)**	**Somewhat effective (2)**	**Not effective (3)**
Effectiveness of the program			

15. Do you think more environmental education programs are needed?

a. Yes ☐
b. No ☐

16. How effective do you think the following methods are in educating the community on household waste management?

Education method	Not effective (1)	Effective (2)	Neutral (3)	Very effective (4)	Extremely effective (5)
Public awareness campaigns					
School education programs					
Community meetings and workshops					
Radio, TV, social media					
Partnership initiative					

17. How significant do you think the following challenges are in hindering environmental education in your community?

Challenge	**Not a Challenge (1)**	**Moderate Challenge (3)**	**Major Challenge (5)**
Lack of trained educators			

Inadequate government support			
Lack of funding			
Absence of school-based environmental programs			
Low community interest			
Limited access to information			

D. COMMUNITY PARTNERSHIPS

18. Are you aware of any partnerships between local communities and external organizations (NGOs, private sector, local government) in waste management?

a. Yes ☐
b. No ☐
c. Not sure ☐

19. If yes, what type of support does these partnerships provide?

a. Financial assistance ☐
b. Provide training programs and tools ☐
c. Waste collection services and facilities ☐
d. Enhance public Awareness campaigns ☐
e. Other (please specify) _____

20. From your perspective, how effective are the existing partnerships in waste management?

Effectiveness Level	Not Effective (1)	Moderately Effective (2)	Extremely Effective (3)
Effectiveness of community partnerships			

E. COMMUNITY STRATEGIES

21. Are you aware of any community Strategies on waste management?

a. Yes ☐ b. No ☐
b. Waste collection and sorting ☐
c. Composting ☐
d. Recycling ☐
e. Community Clean-up Activities ☐
f. Other (Please specify) _____

22. Do you participate in these Strategies?

a. Yes ☐ b. No ☐

23. If no, why not?

a. Lack of time ☐
b. Lack of interest ☐
c. Lack of awareness ☐
d. No incentive measures ☐
e. Other (please specify): _____

24. How often do you separate waste for recycling or composting?

a. Always ☐
b. Sometimes ☐
c. Rarely ☐
d. Never ☐

25. Indicate the extent to which you agree with the following statements:

Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Waste management strategies improve community cleanliness					
These initiatives enhance health conditions					
Community participation is crucial for waste management success					
Waste collection services in my area are adequate					
There is enough support from authorities for waste management.					

F. RECOMMENDATIONS

26. What solutions would you propose to improve community participation in household waste management?

a. _____
b. _____
c. _____
d. _____

APPENDIX 3: INTERVIEW GUIDE FOR KEY INFORMANT INTERVIEWS (KIIS)

Title of the Study: "Community Participation and Household Waste Management in the Municipality of Ngaba, Kinshasa"

Objective of the KIIs: The key informant interviews aim to gather in-depth insights from individuals with specific knowledge, experience, or expertise related to waste management in Ngaba. These interviews will help to understand the broader context, identify key challenges, and explore effective strategies for enhancing community participation in waste management.

Participants: Key informants will include local authorities, leaders of community organizations, and representatives of NGOs, private sector stakeholders, and experts in waste management and/or in environmental study.

Researcher's Signature:

Introduction

My name is Wilfried Kambamba Kabwangala, a student at the Catholic University of Eastern Africa (CUEA), Faculty of Arts and Social Sciences, Department of Social Sciences and Development Studies, Nairobi-Kenya. I am conducting research on "Community Participation and Household Waste Management in the Municipality of Ngaba, Kinshasa, and Democratic Republic of Congo."

You have been identified as a key informant due to your expertise and experience in this field. Your insights will greatly contribute to understanding the current situation of waste management in Ngaba and developing strategies for improvement. The information you provide will be treated confidentially, and your identity will not be disclosed without your permission.

Thank you for agreeing to participate.

Key Interview Themes and Questions

Theme 1: Current Situation of Waste Management

1. How would you describe the current state of household waste management in the Municipality of Ngaba?
2. What are the main challenges faced in managing waste effectively in this area?

Theme 2: Community Participation

3. From your perspective, how actively are community members participating in waste management initiatives?

4. What factors encourage or discourage community participation in waste management programs?

5. Are there specific groups (e.g., women, youth, and community leaders) that play a key role in these initiatives? If yes, how do they contribute?

Theme 3: Barriers and Challenges

6. What are the main socio-economic barriers that hinder effective community participation in waste management?

7. How do you think these barriers can be addressed or mitigated to encourage greater participation?

Theme 4: Education and Awareness

8. In your opinion, how effective are current environmental education programs in raising awareness about waste management?

9. What strategies or improvements would you suggest to enhance awareness and encourage better waste management practices among community members?

Theme 5: Partnerships and Collaboration

10. Are there any existing partnerships between local communities and other organizations (e.g., NGOs, private sector, and government) for waste management in Ngaba?

If yes, could you describe these partnerships?

11. What types of collaboration or support do you think are most effective for improving waste management?

12. What role do local authorities play in supporting community initiatives, and how can this role be enhanced?

Theme 6: Recommendations for Improvement

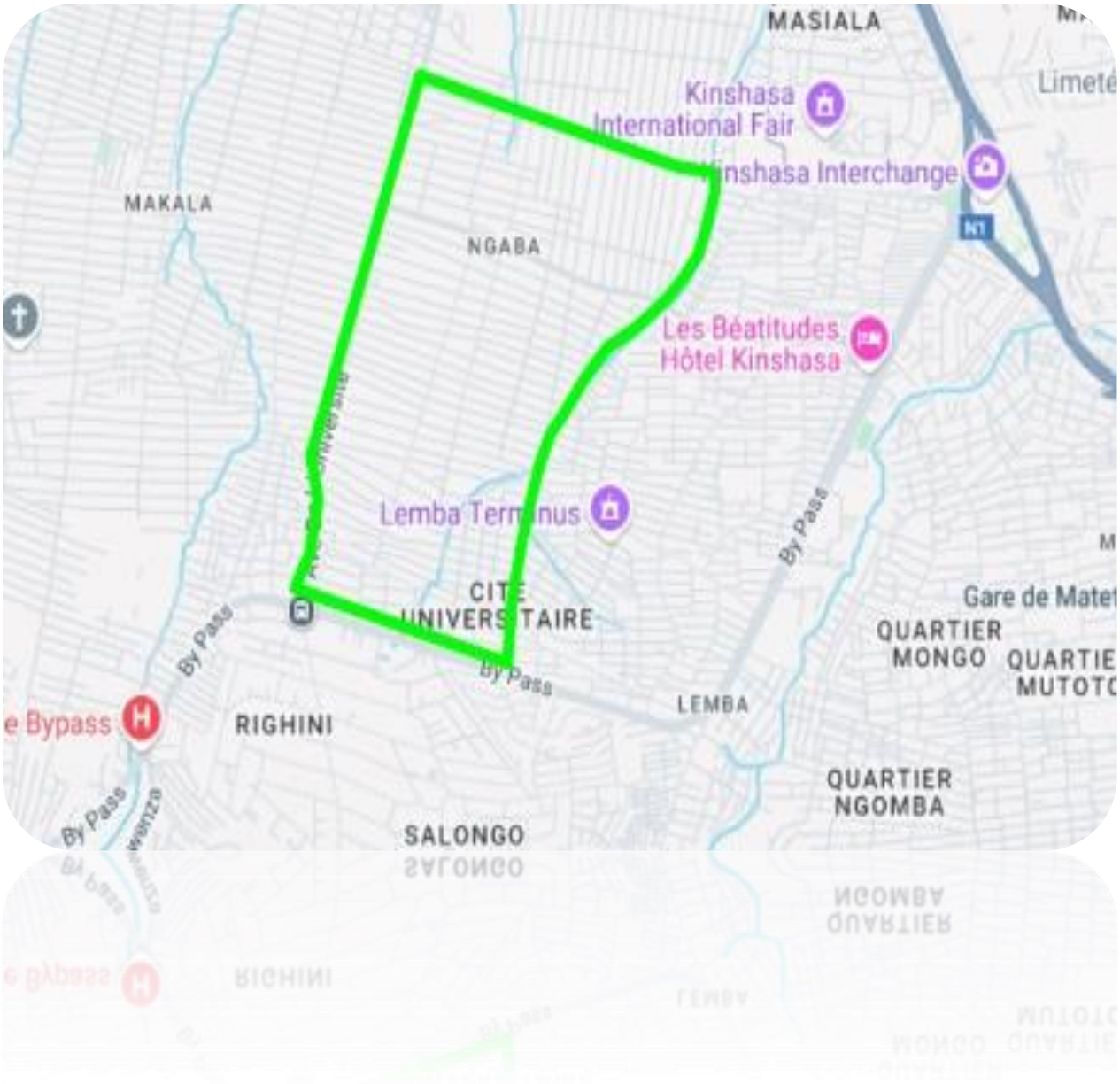
13. Based on your experience, what recommendations would you make to improve community participation in waste management in Ngaba?

14. What advice would you give to policy makers, NGOs, and community leaders to create a more sustainable and effective waste management system?

APPENDIX 4: OBSERVATION GRID

VARIABLES	OBSERVATION AREA	OBSERVATION NOTES
OBJECTIF 1: SOCIO-ECONOMIC BARRIERS		
Social Inequalities	Groups exposed to Waste	
Lack of infrastructure	Availability and use of waste bins, Dumping sites, Collection points, Access roads	
Cultural belief	Community waste disposal behavior	
OBJECTIF 2: ENVIRONMENTAL EDUCATION		
Awareness Campaigns	Posters and Flyers Campaign materials in the area	
Training Session	Workshops Community Trainings Group education sessions	
Informational Resources		
OBJECTIF 3: COMMUNITY PARTNERSHIPS		
Projects Initiated and Funded	Presence of externally or internally funded waste projects	
Availability of Resources Needed by Communities	Provision of tools, bins, gloves, or vehicles by partners	
OBJECTIF 4: COMMUNITY STRATEGIES		
Recycling Cooperative	Presence of Organized recycling activities	
Composting Cooperative	Presence of composting initiatives or spaces	
Community Clean-up Initiative	Group cleanups	

APPENDIX 5: MAP OF LOCATION OF STUDY



APPENDIX 6: ANTIPLAGIARISM REPORT

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I HEREBY CONFIRM THAT **KABWANGALA KAMBAMBA WILFRIED** REG NO: **1042805**, SUBMITTED A CHECK OF ANTIPLAGIARISM ON EVALUATION OF **COMMUNITY PARTICIPATION AND HOUSEHOLD WASTE MANAGEMENT IN THE MUNICIPALITY OF NGABA, KINSHASA-DEMOCRATIC REPUBLIC OF CONGO. A DISSERTATION PRESENTED TO THE FACULTY OF ARTS AND SOCIAL SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF DOCTOR OF PHILOSOPHY DEGREE IN SOCIAL WORK AT THE CATHOLIC UNIVERSITY OF EASTERN AFRICA, KENYA.**

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APPENDIX 7: APPROVED RESEARCH LETTER



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

Faculty of Arts and Social Sciences

Department *of Social Sciences and Development Studies*

11th February 2026

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: KABWANGALA KAMBAMBA WILFRIED - REG NO. 1042805

This letter is to confirm that the above-named individual is a final-year student pursuing a **Doctor of Philosophy in Social Work** at The Catholic University of Eastern Africa.

As part of the degree requirements, he is undertaking a research study with the title:

"Community Participation and Household Waste Management in The Municipality of Ngaba, Kinshasa-Democratic Republic of Congo"

The information gathered during this study will be used solely for academic purposes and will be handled with strict confidentiality.

Any assistance accorded to him is highly appreciated.

Yours faithfully,

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA HEAD OF DEPARTMENT 11 FEB 2026 SOCIAL SCIENCES AND DEVELOPMENT STUDIES P. O. Box 62157 - 00200, NAIROBI

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APPENDIX 8: FIRST ARTICLE PUBLISHED

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Socio-Economic Barriers and Community Participation in Waste Management in Ngaba Municipality, Kinshasa, Democratic Republic of Congo

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Oversight
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Abstract: *The aim of the study was to assess the existing socio-economic barriers and community participation in waste management in Ngaba Municipality, Kinshasa, Democratic Republic of Congo. The study was anchored on collective action theory. A mixed method with convergent-parallel design was used. A population of 5,985 household heads and 8 local leaders was targeted. Further, 386 households were sampled using Yamane's formula of 1967 and stratified technique used to recruit the household heads while 8 local authorities were considered purposively. Interviews and observation techniques collected qualitative data while questionnaires gathered quantitative data. Validity was ensured by applying data triangulation to compare quantitative data from surveys with qualitative data from interviews with key informants. The quantitative data was analyzed using statistical techniques with the help of SPSS Version-27. Qualitative data were analyzed through semantic and narrative thematic analysis. Results show that, socio-economic and institutional factors hinder efficient management of domestic wastes because of poor government support, infrastructure, poor level of awareness and lack of incentives, regardless of affordable costs associated with the services. The study concluded that, household waste management in Ngaba Municipality is greatly impeded by intertwined socioeconomic issues. The study made a recommendation that the Ministry of Environment and Municipal Authorities (Ngaba Municipality): Enhance waste management processes through strengthening the service delivery process by ensuring there is enough infrastructure like waste bins, collection facilities, and waste collection services and addressing weaknesses in institutional capability which have made it hard to effectively engage with households on waste management*

Key words: *Socio-Economic Barriers, Community Participation, Waste Management*

1.1 Background of the Study

Waste management is emerging as a matter of utmost concern to the global community because of its immediate relevance to global health, sustainability of the environment, and upholding human dignity. Community participation in waste management implies not only the awareness of households about various problems related to waste generation and management but also practical actions such as sorting out waste at source, utilizing proper disposal facilities, conducting cleaning campaigns and participating in local decision making on sanitation issues (Tarigan et al., 2020). Empirical studies have revealed that when community members are involved in such activities as sorting waste at source, utilizing waste bins, participating in recycling campaigns or conducting cleaning campaigns, the efficiency of solid waste management system increases considerably due to increasing joint efforts (Harnita, 2025).

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The Influence of Community Partnership Approaches on Household Waste Management in Ngaba Municipality, Kinshasa, Democratic Republic of Congo

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Abstract: *The aim of the study was to assess the influence of community partnership approaches on household waste management in Ngaba Municipality, Kinshasa, Democratic Republic of Congo. The study was anchored on Stakeholder Theory. A mixed method with convergent-parallel design was used. A population of 5,985 household heads and 8 local leaders was targeted. Further, 386 households were sampled using Yamane's formula of 1967 and stratified technique used to recruit the household heads while 8 local authorities were considered purposively. Interviews and observation techniques collected qualitative data while questionnaires gathered quantitative data. Validity was ensured by applying data triangulation to compare quantitative data from surveys with qualitative data from interviews with key informants. The quantitative data was analyzed using statistical techniques with the help of SPSS Version-27. Qualitative data were analyzed through semantic and narrative thematic analysis. Findings showed that community partnership approaches have an important role in supporting household waste management in Ngaba, particularly through financial support, training activities, awareness, and waste collection services. The study concluded that, although community partnership was established as instrumental in waste management, it was also established that it was not sufficient, owing to issues of poor visibility, poor engagement, and structural issues. On the effectiveness of community partnerships in enhancing household waste management, 60.3% of the respondents saw the partnerships as moderately effective, 20.0% saw the partnerships as extremely effective, while 19.7% saw the partnerships as not effective. The study recommends local and National governments to develop and improve a formal structure for the involvement of communities in waste management by facilitating training and awareness-raising and promoting waste management projects among communities like recycling and segregation and ensure improved coordination and greater access to services among households.*

Key words: *Community Partnership Approaches, Households, Waste Management Practices*

1.1 Background of the Study

Waste management is emerging as a matter of utmost concern to the global community because of its immediate relevance to global health, sustainability of the environment, and upholding human dignity. In this regard, it falls in sync with Sustainable Development Goal 6, which underlines well-managed sanitation facilities, especially in growing cities at a global level (Ram et al., 2024). Waste management within the household can be viewed as encompassing all activities related to managing household solid waste from the point of creation through storage, collection, transportation, reusing, and recycling to

APPENDIX 10: FIELDS PHOTO/OBSERVATION



Waste in front of a government Hospital in Ngaba, Kinshasa-DRC



Waste disposed in front of a Hotel in Ngaba, Kinshasa-Drc



Waste disposed in front of a Medical Center in Ngaba, Kinshasa-Drc



Collector of waste (PUSU-PUSU) in Ngaba, Kinshasa-Drc



Waste disposed on one of the main road of Ngaba Municipality, Kinshasa-DRC



Another road in Ngaba, Kinshasa-Drc, facing Waste management challenges