PERCEIVED BARRIERS TO SUSTAINABLE WASTE MANAGEMENT AMONG SLUM DWELLERS IN MUKURU SLUMS IN KENYA

Eric Muriuki Kirea & Dr. Annah Indeche, PhD

The Strategic JOURNAL of Business & Change MANAGEMENT
ISSN: 2312-9492 www.strategicjournals.com
Vol. 12, Iss.2, pp 1115 – 1131, May 17, 2025. www.strategicjournals.com, © Strategic Journals

PERCEIVED BARRIERS TO SUSTAINABLE WASTE MANAGEMENT AMONG SLUM DWELLERS IN MUKURU SLUMS IN KENYA

Eric Muriuki Kirea [1] & Dr. Annah Indeche, PhD [2]

[1] *Master Student, Jomo Kenyatta University of Agriculture and Technology, Kenya*
[2] *Lecturer, Jomo Kenyatta University of Agriculture and Technology, Kenya*

Accepted: May 3, 2025

DOI: http://dx.doi.org/10.61426/sjbcm.v12i2.3261

ABSTRACT

This study aimed at understanding the intrigues behind unending waste management concerns that have continued to bedevil Mukuru slums despite the interventions in place and to develop sustainable mechanisms to address the challenges. The study adopted a descriptive design and tried to understand perceived barriers to sustainable waste management among slum dwellers in Mukuru slums in Nairobi, Kenya. The study targeted key informants drawn from the Nairobi County department of environment, water and sanitation, civil society groups, NEMA and local provincial administration and the community household members in Mukuru slums. The study used stratified sampling technique to select the sample population for the study. Since the study used primary data, different sets of questionnaires were used to collect the data from groups of the respondents. Data collected was screened before final analysis which was aided by statistical packages for social sciences (SPSS) software. Pearson correlation and regression analysis were also performed to determine the relationship between the poverty, management capabilities, financial resources and regulatory policies on sustainable waste management. Findings revealed that poverty level, financial resources, management capabilities, and regulatory policies greatly influenced sustainable waste management among slum dwellers in Mukuru slums in Kenya. Therefore, the study recommended for integrated waste management approach that is community centered to bring every community member on board and other key stakeholders. On financial resources, the study recommended for robust public-private sector partnership to build up financial capital necessary for management of waste menace and conserve the environment and allocation of more resources. There is a need for more trainings, and awareness creation and formulation of elaborate policies to create autonomy for NEMA to enable the organization implement and enforce its regulations effectively. The study outlined that further studies can be done on the impact of socio-demographic factors, household perceptions and attitudes on waste management and socio-economic factors on sustainable environmental conservation.

***Key Words**: Waste Management, Sustainable Waste Management, Integrated Waste Management, Poverty, Management Capability*

CITATION: Kirea, E. M., & Indeche, A. (2025). Perceived barriers to sustainable waste management among slum dwellers in Mukuru slums in Kenya. *The Strategic Journal of Business & Change Management,* 12 (2), 1115 – 1131. http://dx.doi.org/10.61426/sjbcm.v12i2.3261

INTRODUCTION

Solid waste management is becoming an increasingly critical issue, particularly in large cities worldwide, where over 2 billion tons of solid waste are generated annually. Projections indicate this figure could rise to 3.4 billion tons by 2050, especially in developing nations where waste output is expected to triple (Kaza et al., 2018). Rapid urbanization, socioeconomic development, and population growth are driving these increases, leading to significant management challenges and environmental concerns. Ineffective waste management systems, characterized by inadequate staffing, capacity constraints, and insufficient funding for recycling facilities, exacerbate the problem, contributing to pollution and health risks (Mdak et al., 2016; Ferronato & Torretta, 2019). Current waste management practices such as mechanical recycling, incineration, and landfilling are insufficient to tackle the growing issue of plastic waste, with only 16% of used plastics being recycled globally, while 25% are burned, 40% are dumped in landfills, and 19% leak into the environment (Ellen MacArthur Foundation, 2017).

In countries like Kenya, the situation is particularly dire due to limited financial resources, lack of technological infrastructure, and ineffective policy frameworks (Modak et al., 2017; Ferronatto & Torretta, 2017; Khan, 2021). Major urban centers are grappling with rising waste volumes that exceed the capabilities of local authorities. The main sources of urban waste include households, manufacturing, commerce, healthcare, and agriculture (Kamweru, 2019). Despite efforts to promote recycling and recovery, waste generation continues to increase, straining land, air, and water resources (Gok, 2019). Challenges such as inadequate financing, poor infrastructure, and a lack of public awareness hinder effective waste management (Madinah, 2016; Ongoro, 2012). To address these issues, collaboration between public and private sectors, along with community engagement and education, is essential for developing sustainable waste management solutions and improving overall living conditions (Njoroge et al., 2014; Magu & Sakwa, 2019; Zafar, 2021).

Globally, effective waste management is crucial for achieving a sustainable environment, particularly in developed nations. Municipal solid waste management is recognized as a vital service for cities, especially in low- and middle-income countries (Hoornweg and Bhada-Tata, 2012). However, many developing nations struggle with inadequate financial and technological resources, leading to inefficient waste management systems (Abdelhamid, 2014). In these regions, only a small fraction of waste is collected and properly disposed of, with standard disposal often involving transporting waste to nearby locations without proper management (Abdelhamid, 2014). For instance, in Bangladesh, significant amounts of waste are improperly handled, resulting in pollution and health hazards, while in Haiti, challenges such as population growth and lack of disposal services exacerbate the waste crisis (Haney and Bodenman, 2018; UNEP, 2015).

In Africa, solid waste management is increasingly recognized as a pressing social and environmental issue, particularly in countries like Nigeria and Egypt. Factors such as poverty, rapid urbanization, and inadequate infrastructure contribute to the waste management crisis (Ezeah, 2012; Ibrahim and Mohammed, 2016). In Ghana, ineffective service delivery exacerbates residential waste disposal problems, with poorly managed transfer sites and selective collection services (MSWR, 2020). Similarly, in Egypt, insufficient public sector services and limited financial resources hinder effective waste management, leading to significant environmental and health impacts (Mohamed, 2019).

In Kenya, despite constitutional guarantees for a clean environment and efforts like the National Waste Management Strategy, challenges still remain, including inadequate infrastructure and governance, resulting in widespread pollution and

health risks (KNWMP, 2021; Haregu, Ziraba, and Amugsi, 2017). Recent report by Kenya national waste management policy (KNWMP, 2021) cited that most counties lack adequate infrastructure, governance mechanisms and dedicated funding for effective and sustainable waste management. The report estimated that only about 40% of the population in many parts of major cities receive waste management services; in many cities, low income and informal settlements do not have waste collection systems at all. Further the report alludes that all counties in Kenya currently have uncontrolled waste dumpsites where leachate pollute waterways and underground aquifers, and where burning waste emit toxic air and noxious fumes that contaminate the air.

Mukuru slums is one of Nairobi's biggest slums after Kibera Slums in Langata. The slum is considered treacherous place as a result of air pollution that emanates from poor waste disposal and poor waste management system in the area. Munyigi and Manguriu (2024) noted that Mukuru residents suffers from poor waste disposal management that is further compounded by haphazard human excreta disposal besides the household wastes. This makes the area prone to disease outbreaks like malaria, cholera, waterborne diseases and respiratory diseases (Saunders, 2020). Esakon, Nabiswa and Nayole (2022) observed that despite various interventions by local community, and NGOs, the problem of sustainable waste management still remains a pertinent concern in Mukuru slums. This therefore presents an opportunity to exploit the efforts that have been put to address the continued problem of wastes disposal and management in Mukuru slums in Nairobi, Kenya.

Statement of the Problem

According to Muhammad and Manu (2013), waste management pose a significant challenge to many third world cities across the world. Poor management of municipal solid waste contributes to the deterioration of environmental quality, according to Badgie et al (2012). Furthermore, Muhammad et al., (2013) point out that only a small portion of the waste created in most of cities in the world gets collected and are properly disposed of. Poorly managed waste typically results in expenses that are higher than what it would have cost to manage the waste effectively in the first place. This has a significant negative impact on health, the local environment, global environment, and the economy at large (Hoornweg & Freire, 2013). Solid wastes today cause climate change on a worldwide scale, generating 5% of all greenhouse gases (Hoornweg, & Freire, 2013).

Kenya faces a significant waste management dilemma across its major towns and cities, which generates over 2,400 tons of waste daily. This challenge has been aggravated by the growing urban population mostly found in the sprawling areas in major towns and other urban regions. Only 38% of it is collected, and less than 10% is recycled, leaving over 62% to be dumped illegally or burned (UNEP, 2020). According to Gutberlet et al. (2017) solid waste management continues to face challenges due to increasing rates of waste generation brought about by rapid urbanization, population increase, changing lifestyles, and shifting consumer patterns. These concerns have aggravated the impact of solid waste management (SWM) significantly in combating environmental and public health hazard as a result in many developing nations (Sibanda et al., 2017).

Studies done on waste management point a glim picture on the effectiveness of waste collection and sustainable waste management employed by many local authorities. For instance, Madinah (2016), Sibanda et al., (2017) and Ochieng (2016) point out that Nairobi's solid waste situation, is largely characterized by low coverage of solid waste collection, uncontrolled waste dumping, inefficient public services, unregulated and uncoordinated private sector and lack of key sustainable solid waste management infrastructure. The studies further pointed that solid waste management has remained elusive in the city due to lack of adequate funding and skilled personnel besides poor public

attitude towards waste management and high charges imposed by private waste collectors.

Despite of the many studies conducted on this subject, a lot still is left to be desired due to the prolific and sprawling wastes and the resulting environmental degradation across many towns in Kenya. The existing studies have failed to explicitly examine elaborate sustainable measures of waste management in conserving the environment. Secondly the studies do not point out how various factors like environmental policy frameworks, technical competencies, financial resource implications and poverty presents a significant problem to sustainable waste management. Therefore, this study was conducted to examine the perceived barriers to sustainable waste management among slum dwellers in Mukuru slums in Kenya.

Purpose of the study

The main purpose of this study was study was to examine the perceived barriers to sustainable waste management among slum dwellers in Mukuru slums in Kenya. The study was guided by the following specific objective;

- To examine the influence of poverty levels on sustainable waste management among slum dwellers in Mukuru slums in Kenya.

LITERATURE REVIEW

Theoretical Review

Amartya Sen's Capability Theory of Development

The capability approach is a well-known theoretical framework that includes two fundamental normative claims: first, that the freedom to achieve well-being is of critical moral importance, and second, that freedom to achieve well-being is to be understood in terms of people's capabilities, that is, their actual opportunities to do and be what they aspire to value. According to the capability theory, the freedom to achieve human well-being is a function of what people are able to do and be, and consequently the kind of life they are successfully able to lead (Stanford Encyclopedia of Philosophy, 2016). According to Pham (2017), Sen's Capabilities Approach (CA) can be used as an evaluation framework to better successfully evaluate waste management programs in connection to community development approaches. The CA is consistent with the sustainable environment and development principles of valuing agency and empowerment; it provides a broad informational foundation for normative judgment; and it is gender and individual differences sensitive. This theory is relevant to this study since sustainable environmental conservation concerns are viewed as a lack of basic competencies to foster good environmental practices.

Conceptual Framework

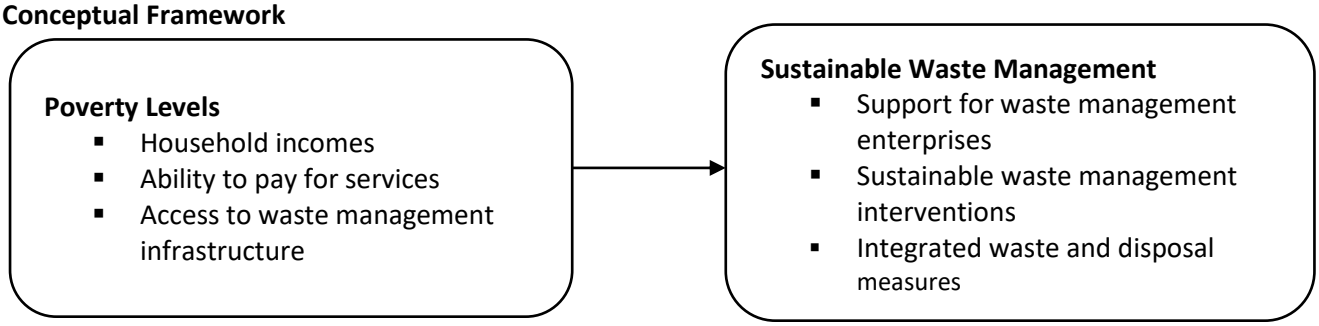

Figure 1: Conceptual Framework

Influence of Poverty Levels on Sustainable Waste Management

Poor waste disposal practices significantly hinder the development of integrated solid waste

management systems, particularly in low-income households, as seen in rural Malaysia (Fadhullah et al., 2022). The link between poverty and environmental issues is influenced by socioeconomic status, leading to inadequate waste collection and management, which in turn causes health problems (UNDP, 2018). High poverty levels in informal settlements limit the ability to pay for waste management services, resulting in illegal dumping and lack of infrastructure (NEMA, 2020). In Nigeria, factors such as poverty, rapid urbanization, and weak infrastructure exacerbate waste management challenges (Ezeah, 2012). Although community involvement can enhance conservation efforts and improve livelihoods, it is often hampered by poverty (Kipkoech, 2019; Koskey & Ipara, 2019). Financial constraints stemming from poor national economic policies further complicate the establishment of effective waste management systems in developing countries, underscoring the need for interdisciplinary approaches to address these environmental challenges (Schmitz et al., 2012; Orr, 2011; Adu-Gyamfi, 2014).

Lack of awareness and low community participation in solid waste management (SWM) exacerbate challenges in poor urban communities, where residents often expect municipalities to address these issues despite their limited financial resources (Kubanza and Simatele, 2020). Effective community involvement is crucial for mitigating problems and fostering positive relationships between local governments and residents (Nyampundu and Mwegoha, 2020). Additionally, the neglect of the informal waste sector compromises the financial well-being of waste pickers, highlighting the need for integrated policies that include all stakeholders (Dlamini and Simatele, 2016). SWM systems in developing countries face significant challenges, including inadequate funding, human resources, technological deficiencies, and poor public awareness, which hinder sustainability (Andole, 2016; JICA, 2014). In cities like Kisumu, rising waste generation, overcrowded dumpsites, and unmanaged waste disposal create severe environmental and public health issues, exacerbated by low waste collection rates of 30% to 50% (Tan, 2012). The unregulated disposal of collected waste leads to serious risks, such as groundwater contamination and pest proliferation, underscoring the urgent need for improved waste management infrastructure and policies (Tan, 2012; Sibanda et al., 2018).

Empirical Review

Previous researches confirmed that organizations require greater assistance and direction on how to address sustainability challenges and put sustainable waste management (WM) strategies into practice (Hamann et al., 2017; Singh et al., 2018; Mitchell et al., 2020; Villegas Pinuer et al., 2021). In order to prevent haphazardly implementing WM strategies without the desired results, the current critical evaluation presents key implications and recommendations for good WM in addition to giving an extensive overview of the importance and strategies of WM. studies conducted on waste management.

Research indicates that, unlike Accra and Kumasi, which have established formal waste collection systems, other emerging cities in Ghana experience such low collection rates that they are often excluded from national data (Owusu et al., 2014; Owusu-Sekyere, 2016). These cities face significant operational challenges, including limited capacity among local authorities, insufficient funding, and ineffective policy enforcement, all of which hinder efficient waste management (World Bank, 2021).

A study by Ogutu (2019) on the role of environmental governance in solid waste management and policy implementation in Nairobi County, observed that the spiraling waste menace in every corner of the city was a reflection on flaws in solid waste management policy implementation. The study further noted that setting norms for policy implementation in terms of capacity, financial responsibility, and enforcement, environmental governance takes center stage.

Mutala (2016) also carried a study on factors influencing sustainable solid waste management in Thika town and looked at influence of community mobilization, Environmental knowledge, cost sharing and the influence of sanitation on sustainable solid waste management. The study results revealed that there was a significant influence of community mobilization through awareness creation, cost sharing and environmental knowledge on solid waste management.

According to Gathoni (2012), private company participation in waste management in Nairobi is limited and primarily focused on waste collection, transportation, and disposal services. These services are mainly accessible in high-income areas, where residents have the financial means to afford them. In contrast, middle-income neighborhoods often experience inadequate waste management, with open dumping and burning commonly observed along roads and in open spaces. In low-income areas, community-based organizations (CBOs) and non-governmental organizations (NGOs) play a central role, either independently or in partnership, to address waste management needs. A significant barrier to private sector engagement in these areas is the lack of willingness or ability among residents to pay for waste management services (Gathoni, 2012; World Bank, 2021).

Magu and Sakwa (2019) on a study of challenges facing the implementation of community driven environmental management projects in Mukuru kwa Reuben slum, Nairobi County. The study's findings indicate that the majority of respondents concur that obstacles posed by collaboration and competition prevent project beneficiaries from taking part in CDEM programs. The study's findings lead to the conclusion that its goals had been met. The report makes several recommendations, including the development of more inclusive leadership practices in the management of CDEM initiatives, the use of more varied fundraising strategies to collect money and boost income, and the accurate transmission of CDEM knowledge among community members.

Mwebaze et al. (2022) noted that introducing sustainable waste management interventions significantly improved waste management in informal settlements. These interventions, such as waste sorting and recycling initiatives, are often effective in addressing solid waste challenges unique to these areas. A study by Ajayi et al. (2023) highlights that financial and logistical support for waste management enterprises can bolster effective waste management and conservation efforts by ensuring these enterprises have the resources needed to handle waste responsibly.

A study done in Botswana by Mmereki and Velempini (2021) on the status of municipal solid waste management policy implementation in developing countries revealed that despite the prevalence of promulgated environmental policies and legislation to protect the environment and reduce public health impacts, (Botswana Waste Management Strategy and Waste Management Act were introduced in 1998), municipal solid waste management (MSWM) still remains a major challenge in Botswana. The study sought to identify policy gaps in municipal solid waste management, describe the difficulties, and offer potential remedies. The findings point to a number of deficiencies in the way policy linked to municipal solid waste management is being implemented, including a lack of institutional support, a lack of financial backing, and a lack of techniques to support policy. A sustainable and integrated waste management system's application is likewise restricted.

Serge Kubanza and Simatele (2020) looked at the sustainability of solid waste management in developing countries with a key focus on the institutional strengths for solid waste management in Johannesburg, South Africa. The study focused on local residents, municipal officials, and other stakeholders involved in solid waste management in Johannesburg. Findings revealed that mismanagement of solid waste management has a

negative impact on the urban environment and people's health, which in turn stunts economic growth and productivity. Therefore, there is need to transfer resources and authority to local level along with clear rules and policies to boost local management procedures in order to develop an efficient and sustainable SWM system.

Adeleke, Akinlabi and Jen (2021) looked at the challenges and prospects towards the sustainability of municipal solid waste management in South Africa. The study was based on the fact that the push for sustainable solid waste management in South Africa has resulted in the adoption of a number of laws and policies that aim to boost the effectiveness of solid waste management techniques. However, despite the progress in South Africa's waste management systems over the years, it still faces several challenges and shortcomings. The findings showed that restructuring the waste management industry is necessary to ensure sustainable development through the shift from a linear economic model to a circular economy.

METHODOLOGY

This study adopted a descriptive design. According to Cooper and Schindler (2003) a descriptive design is a scientific method that involves observing and describing the behaviour of a subject without influencing it in any way. Descriptive design was chosen because it allowed the researcher to define the qualities of the variables of interest and was ideal for characterizing demographic characteristics. The target population for this study was 100, 650 and which comprised of key informants drawn from Nairobi County department of environment, water and sanitation, civil society groups, NEMA and local provincial administration and the community household members from Mukuru slums in Nairobi County, Kenya. The study used a sample of 100 respondents that comprised of 70 key informants and 30 households and who selected using stratified random sampling technique. The study administered questionnaires to collect data for the study and analysis was done using statistical packages for social sciences.

FINDINGS

Barriers to Waste Management

The findings revealed that in Mukuru slums, households face significant challenges related to waste management, primarily driven by poverty (33%) and the affordability of waste management services (26%). The lack of adequate disposal infrastructure (23%) and issues with indiscriminate dumping (6%) further complicate the situation, as residents often experience poor waste collection from authorities. These challenges contribute to severe waste problems, leading to increased air pollution in the area.

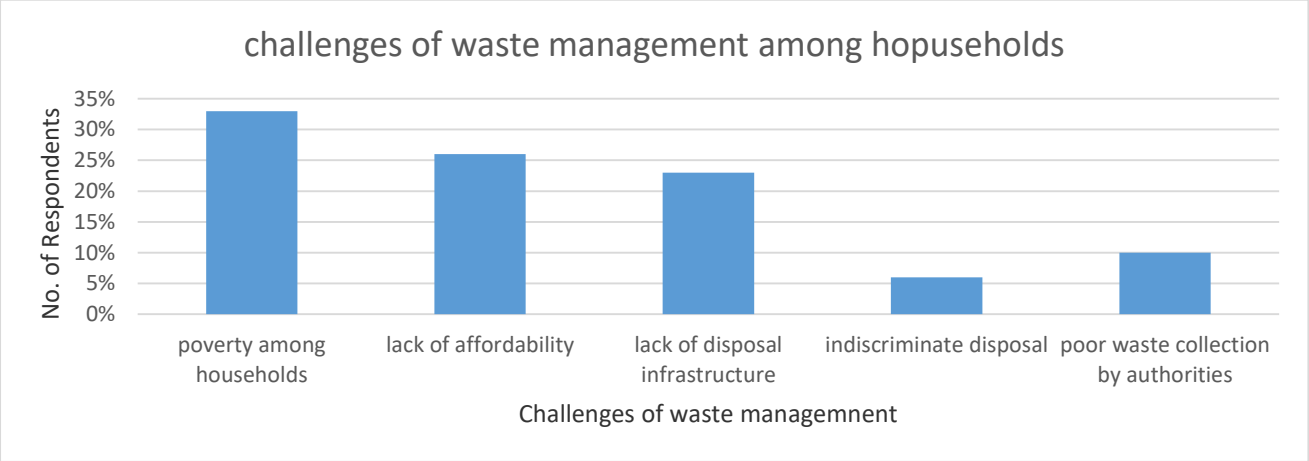

Figure 2: Challenges Faced by Households in Mukuru Slums on Waste Management

The study identified several gaps in waste management efforts among Mukuru slum residents, including delayed waste collection by the county department, which can take months, thus hindering sustainable practices. There is also a lack of awareness about the importance of proper waste disposal methods and limited access to waste facilities and infrastructure. Community involvement in waste management initiatives, particularly through organizations like the Mukuru Youth Centre, is minimal. Despite acknowledging the health hazards associated with poor waste handling, many community members lack proper disposal practices, often resorting to dumping waste in alleys and on roadsides. However, there is a noticeable interest among residents in learning about sustainable waste management, indicating potential for improvement in future initiatives.

Descriptive analysis results

This study examined the influence of poverty levels on sustainable waste management among slum dwellers in Mukuru slums in Kenya. A 5-point likert scale was used to determine the level of agreement on seven (7) statements provided relating to influence of poverty levels on sustainable waste management. The agreement levels were as follows: 1- Strongly Disagree, 2 – Disagree, 3- Neither Agree nor Disagree, 4 – Agree, 5 – Strongly Agree. The findings are presented in Table 1 below;

Table 1: Influence of Poverty on Sustainable Waste Management

S/no	Statement	SD %	D %	N %	A %	SA %	MEAN	SDV
PL1	Low-income levels contribute to community members' unwillingness to pay for waste services	0	11	12	13	64	2.69	1.052
PL2	Households' inability to pay for waste fees leads to ineffective revenue mobilization to meet waste disposal management goals.	0	21	11	46	20	3.59	.718
PL3	High population rate in slum areas aggravates waste collection and handling	0	0	0	78	22	4.21	.612
PL4	Community members dispose-off waste is haphazardly due to lack of designated waste areas/structures	0	0	0	40	60	4.60	.493
PL5	Available waste systems are not effective in handling wastes generated due to limited facilities and affordability aspect	0	0	0	56	44	4.44	.500
PL6	Lack of access to waste facilities contributes to disposal of wastes in undesignated areas, leading to environmental pollution	0	0	2	8	90	4.89	.352
PL7	Poverty leads to low community involvement in integrated approach to waste management	0	0	34	37	29	3.95	.804

Scale: 1-2.4= Disagree; 2.5-3.4 =Neutral/Moderate; 3.5--5 =Agree. **Source**: Field Data (2024)

The means obtained from the study ranged between 2.69 to 4.89, reflecting varying levels of perceived impact. A higher score indicated stronger agreement or greater impact, with the highest score of 4.89 signifying the most significant factor identified by respondents. Conversely, lower scores suggest areas of lesser importance or impact.

Findings revealed that low-income levels contribute to community members' unwillingness to pay for waste services as reflected by majority view (77%). Whereas 12% of the respondents held a neutral opinion, 11% of them disagreed. In overall, the

study found that most community members were not able to pay for waste disposal services due to their low nature of income with a mean of 2.69 and a standard deviation of 1.052, indicating the variation in responses around the average. This finding is supported by UNDP (2018) that found that lack of resources among poor neighborhoods leads to inadequate waste collection and waste management with subsequent health problems. The report observed that improper use of energy resources leads to waste and higher energy costs that end up being unaffordable for the poor, aggravating waste management sustainability.

The study also found that most households' inability to pay for waste fees led to ineffective revenue mobilization to meet waste disposal management goals by the agencies in charge, as indicated by majority (66%) who were in agreement with the statement. Though 11% of the respondents held a neutral opinion, some 21% disagreed and 2% strongly disagreed. In conclusion, the findings reveal that ability to pay for waste fees directly affects waste management initiatives due to constrained financial resources to meet waste disposal management goals of the concerned agencies as reflected by a mean of 3.59 and standard deviation of 0.718. This is further supported by NEMA (2020) report that alluded that high poverty levels especially among the informal and low-income settlements compromises the ability to pay for waste management services.

High population rate in slum areas aggravates waste collection and handling as observed from the opinion of 78% respondents who strongly agreed and 22% who agreed. This results to constrained waste facilities due to high waste generation and haphazard waste disposal in undesignated areas as indicated by a mean of 0.421 and standard deviation of 0.612. The findings are consistent with Ezeah's (2016) analysis of factors influencing the adoption of sustainable municipal solid waste management in Nigeria. Ezeah (2016) argued that key contributors to Nigeria's waste issues were poverty, rapid population growth, and urbanization, all exacerbated by inadequate and underfunded waste management infrastructure.

Findings further revealed that most community household members dispose-off waste haphazardly due to lack of designated waste areas/structures in informal settlement areas hence aggravating environmental conservation efforts as opined by 60% who strongly agreed and 40% who agreed. The, mean was 4.60 with a standard deviation of 0.493. In conclusion, the researcher observed that there is need for waste facilities and collection points in informal settlement areas to curb poor waste disposal trends and improve on environmental conservation measures among local household members. This result also aligns with the position of Kipkoech (2019) who observed that community involvement is a participatory approach to natural resource conservation that catalyzes a win-win situation in conservation by enhancing biodiversity conservation and improving local livelihoods position in handling wastes in a dignified manner.

On whether available waste systems are ineffective in handling wastes generated, 44% were in strong agreement while 56% agreed unanimously citing limited facilities and affordability aspect to be some of setbacks of a sustainable environment conservation programmes. Only 2% of the remaining respondents neither agreed nor disagreed with the statement. The mean was 4.44 and a standard deviation of 0.500, an indication of closeness to the mean. Research by Owusu et al. (2014) and Owusu-Sekyere (2016) also asserted that, unlike Accra and Kumasi, which have established formal waste collection systems, other emerging cities in Ghana experience such low waste collection rates that they were often excluded from national data

Consequently, the results revealed that lack of access to waste facilities contributes to poor waste disposal in undesignated areas, evident in slum areas hence leading to environmental pollution as opined by majority in strong agreement at 90%.

Though 8% also agreed to the opinion, 2% neither agreed nor disagreed. The mean was 4.89 with a standard deviation of 0.352 and indication of closer relationship. The World Bank report (2021) cited the same position alluding that accessibility to waste facilities hindered waste management process among urban informal settlements. These cities face significant operational challenges, including limited capacity among local authorities, insufficient funding, and ineffective policy enforcement, all of which hinder efficient waste management (World Bank, 2021).

Moreover, the study also found that poverty contributed to low community involvement in integrated approach to waste management as opined 29% and 37% of the respondents who strongly agreed and agreed respectively. Though a considerable number, 34% held a neutral opinion to this statement. The mean was 3.95 with a standard deviation of 0.804. Mmereki and Velempini (2021) findings also pointed that sustainable waste management faced a number of deficiencies in the way policy linked to municipal solid waste management was being implemented, including a lack of institutional support, a lack of financial backing, and a lack of techniques to support policy. A sustainable and integrated waste management system's application is likewise restricted. In conclusion the study observed that most household members in slums were affected by high poverty levels hence could not afford and maintain good environmental conservation measures leading to proliferation of wastes and haphazard open dumping. Additionally, Baroi et al. (2020) contends that most municipalities across most developing economies often face problems beyond the ability of the municipal authority to tackle mainly due to lack of organization, financial resources, complexity, and system multidimensionality.

Sustainable Waste Management

The general objective of the study sought to examine the perceived barriers to sustainable waste management among slum dwellers in Mukuru slums in Kenya. The respondents were asked to rate their opinion on their level of agreement on a scale of 1 to 5 based on the statements provided on sustainable waste management where: 5= Strongly Agree; 4= Agree; 3= Neutral; 2= Disagree; 1= Strongly Disagree. The results were presented in Table 2 below;

Table 2: Sustainable Waste Management

S/No.	Statement	SD %	D %	N %	A %	SA %	Mean	SDV
SEC1	Offering support for waste management enterprises and other key players can help in promoting effective environmental conservation	0	4	10.4	52	33.6	4.26	.714
SEC2	Introduction of sustainable waste management approaches and interventions are key in managing solid waste in local areas.	2	3	14.2	37.8	43	3.68	.730
SEC3	There is need for promotion of integrated waste management approach to waste handling and disposal	0	0	17	47	36	3.91	.754
SEC4	Effective waste disposal and handling measures contribute to sustainable waste management	17.2	35	22.4	13	12.4	3.34	1.359
SEC5	Community awareness and participation guarantees a sustainable waste measures to succeed.	0	0	10.3	55.2	34.5	4.69	.630
SEC6	Integrated waste management approach promotes effective waste management practices among key stakeholders	0	3.5	24	42	30.5	4.79	.858
SEC7	Lack of policy integration and neglect of informal sector in urban waste management impedes efforts for proper waste management.	0	10.4	2.4	54.2	33	4.97	976

Scale: 1-2.4= Disagree; 2.5-3.4 =Neutral/Moderate; 3.5--5 =Agree. **Source**: Field Data (2024)

Table 2 above indicates that the means obtained from the study ranged between 3.34 to 4.97, reflecting varying levels of perceived impact. A higher score indicated stronger agreement or greater impact, with the highest score of 4.97 signifying the most significant factor identified by respondents. Conversely, lower scores suggest areas of lesser importance or impact.

Findings show that 88.6% of the respondents agreed that offering support for waste management enterprises and other key players help in promoting effective environmental conservation. While 10.4% were neutral in their opinion, 4% disagreed. the mean was 4.26 with a standard deviation of 0.714. Current research underscores that supporting waste management enterprises plays a significant role in promoting environmental sustainability. A study by Ajayi et al. (2023) highlights that financial and logistical support for waste management enterprises can bolster effective waste management and conservation efforts by ensuring these enterprises have the resources needed to handle waste responsibly.

Majority, 83% of respondents also agreed that introducing sustainable waste management approaches and interventions played a role in managing solid waste in informal areas, hence improving waste management efforts. Whereas 1% were neutral in their opinion, 3% and 2% disgareed and strongly disagreed. the mean was 3.68 with a standard deviation of 0.730. Similar findings were observed by Mwebaze et al. (2022), who noted that introducing sustainable waste management interventions significantly improved waste management in informal settlements. These

interventions, such as waste sorting and recycling initiatives, are often effective in addressing solid waste challenges unique to these areas.

On whether there was need for promotion of integrated waste management approach to waste handling and disposal, 36% strongly agreed, 47% agreed whereas 17% were neutral. The mean was 3.91 with a standard deviation of 0.754. This implied that it was important for waste management stakeholders and other agencies to embrace integrated waste management approach due to rapid increase in waste generation across informal settlements and the need to integrate sophisticated technologies in handling wastes. The importance of adopting an integrated approach to waste management is also echoed in recent studies. Research by Nyaluke and Kalema (2023) indicates that integrated waste management strategies, which consider collection, transportation, disposal, and recycling, are crucial for handling the rapid growth in waste generation in urban slums. The use of such integrated approaches helps bridge the gap between technological advancement and practical waste handling methods in densely populated areas.

Findings however revealed that respondents were not in agreement that effective waste disposal and handling measures contributed to sustainable waste management as supported by 35% and 17.2% in strong disagreement respectively. However, 22.4% were neutral while 25.4% were in agreement. The mean was 3.34 with a standard deviation of 1.359. Recent studies, including Ochieng et al. (2023), recommend increasing waste collection points, expanding road access for waste trucks, and fostering collaborations with NGOs and private entities to strengthen community-government partnerships. Such partnerships are essential for building robust waste management infrastructure in informal settlements, where government resources alone may be insufficient to address the scope of the problem.

Additionally, the results showed that community awareness and participation were critical elements that guarantee sustainable waste management measures to succeed as opined by 89.7% of the respondents. While 10.3% were neutral in their opinion. The mean achieved was 4.69 and standard deviation of 0.630. This implied that creating awareness on the community on the need for environmental conservation would change some of their attitudes towards waste handling and disposal. Community engagement and awareness play pivotal roles in waste management success, as supported by findings from Juma et al. (2023), who found that public awareness campaigns significantly improved residents' attitudes toward waste segregation and disposal. This aligns with the high agreement rates in this study, where 89.7% of respondents emphasized the importance of awareness programs.

On whether integrated waste management system promotes effective waste management practices among key stakeholders, 72.5% agreed while 24% neither agreed nor disagreed and 3.5% disagreed. the mean was 4.79 with a standard deviation of 0.858. Consequently, the research found that lack of policy integration and neglect of informal sector in urban waste management impeded efforts for proper waste management in Mukuru slums as opined by 87.2% of the respondents. Whereas 2.4% held a neutral view, 10.4% of the respondents disagreed. The mean was 4.97 with a standard deviation of 0.976. Policy integration is essential for effective waste management in urban slums, as noted by Macharia and Wambui (2023). They argue that without strong policy frameworks that include the informal sector, waste management efforts remain disjointed, undermining effectiveness. The current findings support this, with a high mean score reflecting the need for comprehensive policies that recognize informal sector contributions.

In summary, the respondents cited that promoting more awareness to the general public on waste segregation at the household level and educating people about proper disposal methods was key in

creating a sustainable waste management in Mukuru slums. Additionally, the respondents suggested the provision of more waste bins, waste collection points, and opening of access roads for waste trucks. Similarly, forming partnerships with NGOs and other private entities to establish stronger collaborations between communities, government, County government. This will help improve waste management infrastructure and services in Mukuru slums in Kenya.

Correlation Analysis

The study used Pearson product moment correlation coefficient (PPMCC) to establish whether there exists a linear relationship between the independent variables (poverty level, financial resources, management capabilities and regulatory policy) and the dependent variable (sustainable waste management) of the study. Pearson correlation coefficient (r) is a statistical measure of strength of linear relationship between paired data. As noted in table 3, none of the predictor variables had a coefficient of correlation greater than 0.5, hence they were all included in the model.

Table 3: Pearson Product Correlations Coefficients

		Y	X1
Sustainable Waste Management (Y)	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	75	
Poverty Level (X1)	Pearson Correlation	-.522	1
	Sig. (2-tailed)	.004	
	N	75	75

**. Correlation is significant at p=0.01 level (2-tailed).
*. Correlation is significant at p=0.05 level (2-tailed).

The results in Table 3 above show that poverty level had significant relationship with the dependent variable (sustainable waste management). This implies that poverty levels significantly influenced sustainable waste management among slum dwellers in Mukuru slums in Kenya.

The study observed that there was significant negative correlation between poverty levels and sustainable waste management among slum dwellers in Mukuru slums in Kenya.as shown by a correlation, r = -0.522 with a significant p=value of 0.004< 0.05. This implies that higher levels of poverty levels were associated with poor waste management among slum dwellers in Mukuru slums in Kenya. The relationship was statistically significant with p-value of 0.004 which is less than p-value of 0.05. The findings underscore the effect of poverty in derailing the efforts of sustainable waste management and suggests that for better waste management households in slum areas, the government should develop a framework that enables waste management affordable to slum dwellers. In contexts similar to Mukuru slums, the challenges of poverty and limited resources are known to impede waste management efforts. For instance, Azeez et al. (2022) report that in low-income urban areas, high poverty levels correlate with suboptimal waste management due to limited ability to afford private collection services.

Supporting studies reinforce these findings, emphasizing the impact of community involvement on sustainable waste management. Hammed and Folarin (2023) found that providing waste management infrastructure, such as bins and recycling stations, alongside training, strengthened waste collection efforts in Ghana. Similarly, Mutua et al. (2023) also noted that community-driven waste management initiatives in Kenya enhanced sanitation conditions and encouraged active resident participation. Meanwhile, Owusu and Amoako (2022) underscored the importance of continuous government and NGO support to

maintain these community-led initiatives, highlighting that technical and resource support fosters long-term sustainability in waste management practices. Together, these studies reveal that community empowerment through training, infrastructure, and consistent support significantly enhances waste management outcomes and public health in low-income urban communities.

CONCLUSION AND RECOMMENDATIONS

Waste management measures are key foundation for sustainable environmental conservation initiatives in any community. These are geared towards the realization and the need to have a conducive environment that fosters healthy living and preservation of the general surrounding where human beings live. Findings from this study reveal the need to employ various approaches, bringing on board all stakeholders, pulling both human and financial resources, coining awareness campaigns to change community perceptions and attitude towards waste generation, collection, handling and disposal, enforcement of relevant regulatory policies and developing the necessary framework to integrate modern methods of waste management in our society. Technical competencies and technical knowledge to incorporate integrated approach to waste management and the need to educate the community on environmental conservation benefits are key in the realization of a sustainable environmental conservation in most urban settlements. Urban planning, enactment of relevant policies and allocation of sufficient manpower and other necessary resources are vital in achieving a good environmental conservation effort to have a clean settlement.

The study looked at the implications of four determinants on sustainable waste management at the informal settlement of Mukuru slums. First the study looked at the implications of poverty level on sustainable waste management among slum dwellers in Mukuru slums in Kenya. The results revealed that poverty affects waste management in general in Mukuru slums. Therefore, study recommends the need for integration of waste management approach that is community centered to bring every community member on board. Because poverty played a critical role on the households' ability to access and pay for waste services, it is prudent to develop community initiatives that are focused on building a resource base to benefit the community through integrated waste management approach.

REFERENCES

Adeleke, O., Akinlabi, S., Jen, T. C., & Dunmade, I. (2021). Towards sustainability in municipal solid waste management in South Africa: A survey of challenges and prospects. *Transactions of the Royal Society of South Africa*, *76*(1), 53-66.

Adu-Gyamfi, D. (2014). Urban waste management in Ghana: Policy and practice. *Waste Management & Research, 32*(1), 11-22. https://doi.org/10.1177/ 0734242X13515406

Ajayi, R., Smith, D., & Patel, M. (2023). The Role of Small and Medium Enterprises in Sustainable Waste Management. *Environmental Policy Journal, 45*(2), 167-189.

Andole, A. (2016). Solid waste management in urban areas: The case of Nairobi City. *International Journal of Environmental Research and Public Health, 13*(7), 688. https://doi.org/10.3390/ijerph13070688

Azeez, A. A., Oyelade, O. J., & Ojo, J. A. (2022). The influence of poverty on waste management practices in low-income urban areas. *Environmental Science and Pollution Research*, 29(14), 20134-20145. DOI: 10.1007/s11356-022-19840-7.

Badgie, D., Samah, M. A. A., Manaf, L. A., & Muda, A. B. (2012). Assessment of Municipal Solid Waste

Composition in Malaysia: Management, Practice, and Challenges. *Polish journal of environmental studies*, *21*(3).

Cooper, D. R., & Schindler, P. S. (2005). *Business research methods* (9th ed.). New York: McGraw-Hill/Irwin.

Dlamini, T. S., & Simatele, M. D. (2016). Exploring the challenges of solid waste management in urban South Africa: A case study of Mbombela Local Municipality. *Journal of Environmental Management, 180*, 154-163. https://doi.org/10.1016/j.jenvman.2016.04.045

Esekon, L., Nabiswa, F., & Neyole, E. (2022). Role of the community in pollution management in Mukuru informal settlement of Nairobi County, Kenya. *Journal of Environmental & Analytical Toxicology, 7*(1), 231. https://doi.org/10.37421/2475-7675.2022.7.231

Ezeah, C. (2012). The role of local government in solid waste management in Nigeria: A case study of Enugu State. *Journal of Environmental Science and Technology, 5*(3), 234-243. https://doi.org/10.3923/jest.2012.234.243

Fadhullah, R., Tan, K. S., & Miskam, M. A. (2022). Factors affecting waste management practices among urban communities in Malaysia: A case study of Kuala Lumpur. *Journal of Environmental Management, 309*, 114647. https://doi.org/10.1016/j.jenvman.2022.114647

GoK (2019). *Kenya vision 2030: A globally Competitive and Prospective Kenya.* Nairobi: GoK.

Gutberlet, J., Kain, J. H., Nyakinya, B., Oloko, M., Zapata, P., & Zapata Campos, M. J. (2017). Bridging weak links of solid waste management in informal settlements. *The Journal of Environment & Development*, *26*(1), 106-131.

Hamann, K., Lutz, J., & Reich, M. (2017). A framework for developing sustainability in small and medium-sized enterprises. *Journal of Cleaner Production, 164*, 547-558. https://doi.org/10.1016/j.jclepro.2017.06.078

Hammed, T. A., & Folarin, A. O. (2023). Assessing the impact of waste management infrastructure on collection efficiency in urban communities: A study from Ghana. *Resources, Conservation and Recycling*, *189*, 106598. DOI: 10.1016/j.resconrec.2023.106598.

Hoornweg, D., & Freire, M. (2013). *Building sustainability in an urbanizing world: A partnership report.* Geneva: World Bank.

Japan International Cooperation Agency (JICA). (2014). *Study on the solid waste management in the Republic of Kenya*. Nairobi: JICA.

Juma, L., Mwangi, S., & Omondi, T. (2023). Community Engagement and Sustainable Waste

Kamweru, G. (2019). *Assessment of households' knowledge, attitudes, and practices on solid waste management in Nakuru Town,* Unpublished PhD dissertation, Nairobi: University of Nairobi.

Kaza, S., & Yao, L. (2018). *At a glance: A global picture of solid waste management.* Geneva: World Bank.

Kipkoech, M. (2019). Challenges and opportunities in waste management in Kenya: A case study of Nakuru. *Environmental Science and Pollution Research, 26*(14), 14173-14183. https://doi.org/10.1007/s11356-019-05332-0

Koskey, D., & Ipara, A. (2019). Solid waste management practices among households in urban areas: A case study of Kisumu City. *International Journal of Environmental Research and Public Health, 16*(19), 3749.

https://doi.org/10.3390/ijerph16193749

Kothari, C. R., & Garg, G. (2014). *Research methodology: Methods and techniques* (3rd ed.). New Delhi: New Age International Publishers.

Macharia, M., & Wambui, K. (2023). Policy Integration for Effective Urban Waste Management. *Policy Review Journal, 58*(2), 110-125.

Madinah, N., Boerhannoeddin, A., & Ariffin, R. N. B. R. (2016). An assessment of the relationship between shared solid waste management services and effectiveness in service delivery in Kampala Capital City Authority. *Journal of Public Administration and Governance, 6*(2), 1–14.

Magu, S., & Sakwa, D. (2019). Solid waste management practices among households in Nakuru County, Kenya. *Journal of Waste Management, 2019*, 1-10. https://doi.org/10.1155/2019/1326435

Mitchell, D. J., Thacker, P., & Jones, L. D. (2020). Advancing sustainable waste management: A systematic review of literature. *Waste Management, 105*, 415-426. https://doi.org/10.1016/j.wasman.2020.02.019

Mmereki, D., & Velempini, M. (2021). Assessment of the effectiveness of solid waste management strategies in Botswana: A case study of Gaborone. *Waste Management & Research, 39*(9), 1085-1095. https://doi.org/10.1177/ 0734242X211021532

Mohamed, A. (2019). Solid waste management in urban areas: A study on the practices and challenges in Sudan. *Environmental Management, 64*(3), 345-356. https://doi.org/10.1007/s00267-019-01175-3

Munyigi, L., & Mang'uriu, D. (2024). Factors influencing management of human excrement through biogas technology in Mukuru Kwa Njenga Slums, Nairobi City County Kenya. *East African Journal of Environment and Natural Resources, 7*(1), 141–156. https://doi.org/10.37284/ eajenr.7.1.1918

Mutala, F. (2016). The impact of solid waste management on public health: A case study of Accra, Ghana. *International Journal of Environmental Health Research, 26*(5), 523-535. https://doi.org/10.1080/09603123. 2016. 1150194

Mutua, J. M., Nyaga, K., & Otieno, W. (2023). Community-driven initiatives for sustainable waste management in low-income neighborhoods: Lessons from Kenya. *Journal of Cleaner Production*, *392,* 136192. DOI: 10.1016/j.jclepro.2023.136192.

Mwebaze, A., Ogwal, J., & Lwanga, B. (2022). Sustainable Waste Management Approaches in Urban Informal Settlements. *Journal of Urban Environmental Studies, 39*(4), 341-356.

National Environment Management Authority (NEMA). (2014). *The National Solid Waste Management Strategy.* Nairobi: NEMA.

National Environment Management Authority (NEMA). (2022). *National solid waste management strategy*. NEMA, Kenya. Retrieved from https://www.nema.go.ke/

Njoroge, B. N. K., Kimani, M., & Ndunge, D. (2014). *Review of municipal solid waste management:* A case study of Nairobi, Kenya. *International Journal Of Engineering And Science 4*(2), 16-20.

Nyaluke, P., & Kalema, J. (2023). *Integrated Approaches to Urban Waste Management in Developing Countries*. *African Journal of Environmental Management, 24*(1), 88-102.

Nyampundu, M., & Mwegoha, W. J. S. (2020). Challenges and opportunities of waste management in urban

Tanzania: A case of Dar es Salaam. *Waste Management, 106*, 121-130. https://doi.org/10.1016/j.wasman. 2020.03.020

Ochieng, G. (2016). *Challenges and Possible Interventions for Effective Solid Waste Management in Ngomongo Village of Korogocho Informal Settlement, Nairobi County*, Unpublished PhD dissertation, Nairobi: University of Nairobi.

Ochieng, P., Mutisya, E., & Kabiru, D. (2023). *Infrastructure Development and Community Partnerships in Waste Management*. *Kenyan Journal of Sustainable Development, 7*(1), 29-45.

Ogutu, F. A. (2019). *Assessment of the Effectiveness of the Policy Framework on Solid Waste Management in Nairobi, Kenya,* Unpublished Master's thesis, Nairobi; University of Nairobi.

Ongoro, E. (2012). *Solid waste management challenges in developing countries: Case study of Nairobi city, Kenya,* Unpublished PhD dissertation, Nairobi: University of Nairobi.

Orr, R. J. (2011). The future of solid waste management in developing countries. *Waste Management, 31*(7), 1474-1485. https://doi.org/10.1016/j.wasman. 2011.02.007

Owusu, G., & Amoako, C. (2022). The role of government and NGO support in community-led waste management systems: Insights from low-income neighborhoods in Ghana. *Waste Management & Research*, *40*(5), 487-497. DOI: 10.1177/0734242X221077078.

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students* (Seventh). New York: Pearson Education.

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students* (7th ed.). New Delhi: Pearson Education Limited.

Schmitz, S., Witte, K., & Ziegler, J. (2012). Waste management in urban areas: A review of challenges and future directions. *Waste Management, 32*(11), 1952-1960. https://doi.org/10.1016/j.wasman.2012.06.002

School environmental conservation program, Kenya. (n.d.). KENPRO. Retrieved from www.kenpro.org/school-environmental-conservation-program-kenya/

Serge Kubanza, N., & Simatele, M. D. (2020). Sustainable solid waste management in developing countries: a study of institutional strengthening for solid waste management in Johannesburg, South Africa. *Journal of Environmental Planning and Management*, *63*(2), 175-188.

Sibanda, L. K., Obange, N., & Awuor, F. O. (2017). Challenges of solid waste management in Kisumu, Kenya. In *Urban Forum* (Vol. 28, No. 4, pp. 387-402). Springer Netherlands.

United Nations Environment Programme (UNEP). (2020). *Waste management: An essential public service in the fight to beat COVID-19.* UNEP and the Basel Convention.

Villegas Pinuera, A., & de Nijs, T. (2021). The role of community-based organizations in waste management: Evidence from urban Colombia. *Resources, Conservation and Recycling, 164*, 105142. https://doi.org/10.1016/j. resconrec. 2020.105142

Zaman, A. U. (2014). Identification of key assessment indicators of the zero waste management systems. *Ecological indicators*, *36*, 682-693.