

# Solid Waste Management and Environmental Quality in Emerging Urban Centres: Insights from Suneka Town, Kisii County, Kenya

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## ABSTRACT

Rapid urbanization in developing regions has intensified environmental management challenges, particularly in relation to municipal solid waste. While extensive research has focused on major cities, emerging urban centres remain underexplored despite facing similar pressures. This study examines the environmental quality implications of solid waste management practices in Suneka Town, Kisii County, Kenya. The study adopts a qualitative desk-based research design based on a systematic synthesis of peer-reviewed literature, policy documents, and institutional reports. Thematic analysis was used to identify patterns and causal relationships linking waste management practices to environmental outcomes. The findings show that inefficient waste collection, informal disposal practices, and poor waste handling contribute to environmental degradation through identifiable mechanisms. Waste accumulation leads to drainage blockage by obstructing water flow, increases pest infestation through organic waste decomposition, and results in odor pollution that reduces environmental quality. These processes collectively compromise sanitation conditions and increase public health risks. The study further demonstrates that these challenges are not isolated but reflect broader structural conditions observed across rapidly growing urban centres in Sub-Saharan Africa. The findings highlight the need for integrated waste management systems that combine infrastructure development, institutional strengthening, and community participation. Improving waste management in emerging urban centres is essential for enhancing environmental quality, protecting public health, and promoting sustainable urban development in Kenya and similar contexts.

**Keywords:** Municipal solid waste management; Environmental quality; Urban sanitation; Waste disposal practices; Emerging urban centres; Sustainable urban development; Kenya

## INTRODUCTION

Urbanization has become one of the most significant demographic transformations of the twenty-first century. According to the United Nations (2022), more than half of the global population currently resides in urban areas, and this proportion is projected to reach nearly 68% by 2050. This rapid urban growth is particularly evident in developing regions, where expanding towns and cities are experiencing accelerated population increase, spatial expansion, and intensified economic activities. While urbanization presents important opportunities for economic development, improved infrastructure, and enhanced livelihoods, it also generates substantial environmental management challenges that threaten the sustainability of urban environments (Seto et al., 2017).

One of the most critical environmental challenges associated with urban growth is the management of solid waste. Increasing population, changing consumption patterns, and expanding commercial activities have led to a significant rise in waste generation globally. Current estimates indicate that municipal solid waste generation exceeds 2.2 billion tonnes annually and is expected to increase further if current trends persist (Kaza et al., 2018). This growth in waste generation has far-reaching environmental consequences, including land degradation, contamination of surface and groundwater resources, air pollution from waste burning, and declining sanitation conditions in urban areas (UNEP, 2021).

Solid waste management therefore plays a central role in maintaining environmental quality within urban environments. Effective waste management systems contribute to environmental cleanliness, protect natural ecosystems, and reduce public health risks through proper collection, transportation, treatment, and disposal of waste. In contrast, inefficient waste management practices often result in waste accumulation in residential areas, open dumping in public spaces, blockage of drainage systems, and the proliferation of pests such as rodents, flies, and mosquitoes. These conditions significantly increase the risk of disease transmission and contribute to declining environmental quality (Ferronato & Torretta, 2019; Wilson et al., 2020).

The environmental implications of poor waste management are particularly severe in developing countries, where urban infrastructure and institutional capacity often struggle to keep pace with rapid urban expansion. Many cities across Africa, Asia, and Latin America face persistent challenges related to limited waste collection coverage, inadequate disposal facilities, and weak regulatory enforcement (Dlamini & Simatele, 2020; Amoah & Kosoe, 2021). As a result, a substantial proportion of solid waste remains uncollected or is disposed of informally in open spaces, drainage channels, and vacant land, contributing to environmental degradation and unsanitary living conditions.

Across Africa, solid waste management has emerged as a major environmental concern due to rapid urban population growth and expanding economic activities. Studies conducted in cities such as Accra, Lagos, and Kampala have documented widespread waste accumulation in residential areas and public spaces associated with inefficient waste management systems (Amoah & Kosoe, 2021; Okot-Okumu, 2012). In many cases, waste management systems are constrained by limited financial resources, inadequate infrastructure, weak institutional coordination, and insufficient technical capacity. Consequently, waste accumulation frequently contributes to environmental pollution, degradation of urban ecosystems, and increased exposure of urban populations to environmental health risks (Guerrero et al., 2013).

In East Africa, countries such as Kenya, Uganda, and Tanzania have experienced rapid urban expansion over the past two decades. This expansion has resulted in increased demand for urban environmental services, including waste management and sanitation. However, waste management systems in many urban centres remain inadequate to effectively manage the growing volumes of waste generated by expanding populations (Kaza et al., 2018). Waste accumulation in residential neighbourhoods, markets, and drainage systems has therefore become a common environmental challenge in many towns and cities across the region.

In the Kenyan context, solid waste management functions are devolved to county governments following the Constitution of 2010, which replaced the former municipal governance system. This governance transition has significant implications for how waste management services are planned, financed, and implemented across urban centres.

Kenya is among the countries experiencing rapid urban growth in East Africa, with both major cities and emerging towns facing increasing waste management challenges. Urban centres generate large quantities of solid waste on a daily basis due to population growth, commercial activities, and changing consumption patterns. Studies conducted in Nairobi and Kisumu show that inefficient waste management contributes to waste accumulation in residential areas and public spaces, leading to environmental pollution and declining sanitation conditions (Kuria et al., 2017; Mascarenhas et al., 2021). Despite these insights, most existing studies have focused on large metropolitan areas, leaving smaller but rapidly growing towns relatively under-researched.

Emerging urban centres such as Suneka Town in Kisii County are increasingly experiencing similar environmental challenges associated with waste accumulation and inadequate waste management practices. Suneka serves as an important commercial hub linking rural agricultural communities with urban markets and has experienced notable population growth and economic expansion in recent years. However, waste management infrastructure and environmental services have not expanded at the same rate. This imbalance has resulted in visible environmental concerns such as waste accumulation in public spaces, blockage of drainage systems, and declining sanitation conditions.

Understanding the relationship between solid waste management practices and environmental quality in such emerging urban centres is therefore essential for developing effective environmental management strategies.

Examining how waste disposal practices influence environmental cleanliness, drainage functionality, pest infestation, and sanitation conditions can provide important insights into the environmental consequences of waste mismanagement in rapidly growing towns.

This study therefore examines the environmental quality implications of solid waste management practices in Suneka Town, Kisii County, Kenya. Specifically, the study assesses how waste management practices influence environmental cleanliness, waste accumulation, drainage conditions, pest infestation, and overall sanitation conditions. By focusing on an emerging urban centre, the study contributes to addressing an important gap in the literature and provides evidence to support sustainable urban environmental management in rapidly growing towns in Kenya and similar developing contexts.

To provide clear analytical direction, this study was guided by the following research questions: (i) How do waste management practices influence environmental cleanliness? (ii) What is the relationship between waste disposal and drainage conditions? (iii) How do waste practices contribute to pest infestation and sanitation challenges? These research questions are intended to systematically examine the linkages between waste management practices and key indicators of environmental quality in rapidly growing urban centres.

## LITERATURE REVIEW

### Environmental Quality and Urban Sustainability

Environmental quality is a central component of sustainable urban development. It reflects the condition of sanitation systems, waste management, air and water quality, and ecosystem health within urban areas (UN-Habitat, 2020; UNEP, 2021). High environmental quality supports public health, enhances urban livability, and contributes to long-term socio-economic sustainability (Bulkeley & Betsill, 2018; WHO, 2016). It is also closely linked to global frameworks such as the Sustainable Development Goals, particularly SDG 11, which promotes inclusive, safe, resilient, and sustainable cities (United Nations, 2022).

Rapid urbanization has made it increasingly difficult to maintain environmental quality, particularly in developing regions. Population growth, expanding economic activities, and changing consumption patterns have placed significant pressure on urban infrastructure and environmental systems (Seto et al., 2017; Kaza et al., 2018). These pressures often result in increased waste generation, environmental pollution, and declining sanitation conditions, especially where planning and service provision lag behind urban growth.

Municipal solid waste management plays a critical role in shaping environmental quality. Effective waste management systems contribute to cleaner environments, reduced pollution, and improved public health outcomes. Conversely, inefficient systems lead to waste accumulation, environmental contamination, and increased exposure to health risks (Ferronato & Torretta, 2019; Guerrero et al., 2018). From an urban systems perspective, cities function as metabolic systems that consume resources and generate waste, making sustainable waste management essential for maintaining ecological balance (Kennedy et al., 2015).

Poorly managed waste can contaminate soil and water, contribute to air pollution, and degrade urban ecosystems. In addition, waste accumulation in drainage systems can obstruct water flow and increase the risk of flooding, highlighting the interconnected nature of urban environmental systems (UNEP, 2021).

### Waste Management Practices in Developing Urban Areas

Waste management practices in developing urban areas are shaped by a combination of infrastructural, institutional, and socio-economic factors (Guerrero et al., 2013; Dlamini & Simatele, 2020). Rapid urban growth has increased both the volume and complexity of waste, while the capacity of urban management systems has often remained limited (Kaza et al., 2018; UNEP, 2021; United Nations, 2022).

As a result, formal and informal waste management systems coexist. Formal collection services are often present but operate with limited coverage and efficiency. In many cases, households and businesses resort to alternative disposal practices such as roadside dumping, open burning, and disposal in drainage systems when formal

services are unreliable or inaccessible (Amoah & Kosoe, 2021; Okot-Okumu, 2012; Ferronato & Torretta, 2019; Wilson et al., 2015).

Table 1: Common Waste Management Practices in Developing Urban Areas

| Waste Management Practice       | Description  | Supporting Literature                          |
|---------------------------------|--|--|
| Limited formal waste collection | Often characterized by inadequate coverage and inefficiency in rapidly growing urban areas | Kaza et al. (2018); World Bank (2019)          |
| Roadside and open dumping       | Common in underserved areas due to limited access to formal waste services                 | Amoah & Kosoe (2021); Okot-Okumu (2012)        |
| Open burning of waste           | Widely practiced where formal disposal systems are absent                                  | World Bank (2019); Ferronato & Torretta (2019) |
| Disposal in drainage systems    | Leads to blockage of drainage channels and increased flood risk                            | UNEP (2021); Liu et al. (2023)                 |

Source: Author’s synthesis based on reviewed literature (Kaza et al., 2018; World Bank, 2019; Amoah & Kosoe, 2021; Okot-Okumu, 2012; Ferronato & Torretta, 2019; UNEP, 2021; Liu et al., 2023)

These informal practices are often adaptive responses to deficiencies in formal waste management systems. However, while they may provide short-term solutions, they generate long-term environmental consequences, including pollution, sanitation challenges, and ecosystem degradation (UNEP, 2021; Wilson et al., 2015). The persistence of these practices reflects deeper structural issues, including inadequate infrastructure, weak institutional capacity, and limited financial resources.

### Environmental Quality Challenges in African Cities

Urbanization in Africa has intensified environmental challenges, particularly in relation to waste management. Many cities face difficulties in providing efficient waste collection and disposal services due to limited financial resources, inadequate infrastructure, and weak governance systems (Ferronato & Torretta, 2019; Guerrero et al., 2018; Dlamini & Simatele, 2020).

Table 2: Environmental Impacts of Poor Waste Management

| Environmental Impact                | Description   | Supporting Literature                   |
|-------------------------------------|---|---|
| Waste accumulation in public spaces | Leads to declining environmental cleanliness and reduced urban livability | UN-Habitat (2020); UNEP (2021)          |
| Blocked drainage systems            | Causes flooding and infrastructure damage due to reduced water flow       | UNEP (2021); Liu et al. (2023)          |
| Pest infestation (flies, rodents)   | Increases risk of disease transmission in urban environments              | WHO (2016); Ferronato & Torretta (2019) |
| Odor pollution                      | Reduces environmental comfort and affects quality of life                 | Chen et al. (2022)                      |

Source: Author’s synthesis based on reviewed literature (UN-Habitat, 2020; UNEP, 2021; WHO, 2016; Ferronato & Torretta, 2019; Chen et al., 2022; Liu et al., 2023)

Waste accumulation in public spaces contributes directly to declining environmental cleanliness and increased exposure to health risks (UN-Habitat, 2020). Disposal of waste in drainage systems has been widely identified as a major cause of flooding, as it obstructs water flow and reduces the efficiency of drainage infrastructure (UNEP, 2021; Liu et al., 2023).

In addition, unmanaged waste creates favourable conditions for pest infestation, including flies and rodents, which are associated with the transmission of infectious diseases (WHO, 2016; Ferronato & Torretta, 2019). Odor pollution resulting from decomposing organic waste further reduces environmental comfort and affects urban livability (Chen et al., 2022).

These impacts are not evenly distributed. Low-income communities are often disproportionately affected due to limited access to waste management services, exposing them to higher environmental and health risks (World Bank, 2019). This highlights the importance of inclusive and equitable waste management strategies.

### Waste Management and Environmental Health in East Africa

In East Africa, rapid urban growth has led to increasing waste generation, while waste management systems remain inadequate (Kaza et al., 2018; UNEP, 2021). Studies in Kampala and Dar es Salaam show that informal disposal practices contribute to environmental pollution, sanitation challenges, and flooding (Okot-Okumu, 2012; NEMA, 2020).

**Table 3: Socio-Environmental Implications of Waste Mismanagement**

| Implication                   | Description  | Supporting Literature                 |
|-------------------------------|--|---------------------------------------|
| Increased flooding risk       | Linked to blockage of drainage systems by waste materials              | UNEP (2021); World Bank (2019)        |
| Increased disease risk        | Results from exposure to contaminated environments and poor sanitation | WHO (2016); Zhang et al. (2024)       |
| Reduced environmental quality | Caused by waste accumulation and environmental pollution               | Kaza et al. (2018)                    |
| Decline in urban livability   | Affects quality of life and economic activities                        | Chen et al. (2022); UN-Habitat (2020) |

**Source:** Author’s synthesis based on reviewed literature (UNEP, 2021; World Bank, 2019; WHO, 2016; Zhang et al., 2024; Kaza et al., 2018; Chen et al., 2022; UN-Habitat, 2020)

These findings reinforce the close link between waste management and public health outcomes. Decomposing waste materials create conditions that support pest infestation, increasing exposure to diseases such as cholera, typhoid, and malaria (WHO, 2016; Ferronato & Torretta, 2019).

Circular economy approaches offer potential pathways for improving waste management by promoting recycling, reuse, and resource efficiency (Geissdoerfer et al., 2017; Kirchherr et al., 2017). However, their implementation remains limited due to infrastructural and institutional constraints (World Bank, 2019; UNEP, 2021).

### Waste Management and Environmental Quality in Kenya

In Kenya, rapid urbanization has intensified waste management challenges. Cities such as Nairobi and Kisumu experience waste accumulation, drainage blockage, and declining environmental quality (Kuria et al., 2017; Mascarenhas et al., 2021).

Institutional challenges, including weak enforcement of environmental regulations, limited financial resources, and poor coordination among stakeholders, continue to undermine effective waste management (NEMA, 2020). These challenges are often more pronounced in rapidly growing towns where infrastructure development has not kept pace with population growth. Despite growing evidence on waste management in major cities, emerging towns remain underexplored, even though they face increasing environmental pressures.

## Research Gap

Existing studies provide valuable insights into municipal solid waste management and environmental quality in large urban centres. However, relatively limited attention has been given to emerging secondary towns, where rapid urban growth is often not matched by adequate infrastructure and institutional capacity.

In addition, much of the literature remains largely descriptive, with limited emphasis on explaining the causal relationships between waste management practices and environmental outcomes. There is also limited integration of environmental quality indicators with waste management practices in smaller urban settings.

This study addresses these gaps by providing a structured synthesis of evidence that links specific waste management practices to environmental quality outcomes, with particular attention to emerging urban centres such as Suneka Town.

## METHODOLOGY

### Research Design

This study adopted a qualitative desk-based research design grounded in a systematic synthesis of existing literature, policy documents, and contextual case studies. The approach was selected to provide a comprehensive understanding of the environmental quality implications of municipal solid waste management practices in rapidly growing urban centres. Desk-based research is appropriate for studies that aim to integrate and critically analyse existing empirical evidence in order to generate insights into complex environmental and urban management challenges (Creswell & Creswell, 2018; Bowen, 2009).

The design enabled the study to draw from a wide range of empirical and conceptual studies, thereby capturing diverse perspectives on waste management practices, environmental quality, and urban sustainability in developing regions. It also facilitated the identification of recurring patterns, relationships, and contextual variations that are relevant to emerging towns such as Suneka. This integrative approach strengthens analytical depth by situating local challenges within broader regional and global contexts (UNEP, 2021; Kaza et al., 2018).

Importantly, this study is designed as a qualitative synthesis rather than a primary empirical investigation. The objective is not to generate new field data, but to integrate and critically examine existing empirical and policy evidence in order to identify consistent patterns and causal relationships between waste management practices and environmental outcomes. This approach is particularly suitable for emerging urban centres such as Suneka Town, where localized data may be limited but comparable evidence from similar contexts provides a reliable basis for analysis. By synthesizing findings across multiple studies, the research is able to draw broader inferences and highlight structural dynamics that may not be captured through single-site investigations.

### Data Sources and Selection Criteria

The study relied on secondary data drawn from peer-reviewed journal articles, institutional reports, policy documents, and global development publications. Key sources included works from the World Bank, United Nations Environment Programme, World Health Organization, and UN-Habitat, alongside reputable academic studies. These sources were selected for their credibility and relevance to environmental management, urban sustainability, and public health (UNEP, 2021; World Bank, 2019; UN-Habitat, 2020).

To maintain relevance and analytical rigor, clearly defined inclusion criteria were applied. The review focused on studies addressing municipal solid waste management in urban or peri-urban settings, with particular attention

to environmental quality indicators such as sanitation, drainage performance, pollution, and public health outcomes. Priority was given to literature published between 2010 and 2024 to ensure alignment with recent developments in the field (Kaza et al., 2018; Ferronato & Torretta, 2019).

Greater weight was given to studies offering empirical evidence or detailed case analyses, as these provided a stronger basis for examining causal links between waste management practices and environmental outcomes (Guerrero et al., 2013; Wilson et al., 2020). Sources lacking methodological clarity, empirical grounding, or direct relevance were excluded. This approach ensured that the analysis was based on high-quality, contextually appropriate evidence, thereby strengthening the validity and reliability of the findings (Creswell & Creswell, 2018; Bowen, 2009).

### **Data Collection Procedure**

Data collection involved a systematic search and review of relevant literature using academic databases such as Google Scholar, Scopus-indexed journals, and institutional repositories. The search process was guided by key terms including municipal solid waste management, environmental quality, urban sanitation, waste disposal practices, and urban sustainability in developing countries.

The selection process followed a structured and iterative approach. Initially, relevant studies were identified through keyword searches across multiple databases. This was followed by screening based on titles and abstracts to assess relevance to the study objectives. Full-text review was then conducted to confirm eligibility and ensure alignment with the thematic focus of the study. This process ensured that only high-quality and relevant sources were included in the final analysis, thereby enhancing the robustness of the study (Bowen, 2009; Creswell & Creswell, 2018).

### **Data Analysis**

The study employed qualitative thematic analysis to synthesize findings from the selected literature. This approach involved systematically identifying, categorizing, and interpreting recurring themes related to waste management practices and their environmental implications. Thematic analysis is widely used to organize complex data into meaningful patterns and to support interpretation across multiple studies (Braun & Clarke, 2006).

The analysis focused on key themes including waste accumulation and environmental cleanliness, waste disposal practices and drainage conditions, pest infestation and environmental health risks, odor pollution and urban livability, as well as institutional and infrastructural challenges in waste management. In addition to identifying patterns, the study examined how and why these patterns emerge.

Particular attention was given to explaining causal relationships between waste practices and environmental outcomes. This process enabled the study to establish clear linkages while highlighting variations across urban contexts and deepening understanding of how systemic and behavioural factors shape environmental outcomes (Wilson et al., 2020; UNEP, 2021).

### **Validity and Reliability**

To enhance the credibility and rigor of the study, several strategies were employed. Data triangulation was achieved through the integration of multiple sources, including peer-reviewed literature, policy documents, and institutional reports. This allowed for cross-verification of findings and reduced the risk of single-source bias, thereby strengthening the validity of the conclusions (Creswell & Creswell, 2018).

A systematic and transparent approach to data selection and analysis was maintained to ensure consistency and replicability. Clearly defined inclusion and exclusion criteria guided the selection of sources, while the thematic analysis followed a structured and iterative process. In addition, the study prioritized the use of reputable and widely cited sources, which enhanced both the reliability and academic integrity of the findings (Guerrero et al., 2013; UNEP, 2021).

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## Ethical Considerations

This study relied exclusively on secondary data and did not involve direct interaction with human participants. As such, formal ethical approval was not required. However, strict ethical standards were maintained throughout the research process.

All sources were appropriately cited to ensure academic integrity and to avoid plagiarism. Care was taken to accurately represent findings without misinterpretation or selective reporting. The study also ensured that all referenced materials were used responsibly and in accordance with accepted academic research standards. This approach supports transparency, credibility, and ethical scholarship in desk-based research (Bowen, 2009).

## FINDINGS AND DISCUSSION

This section presents a synthesis of evidence from existing literature on municipal solid waste management and its implications for environmental quality in rapidly growing urban centres. The analysis shows that inefficient waste management systems are a major driver of environmental degradation, particularly in developing regions where urban growth often outpaces infrastructure and service provision (Kaza et al., 2018; UNEP, 2021).

In Sub-Saharan Africa, between 30% and 50% of municipal solid waste remains uncollected, especially in rapidly expanding urban areas (World Bank, 2019; UNEP, 2021). In Kenya, waste collection coverage in many urban centres remains below 60%, with even lower coverage in emerging towns. These figures provide a quantitative basis for understanding the environmental challenges observed in towns such as Suneka, where growing waste volumes are not matched by adequate service provision.

One of the most visible outcomes of poor waste management is the accumulation of waste in public spaces. Evidence from urban areas across Africa and other developing regions shows that inadequate waste collection services lead to the buildup of waste in residential neighbourhoods, markets, and open spaces, reducing environmental cleanliness and overall urban livability (UN-Habitat, 2020; Amoah & Kosoe, 2021). These conditions are often associated with irregular collection schedules, limited service coverage, and weak institutional capacity, which constrain the effectiveness of formal waste management systems (Guerrero et al., 2013; Dlamini & Simatele, 2020).

Closely related to waste accumulation is the widespread use of informal waste disposal practices. Households and businesses frequently resort to roadside dumping, open burning, and disposal in drainage systems when formal waste collection is unreliable or inaccessible (Ferronato & Torretta, 2019; Wilson et al., 2015). These practices are shaped by structural limitations within urban management systems and reflect adaptive responses to service gaps rather than deliberate environmental neglect (Okot-Okumu, 2012). However, while they may offer short-term solutions, they generate long-term environmental consequences, including pollution, ecosystem degradation, and declining sanitation conditions (UNEP, 2021).

Improper waste disposal has a direct effect on drainage systems. The accumulation of plastics and organic waste in drainage channels reduces flow capacity and obstructs water movement, particularly during rainfall events. As a result, even moderate precipitation can lead to localized flooding, infrastructure damage, and disruption of urban services (UNEP, 2021; Liu et al., 2023). This demonstrates a clear causal relationship between waste management practices and drainage performance, highlighting how deficiencies in one sector can affect broader urban systems.

Another critical dimension is the link between waste accumulation and pest infestation. Poorly managed waste, especially organic waste, creates favourable conditions for the proliferation of disease vectors such as flies, rodents, and mosquitoes. The decomposition process produces moisture and nutrients that support rapid pest growth, increasing the risk of diseases such as malaria, cholera, and typhoid (World Health Organization, 2016; Ferronato & Torretta, 2019). This establishes a direct connection between waste management practices and public health outcomes.

Odor pollution also emerges as a significant environmental concern. The decomposition of organic waste in open spaces releases gases that reduce air quality and environmental comfort. These conditions negatively affect quality of life and can discourage economic activity in residential and commercial areas (Chen et al., 2022). Together, these impacts illustrate how waste mismanagement affects multiple dimensions of urban environmental quality.

To synthesize these relationships, Table 4.1 presents the key linkages between waste management practices and environmental quality outcomes.

The synthesis presented in Table 4.1 highlights the multidimensional nature of waste management challenges in rapidly growing urban centres. Different waste practices are closely linked to specific environmental outcomes, which collectively contribute to declining environmental quality. This underscores the need for integrated approaches that address multiple aspects of waste management simultaneously.

From a broader perspective, the findings show that waste management challenges are not purely technical but are shaped by socio-institutional conditions. Limited financial resources, inadequate infrastructure, weak regulatory enforcement, and poor coordination among stakeholders contribute to systemic inefficiencies (Guerrero et al., 2013; Dlamini & Simatele, 2020). These structural constraints are further compounded by low levels of public awareness and participation in sustainable waste management practices (UN-Habitat, 2020).

Table 4: Waste Management Practices and Environmental Quality Outcomes

| <b>Waste Management Practice</b>      | <b>Environmental Impact</b>                                | <b>Supporting Literature</b>                   |
|---------------------------------------|--|--|
| Irregular or limited waste collection | Waste accumulation and declining environmental cleanliness | UN-Habitat (2020); Kaza et al. (2018)          |
| Roadside dumping and open disposal    | Land pollution and degradation of urban landscapes         | Amoah & Kosoe (2021); Okot-Okumu (2012)        |
| Disposal in drainage systems          | Blockage of drainage systems and increased flood risk      | UNEP (2021); Liu et al. (2023)                 |
| Open burning of waste                 | Air pollution and associated health risks                  | Ferronato & Torretta (2019); World Bank (2019) |
| Organic waste accumulation            | Pest infestation and increased disease transmission        | WHO (2016); Ferronato & Torretta (2019)        |
| Poor waste handling and storage       | Odor pollution and reduced urban livability                | Chen et al. (2022); UN-Habitat (2020)          |

Source: Author’s synthesis based on reviewed literature

The literature also reveals significant spatial inequalities in access to waste management services. Areas with relatively better infrastructure tend to experience higher levels of environmental cleanliness, while underserved areas face cumulative environmental risks associated with waste accumulation, pollution, and health hazards (World Bank, 2019). This uneven distribution highlights the need for inclusive and equitable waste management strategies.

Importantly, similar patterns have been observed across other urban centres in Sub-Saharan Africa. Studies in Accra, Kampala, and Dar es Salaam report comparable challenges, including waste accumulation, informal disposal practices, and environmental health risks (Amoah & Kosoe, 2021; Okot-Okumu, 2012; NEMA, 2020).

This suggests that the conditions observed in Suneka Town reflect broader regional dynamics rather than isolated local issues.

The findings also point to the potential of integrated waste management approaches in improving environmental outcomes. Evidence from cities that have adopted strategies such as regular waste collection, recycling, composting, and community participation shows measurable improvements in environmental quality and urban sustainability (Wilson et al., 2020). These approaches align with circular economy principles, which emphasize resource efficiency and waste reduction as pathways toward sustainable urban development (Geissdoerfer et al., 2017; Kirchherr et al., 2017).

In the context of emerging urban centres such as Suneka Town, the synthesis suggests that waste management challenges are likely to follow similar patterns observed in other rapidly growing towns. Increasing population growth, expanding economic activities, and limited infrastructure create conditions in which waste generation rises while management capacity remains constrained. This imbalance between urban growth and service provision remains a key driver of environmental degradation (Kaza et al., 2018; UNEP, 2021).

Overall, the analysis demonstrates that municipal solid waste management is a critical determinant of environmental quality in rapidly urbanizing contexts. Addressing these challenges requires a combination of institutional strengthening, infrastructure development, and behavioural change. Improving waste collection services, enhancing regulatory enforcement, and promoting community participation are essential for reducing environmental risks and improving urban sustainability.

## CONCLUSION AND POLICY IMPLICATIONS

This study examined the environmental quality implications of municipal solid waste management practices in Suneka Town, Kisii County, Kenya. The evidence indicates that inadequate waste management systems significantly contribute to declining environmental conditions in rapidly growing urban centres.

The analysis shows that inefficient waste collection, informal disposal practices, and improper waste handling are consistently associated with waste accumulation in public spaces, blockage of drainage systems, increased pest infestation, and odor pollution. These conditions collectively reduce environmental cleanliness, compromise sanitation, and pose risks to public health. The findings therefore reaffirm the critical role of effective waste management systems in maintaining environmental quality and supporting sustainable urban development.

Importantly, the synthesis highlights a broader structural challenge common in many developing regions, where rapid urban growth is not matched by adequate infrastructure and service provision (Kaza et al., 2018; UNEP, 2021). In emerging urban centres such as Suneka, this imbalance contributes to increasing environmental pressure and declining urban livability. Addressing these challenges requires a shift from reactive waste management approaches to more proactive and integrated systems that align with sustainable urban development goals.

From a policy perspective, the study underscores the need to strengthen local institutional capacity and improve governance frameworks for waste management. County governments and relevant urban management authorities should prioritize the expansion of waste collection services, investment in waste management infrastructure, and enforcement of environmental regulations. In addition, there is a need to promote inclusive waste management systems that integrate informal waste collectors, enhance recycling initiatives, and encourage community participation. Such approaches have been shown to improve efficiency and sustainability in waste management systems in comparable urban contexts (Wilson et al., 2020; World Bank, 2019).

Furthermore, public awareness and behavioural change remain critical components of effective waste management. Policies should incorporate environmental education programs that promote responsible waste disposal practices at the household and community levels. Strengthening public-private partnerships can also enhance service delivery and provide innovative solutions to waste management challenges in rapidly growing towns.

Theoretically, this study contributes to the understanding of urban environmental sustainability by reinforcing the linkage between municipal solid waste management and environmental quality within the framework of socio-ecological systems. It demonstrates that waste management is not merely a technical function but a complex socio-institutional process shaped by governance structures, resource availability, and community behaviour (Guerrero et al., 2018). By focusing on a secondary urban centre, the study extends existing literature that has largely concentrated on major cities and addresses an important empirical and conceptual gap.

Overall, the study provides valuable insights for policymakers, urban planners, and environmental managers seeking to improve waste management systems in emerging urban centres. Enhancing municipal solid waste management is essential not only for improving environmental quality but also for safeguarding public health, strengthening urban resilience, and promoting sustainable development in Kenya and similar developing contexts. The findings are based on a synthesis of existing literature and therefore reflect broader patterns observed across comparable urban contexts.

## RECOMMENDATIONS

This section is already well aligned. Only slight tightening for flow:

County governments and relevant urban management authorities should strengthen waste collection systems to ensure regular and reliable service coverage across all residential and commercial areas. Improved collection services can reduce waste accumulation and minimize reliance on informal disposal practices. In addition, environmental awareness among residents should be enhanced through public education programs, as promoting responsible waste disposal practices can reduce littering and encourage community participation in environmental management.

Enforcement of existing waste management policies and regulations should also be strengthened to discourage illegal dumping and improve compliance with proper waste disposal practices. Investment in waste management infrastructure, including designated disposal sites and recycling facilities, should be prioritized to improve system efficiency. Integration of informal waste collectors into formal waste management systems should be encouraged to enhance recycling efforts while also creating economic opportunities.

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