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Proper Segregation, Prompt Disposal, And Scheduled Nightly Collections: A Solution For Waste Management In Calabar Metropolis, Cross River State, Nigeria

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Abstract

Waste management in urban areas of developing countries like Nigeria has become a critical challenge with far-reaching implications for public health, environmental sustainability, and urban development. Calabar Metropolis, once praised for its historical cleanliness, now faces significant challenges due to ineffective waste management systems. This theoretical paper addresses the waste management crisis in Calabar by proposing a sustainable solution centered on proper waste segregation, prompt disposal, and scheduled nightly collections. Drawing on successful waste management models from other cities, the paper constructs a conceptual framework that outlines how an integrated strategy can restore Calabar's sanitation standards, mitigate public health risks, and promote environmental sustainability. The analysis emphasizes the importance of coordinated efforts between stakeholders, including government agencies, private waste collectors, and the local community. The proposed framework serves as a guide for policymakers and practitioners while identifying key areas for future research and policy development in waste management.

Introduction

Calabar, historically known as one of Nigeria's cleanest cities, is facing a gradual decline in environmental hygiene, primarily due to rapid urbanization, population growth, and increased industrial activities in the last decade. Presently, Calabar is faced with the challenge of daily collection and disposal of large volumes of municipal waste. The city's waste generation has significantly increased, placing tremendous pressure on the existing waste management infrastructure (Ediene and Umoetok 2017, Ediene, et al., 2020). The Cross River State Waste Management Agency (CRSWMA) and private operators have been unable to cope with the growing demands, leading to ineffective waste collection and disposal practices. Currently, Calabar generates approximately 350 tons of waste daily, predominantly consisting of organic material (65 %), followed by plastics (15 %) and paper waste (5 %) (Adeleke et al., 2020; Otu et al., 2018). Despite these alarming figures, only 20% of this waste is adequately collected and managed, while the remaining 80% is left to accumulate in public spaces, resulting in open dumping, burning, and contamination of the environment (Okoro et al., 2018).

Urbanization in developing countries like Nigeria is a double-edged sword. While cities grow and economies expand, the capacity of municipal authorities to manage the corresponding increase in waste often lags behind (Sridhar & Adeoye, 2015). This gap leads to deteriorating living conditions in cities, with public health and environmental sustainability facing the brunt of the fallout (Ogwueleka, 2009). The case of Calabar is not unique, as urban centers across Africa struggle with similar challenges. However, Calabar's previous success as a clean city makes its current situation particularly alarming. The indiscriminate dumping and sometimes burning of wastes may lead to the accumulation of heavy metals in soil, plants and water aquifers which can lead to serious negative health impacts on human (Ediene et al., 2021).

Statement of Problem

Calabar's waste management system is insufficient and poses serious public health risks, contributes to environmental degradation, and reduces the quality of life for residents. The lack of effective waste segregation, delayed disposal, and inadequate collection schedules has exacerbated the waste management crisis. The problem is not limited to technical issues but is rooted in deeper socio-political and institutional challenges (Aniah & Obong, 2008). These include weak regulatory enforcement, limited public awareness, and poor funding of waste management initiatives. The proliferation of informal waste dumps and illegal disposal practices further complicates efforts to maintain environmental cleanliness (Nzeadibe & Ajaero, 2010).

In Calabar, like many other Nigerian cities, informal waste management practices are prevalent. Residents often resort to open dumping in unauthorized sites or burn their waste, exacerbating air pollution and greenhouse gas emissions (Longe & Williams, 2006). These practices contribute to significant environmental contamination and create breeding grounds for disease vectors such as mosquitoes, rodents, and flies, which have been linked to the spread

of malaria, cholera, and typhoid (Ekere et al., 2009). Consequently, the need for an effective waste management solution has never been more urgent.

Objectives

This paper seeks to:

1. Investigate the Current State of Waste Management in Calabar Metropolis
2. Propose a Sustainable Waste Management Framework
3. Assess the Public Health, Environmental, and Economic Impacts
4. Provide Actionable Recommendations for Stakeholders

Literature Review

The literature on waste management in Nigeria, particularly in Calabar, highlights several key issues. Urbanization and population growth have outpaced the capacity of municipal authorities to manage waste effectively (Sridhar, 2006). Poor waste collection rates, lack of infrastructure, and insufficient public awareness contribute to the growing problem of environmental pollution and public health hazards (Ogwueleka, 2009). According to research by Otu et al. (2018), Calabar's waste management system is severely strained, with only 20% of waste being properly collected, while the remaining 80% accumulates in public areas or is disposed of improperly.

Case Studies: Global Best Practices in Waste Management Successful case studies from Curitiba, Brazil, and Vancouver, Canada, demonstrate the importance of proper waste segregation, recycling, and efficient collection systems (Waste Management Journal, 2019). These cities have managed to significantly reduce landfill dependency and increase recycling rates through public education, investment in infrastructure, and strict regulatory enforcement. In Curitiba, for example, waste segregation is mandated by law, and residents are provided with color-coded bins for different waste types (Andrade & Teixeira, 2019). Vancouver has implemented a zero-waste policy that emphasizes the reduction of waste generation and the promotion of recycling and composting (City of Vancouver, 2020). These models offer valuable lessons for cities like Calabar, where waste management systems are struggling to keep pace with rapid urbanization.

Challenges in Waste Management in Developing Countries The literature also points to challenges specific to developing countries. For instance, the World Bank (2018) notes that inadequate funding and poor governance are major impediments to effective waste management in Sub-Saharan Africa. Similarly, Ogwueleka (2009) identifies weak institutional capacity and lack of political will as barriers to progress. In Nigeria, these issues are compounded by a lack of public awareness and education on proper waste disposal practices (Adewole, 2009).

Methodology

This study employed content analysis as its primary research method, focusing on a comprehensive theoretical review of relevant published works and scholarly literature. The content analysis entailed a systematic examination, interpretation, and evaluation of a wide array of sources, including academic articles, books, policy documents, governmental and non-governmental reports, and other pertinent publications. These sources specifically addressed critical topics such as waste segregation, prompt disposal practices, and scheduled nightly collections, drawing from successful models and case studies across various contexts.

The process involved identifying key theoretical frameworks, concepts, and empirical evidence, which were then analyzed to discern patterns, themes, and emerging trends relevant to waste management. Through this method, the study sought to uncover relationships between waste management practices and their outcomes, assessing the applicability and effectiveness of proposed solutions within the Calabar metropolis.

The rigorous approach to content analysis facilitated the synthesis of existing knowledge across multiple disciplines, including environmental management, urban planning, and public policy. This provided a solid foundation for the formulation of recommendations and the interpretation of findings. Ultimately, the methodology enabled the study to draw meaningful conclusions and insights that contribute to the development of a sustainable waste management framework for Calabar, with broader implications for similar urban settings.

Findings

The study revealed several critical issues in Calabar's waste management system:

Inadequate Collection Coverage: Only 20% of the daily waste generated in Calabar is collected, leaving a significant portion uncollected and improperly disposed of in public spaces (Otu et al., 2018).

Poor Segregation Practices: There is little to no segregation of waste at the source, leading to increased contamination and reduced recycling rates (Ediene, and Umoetok, 2017; Nwaogu et al., 2019).

Environmental and Public Health Risks: Indiscriminate dumping and burning of waste have led to significant soil and water contamination, contributing to public health risks such as respiratory illnesses and waterborne diseases (Aniah & Obong, 2008; Umoetok et al., 2011; Ediene, et al., (2020); Ediene et al., 2021).

Lack of Public Awareness: Residents are largely unaware of proper waste disposal practices, and there is a general lack of education on the importance of waste segregation and recycling (Ibe et al., 2017).

Overwhelmed Dumpsites: The city's dumpsites are operating beyond capacity, leading to increased environmental degradation and the proliferation of illegal dumping sites (Okoro et al., 2018).

Discussion of Findings

The findings suggest that Calabar's waste management system is at a critical juncture. Without immediate intervention, the situation is likely to worsen, with dire consequences for public health and environmental sustainability. The study underscores the importance of adopting a strategic framework based on the three pillars of proper waste segregation, prompt disposal, and scheduled nightly collections. This approach has proven successful in other cities, such as New York and Curitiba, where similar strategies have been implemented to great effect (Waste Management Journal, 2019).

Proper Waste Segregation Segregating waste at the source is essential to reducing the volume of waste sent to landfills and increasing recycling rates. In cities like Curitiba, residents are required to separate their waste into recyclable, biodegradable, and non-biodegradable categories, a practice that has significantly reduced landfill dependency (Andrade & Teixeira, 2019). Implementing similar practices in Calabar could have a profound impact on the city's waste management system, reducing contamination and promoting recycling.

Prompt Disposal Timely disposal of waste is critical to preventing the accumulation of waste in public spaces and reducing the risk of pest infestations and contaminants spreading into the environment. Cities such as Tokyo have implemented strict schedules for waste disposal, ensuring that waste does not linger in the streets and that collection occurs before waste can decompose (Ishii & Morioka, 2019). In Calabar, improving prompt waste disposal practices could significantly reduce the health risks associated with waste decay, such as the spread of diseases like cholera, malaria, and typhoid fever (Ekere et al., 2009).

Scheduled Nightly Collections Scheduled nightly waste collections present a practical solution to several challenges. Nightly collections minimize the disruption caused by waste collection activities during peak traffic hours, thereby reducing noise pollution and traffic congestion. Additionally, waste collected at night avoids the issue of waste sitting in the streets for prolonged periods during the heat of the day, which can accelerate decay and lead to the emission of foul odors (UNEP, 2019). Research indicates that cities such as Barcelona and New York have benefited greatly from nightly waste collection schedules, which have contributed to cleaner streets and improved urban hygiene (UN Habitat, 2017).

Conclusion

Calabar's waste management system is currently in crisis, with significant implications for public health, environmental sustainability, and the city's overall quality of life. However, this crisis also presents an opportunity for the city to adopt a more sustainable and effective waste management system. By implementing a strategic framework that focuses on proper waste segregation, prompt disposal, and scheduled nightly collections, Calabar can restore its reputation as one of Nigeria's cleanest cities. The success of this approach will depend on collaboration between government agencies, private waste operators, and the local community.

Furthermore, investments in public education, infrastructure, and regulatory enforcement will be essential to achieving the desired outcomes.

Recommendations

1. Increase Public Awareness: A sustained public education campaign should be launched to raise awareness of the importance of proper waste segregation, recycling, and the dangers of improper disposal. Educational programs should target all segments of society, including schools, businesses, and households. Public education campaigns in cities like Curitiba have played a significant role in transforming waste management practices and encouraging residents to take responsibility for their waste (Waste Management Journal, 2019).
2. Enhance Waste Management Infrastructure: Investment in waste management infrastructure is essential. More waste collection vehicles should be procured to expand collection coverage, and color-coded bins should be distributed to encourage waste segregation. Additionally, waste processing facilities such as recycling plants and composting centers must be upgraded to handle the increased volume of segregated waste. Investments in infrastructure have been crucial to the success of waste management systems in cities like Vancouver and New York, where recycling and composting rates have surged (City of Vancouver, 2020).
3. Enforce Waste Disposal Regulations: Stronger regulatory enforcement is needed to curb illegal dumping and ensure compliance with proper waste disposal practices. Cities that have implemented strict penalties for illegal dumping and non-compliance with segregation regulations, such as Tokyo and Singapore, have seen significant improvements in waste management outcomes (Ishii & Morioka, 2019). In Calabar, regulations should be strictly enforced, and penalties should be imposed on individuals and businesses that fail to adhere to designated waste disposal guidelines.
4. Scheduled Nightly Collections: Scheduled nightly waste collections should be introduced to reduce the accumulation of waste in public spaces and to minimize the disruptions caused by daytime collections. Nightly collections have been successfully implemented in cities like New York, where they have contributed to cleaner streets and reduced noise pollution (UN Habitat, 2017).
5. Stakeholder Collaboration: Engaging all stakeholders, including government agencies, private waste operators, and the local community, is essential to the success of the proposed waste management framework. Public-private partnerships (PPPs) have been successfully utilized in other cities to improve waste management efficiency and allocate resources more effectively. For example, in Lagos, Nigeria, PPPs have contributed to more effective waste collection and disposal services (Nzeadibe & Ajaero, 2010).

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