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Assessment of solid waste collection in Akure metropolis (A Likert Scale Approach)

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Abstract

Solid waste management remains a major urban challenge in developing countries, including Nigeria. Despite the importance of solid waste management, there is a dearth of research on the efficiency of solid waste collection practices in Akure Core Area, Ondo State. This study aims to bridge this knowledge gap by evaluating the efficiency of solid waste collection practices in Akure Core Area, identifying the challenges facing the existing waste management infrastructure, and recommending strategies for improving the efficiency of solid waste collection practices in the study area. This study assesses the efficiency of solid waste collection services in Akure metropolis, Ondo State, using a Likert scale-based survey methodology. Data were gathered from 400 households across five major districts. The findings reveal significant dissatisfaction with the frequency, reliability, and cost of collection services. Recommendations for improvement include all-inclusive community participation, increased service frequency, public sensitization, and stakeholder collaboration.

Keywords: Solid Waste Collection; Akure Metropolis; Likert Scale; Waste Management; Public Perception

1. Introduction

Solid waste generation in urban centers has increased dramatically due to population growth, urbanization, and economic activities [27,13]. Akure, the capital city of Ondo State, Nigeria, experiences challenges in waste management, particularly in the efficiency of collection practices. Despite government efforts through the Ondo State Waste Management Authority (OSWMA), issues such as irregular waste collection, inadequate storage facilities, and improper disposal practices persist. [16].

To provide a structured understanding of residents' satisfaction levels, this study adopts a Likert scale approach to evaluate the performance of waste collection services in Akure metropolis.

The near-total ignorance of poor waste management on inhabitants, gave rise to indiscriminate dumping of garbage in gutters or even burning or burying potential toxic waste by community members. These negate the principle of sustainable development. [2,29]. It is common to find large accumulation of solid waste in open dumps without regard for safety, health hazard and environmental degradation. The refuse dumped in the gutters give rise to Hooding, degradation of land and water resources and air pollution. It also poses a potential health hazard to plant, animals and human beings. In some cases infectious wastes from hospital decompose into toxic liquid called leachate which is formed as water flows through a dump site. Its in turn contaminate the ground water. [25].

The absence of public sanitation facilities and poor environmental protection enforcement encourage reckless dumping of refuse. This is further compounded by the absence of adequate dissemination of information on the potential dangers of reckless dumping of waste in villages, towns and cities. It is on this premise this paper attempts the identification of

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how wastes could be properly managed to minimize its hazard and suggestions on how it could be brought under control.

Solid waste management is a critical component of urban environmental management, and its effectiveness is essential for maintaining public health, environmental sustainability, and economic development. The rapid urbanization and population growth in Akure Core Area, Ondo State, have led to an increase in solid waste generation, posing significant challenges to the existing waste management infrastructure.

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1.1. Research Objectives

This literature review seeks to provide a comprehensive overview of current knowledge on solid waste collection practices, with a specific focus on assessing the efficiency of solid waste collection practices in Akure Core Area, Ondo State.

1.2. Significance of the Study

This study is significant because it will provide valuable insights into the efficiency of solid waste collection practices in Akure Core Area, Ondo State. The findings of this study will be useful for policymakers, waste management practitioners, and researchers seeking to improve the efficiency of solid waste collection practices in urban areas. Additionally, the study will contribute to the existing body of knowledge on solid waste management in Nigeria.

1.3. Theoretical Framework/Literature Review

Effective waste collection is essential for maintaining urban health and aesthetics [8]. Previous studies in Nigeria and similar developing economies have highlighted key challenges, including insufficient coverage, lack of public cooperation, and poor funding [5, 24].

The Likert scale is a widely accepted tool for measuring attitudes, opinions, and satisfaction levels. It provides nuanced insights beyond binary "yes/no" answers [12, 25]. By applying this technique to solid waste management studies, more detailed evaluations of service quality and community perceptions can be achieved.

Solid and liquid wastes are products of daily human activity, its management involves the collection, transportation processing and disposal. To adequately manage solid waste with minimum effort and cost, emphasis must be at household level, this could be achieved through the creation of awareness among policy makers, implementers and the community alike, of the need for the exercise. This could generate great potentials in health and environmental protection, recycling and reuse of waste, employment generation and provision of energy security.

Waste collected from the market place and other public places which could not be managed at household level could be handled at community level. Apart from the highlighted benefits of waste management above, the ultimate of waste management is its reduction to a minimum before its final disposal in landfills, incinerators or compost pits. Waste reduction at source is the most effective strategy for waste management. Hence, as a daily product of human activity, waste management should involve active participation of the community. In support of this, the United Nations environment programme (1992) in its Agenda 21 report, upholds the view that environmental issues are best handled with the active participation of the concerned citizens. The major problem of waste management in any community

Among others, is the lack of awareness of the people of the implications of the waste management. The has created a gap in knowledge which prompted the researcher to bring to the fore, to every community, the benefits of investing on waste management vis-a-vis sanitation with its long-term impact on the health profile and quality of life of the general public. evaluation of the efficiency of solid waste collection practice in Akure core Area, Ondo state.

2. Literature review

In Nigeria, solid waste management is a shared responsibility between the federal, state, and local governments. However, the lack of effective waste management practices, inadequate infrastructure, and insufficient funding have hindered the efficient collection and disposal of solid waste. The Nigerian government has implemented various policies and regulations to address these challenges, including the National Environmental [20] and [21].

2.1. Solid Waste Collection Practices in Akure Core Area

Akure Core Area, the capital city of Ondo State, generates a significant amount of solid waste daily. The Ondo State Waste Management Authority (OSWMA) is responsible for solid waste collection and disposal in the city. However, the efficiency of the solid waste collection practices in Akure Core Area has been a subject of concern. The lack of adequate waste collection infrastructure, insufficient funding, and inadequate public awareness and participation have hindered the effective collection and disposal of solid waste.

2.2. Contextual View of Solid Waste Collection Practices.

Solid waste collection is a critical component of solid waste management, and its effectiveness is essential for maintaining public health and environmental sustainability. Several studies have investigated solid waste collection practices in various contexts. investigated the solid waste collection practices in Akure, Nigeria, and found that the lack of adequate waste collection infrastructure and insufficient funding hindered the effective collection and disposal of solid waste. [16].

Effective solid waste management is vital for maintaining a hygienic society, public health, environmental sustainability, and economic development[29]. Rapid urbanization and population growth in Akure Area, Ondo State, have increased solid waste generation, posing challenges to existing waste management facilities [4] .

In Nigeria, solid waste management is a shared responsibility among federal, state, and local governments (Federal Republic of Nigeria, 2009). However, inadequate waste management practices, bureaucratic bottlenecks, inadequate infrastructure, and funding constraints hinder successful solid waste collection and disposal practices [14] .

To address these challenges, the Nigerian government has implemented policies and regulations, including the National Environmental [21] and [20] the Ondo State Environmental Protection Agency (OSEPA) Law (2013).

2.3. Paradox of Waste Collection Practices in Akure Core Area.

Despite being licensed to generate revenue through solid waste collection, the Ondo State Waste Management Authority (OSWMA) faces criticism for poor waste collection practices in Akure [21] (Ondo State Waste Management Authority, 2020). Inadequate waste collection infrastructure, insufficient funding, and inadequate public awareness and participation compromise the efficiency and effectiveness of solid waste collection practices [7].

2.4. Optimizing Solid Waste Collection Practices for Sustainable Urban Management

The efficiency of solid waste collection practices is paramount for maintaining public health and environmental sustainability in urban areas [29] . Research has investigated the efficiency of solid waste collection practices in various contexts, highlighting strategies for improvement.

Studies have demonstrated that adopting effective waste management strategies can significantly enhance the efficiency of solid waste collection practices. For instance, a study conducted in Abuja, Nigeria, found that utilizing compactors and waste transfer stations improved waste collection efficiency [22]. Similarly, research in Port Harcourt, Nigeria, revealed that private sector participation in waste management can also optimize waste collection efficiency [7].

2.5. Overcoming the Challenges Facing Solid Waste Collection Practices in Akure Core Area

Akure Core Area, Ondo State, faces numerous challenges in solid waste collection practices, which hinder the effectiveness of waste management infrastructure. Research has identified various obstacles that impede efficient solid waste collection in this region.

2.6. Infrastructure, Funding, and Public Awareness Challenges

A study by [7] Adeyemi, revealed that inadequate waste collection infrastructure, insufficient funding, and inadequate public awareness and participation in waste management activities are significant challenges facing Akure Core Area's waste management infrastructure [1,5]. These challenges underscore the need for targeted interventions to enhance waste collection efficiency.

2.7. Policy, Regulatory, and Coordination Challenges

Furthermore, research by [16] highlighted the lack of effective waste management policies and regulations, as well as inadequate coordination among stakeholders, as significant challenges facing Akure Core Area's waste management infrastructure [6]. Addressing these challenges requires a multifaceted approach that involves policy reforms, stakeholder engagement, and capacity building. Examined the solid waste collection practices in Ibadan, Nigeria, and found that the lack of public awareness and participation in waste management activities was a significant challenge facing the existing waste management infrastructure.

2.8. Efficiency of Solid Waste Collection Practices

The efficiency of solid waste collection practices is critical for maintaining public health and environmental sustainability. Several studies have investigated the efficiency of solid waste collection practices in various contexts. For example, a study by [3] evaluated the efficiency of solid waste collection practices in Abuja, Nigeria, and found that the use of compactors and waste transfer stations improved the efficiency of waste collection. Similarly, a study by [4] examined the efficiency of solid waste collection practices in Port Harcourt, Nigeria, and found that the use of private sector participation in waste management improved the efficiency of waste collection.

2.9. Challenges Facing Solid Waste Collection Practices in Akure Core Area

Several studies have investigated the challenges facing solid waste collection practices in Akure Core Area, Ondo State. For example, a study by [5] found that the lack of adequate waste collection infrastructure, insufficient funding, and inadequate public awareness and participation in waste management activities were significant challenges facing the existing waste management infrastructure in Akure Core Area. Similarly, a study by [6] found that the lack of effective waste management policies and regulations, and the lack of coordination among stakeholders, were significant challenges facing the existing waste management infrastructure in Akure Core Area.

2.10. Gaps in the Literature

Despite the importance of solid waste management, there is a dearth of research on the efficiency of solid waste collection practices in Akure Core Area, Ondo State. Most of the existing studies have focused on the challenges facing solid waste collection practices in Akure Core Area, without evaluating the efficiency of the existing waste management infrastructure. This study aims to bridge this knowledge gap by evaluating the efficiency of solid waste collection practices in Akure Core Area, Ondo State.

This literature review has provided an overview of the current state of knowledge on solid waste collection practices, with a focus on the efficiency of solid waste collection practices in Akure Core Area, Ondo State. The review has highlighted the challenges facing solid waste collection practices in Akure Core Area, including the lack of adequate waste collection infrastructure, insufficient funding, and inadequate public awareness and participation in waste management activities. The review has also identified a gap in the literature, highlighting the need for research on the efficiency of solid waste collection practices in Akure Core Area, Ondo State

3. Methodology

3.1. Study Area

The study focused on Akure metropolis, encompassing areas such as Alabama, Igapó, Oke Aro, Arak ale, and Isika.

3.2. Sampling Technique

A multistage random sampling method as suggested by [23] (Pires) was used to select 400 households, 80 from each of the five (5) districts.

3.3. Data Collection

The structured questionnaires were designed using a 5-point Likert scale as 1,2,3,4 and 5 indicating strongly dissatisfied, dissatisfied, neutral, satisfied and strongly satisfied respectively.

The key variables assessed includes: Frequency of collection, Reliability of service, Cost of service Attitude of waste collectors and Cleanliness of collection points

3.4. Data Analysis

Descriptive statistics (mean, standard deviation) and inferential analysis (ANOVA) were performed using SPSS version 25.0.

4. Results and Discussion

4.1. Socio-Demographic Profile

The Figure 1. indicated 57% of respondents were female while 39% were male. Majority (65%) were within the age range of 26–45 years as shown in Figure 2. However, the survey revealed that 73% had tertiary education, suggesting good comprehension of waste management issues.

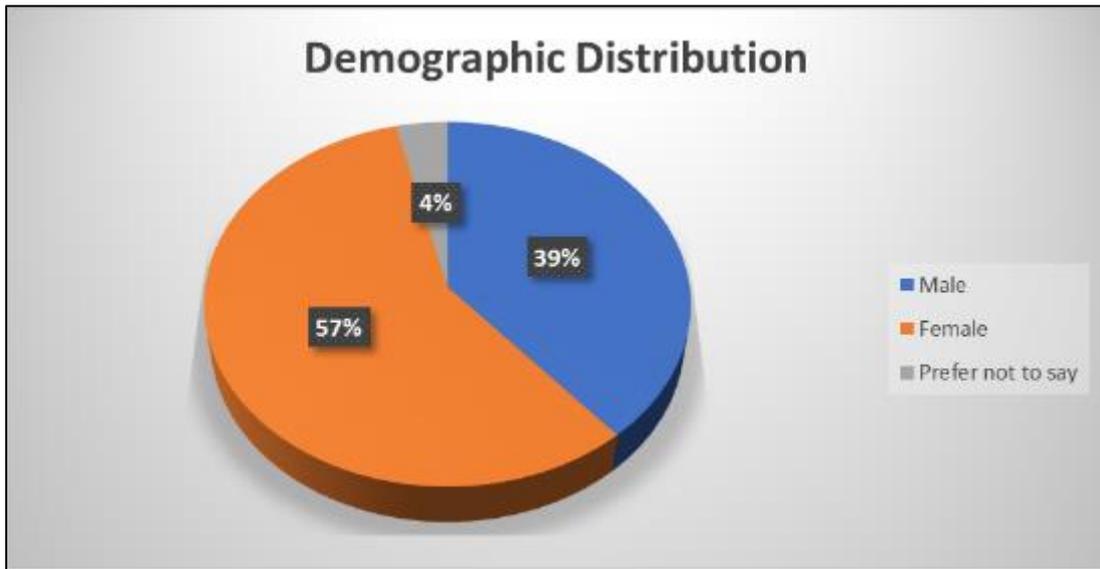


Figure 1 Demographic Distribution

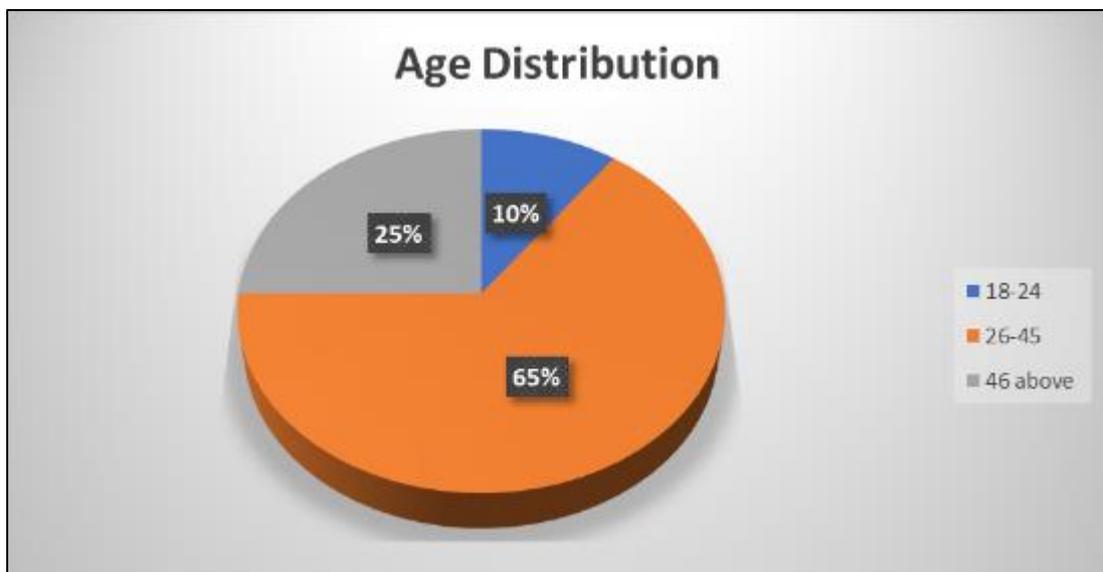


Figure 2 Age Distribution

4.2. Likert Scale Analysis

Table 1 The average score of the respondents with interpretation

Variable	Mean Score	Interpretation
Frequency of Collection	2.10	Dissatisfied
Reliability of Service	2.35	Dissatisfied
Cost of Service	2.85	Neutral
Attitude of Waste Collectors	3.10	Satisfied
Cleanliness of Collection Points	2.20	Dissatisfied

Table 1 Mean Score

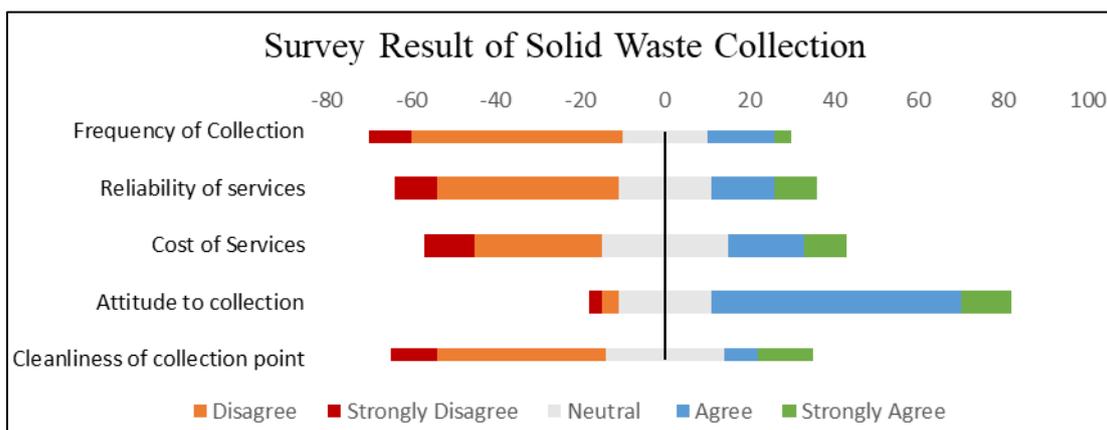


Figure 3 Likert chart of solid waste collection

The Likert survey result depicted in Table 1 and Figure 3 showed that respondents were largely dissatisfied with the frequency and reliability of solid waste collection services. Although the attitude of waste collectors received a moderately positive rating, the general dissatisfaction underscores systemic inefficiencies.

These findings are consistent with the results of [19] and [18] Olubukola, who noted that irregular collection schedules and high service charges often lead to illegal dumping practices.

Inferential Analysis from the ANOVA results showed a statistically significant difference ($p < 0.05$) between districts regarding satisfaction with collection services, indicating uneven service delivery across Akure metropolis.

5. Conclusion

The assessment using a Likert scale approach shows that the current solid waste collection system in Akure metropolis is suboptimal, especially concerning collection frequency, service reliability, and maintenance of collection points. Improved government investment, the introduction of performance-based contracts, and greater public awareness initiatives are crucial for achieving an efficient waste management system in Akure.

The study recommends the following; An increase collection frequency by scheduling more regular waste pickups, especially in densely populated areas. Public-Private Partnerships through Engagement private operators with strict performance monitoring. An all-inclusive community involvement through sensitization programs to encourage residents' cooperation. Monitoring and Evaluation by Setting up an independent monitoring team to assess service quality periodically using similar Likert-based tools.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declared that they have no known competing financial interests or personal relationship that could have appeared to influence the work reported in this paper.

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