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Evaluation of Solid Waste Management Policy and Implementation in Lagos State: A Case Study of Agege Local Government Area

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Abstract

This study investigates the effectiveness of solid waste management policies and their implementation in the Agege Local Government Area of Lagos State, Nigeria. Utilizing both primary and secondary data sources, the research employs descriptive statistics and analysis of variance (ANOVA) to evaluate respondents' socio-economic characteristics, levels of community satisfaction, and the predictive capacity of existing waste management policies. The demographic findings reveal that the majority of respondents are aged between 41 and 60, with a gender imbalance favoring males (60.3%). An unemployment rate of 17.9% highlights the need for targeted employment strategies within the area. A strong positive correlation (0.929) was found between the effectiveness of waste collection services and community satisfaction, indicating that improved collection significantly enhances public contentment. Key influencing factors include the professionalism of waste collectors and the level of public awareness regarding proper waste practices. The predictive model yields a moderate correlation ($R = 0.413$) and an R^2 value of 0.171, suggesting that 17.1% of the variation in policy implementation effectiveness can be explained by the studied variables. The study concludes that sustainable waste

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management in Agege requires comprehensive policy reform, increased public engagement, and improved service delivery. These measures are essential for enhancing environmental quality and public health across Lagos State.

Keywords: Solid Waste Management; Policy Implementation; Community Satisfaction; Descriptive Statistics; Lagos State

INTRODUCTION

Solid waste management is a global issue, particularly acute in developing countries like Nigeria (Amasuomo et al., 2017). The Federal Ministry of Environment (2005) identifies solid waste management as one of the most significant environmental sanitation challenges facing the nation. The indiscriminate dumping of waste on streets can be linked to rapid urbanization driven by advancements in science and technology, which has persisted despite significant investments in the sector. In many urban areas in Nigeria, the rate of waste generation surpasses the capacity for collection, transport, and disposal due to industrialization and rapid population growth. The core problem lies not in the volume of waste generated but, in the failure, to manage it effectively. A dirty environment negatively impacts living standards, aesthetics, public health, and overall quality of life.

In Lagos, the solid waste dumped on roads consists of various types, including domestic and industrial waste, which exacerbate environmental, transportation, and drainage issues (UNEP, 2005). Appropriate policies are crucial for addressing solid waste challenges (Medina, 2010). These policies should focus on waste minimization and prevention, integrating mechanisms to change the behavior of waste producers. They must reflect sustainability, taking into account environmental, social, and economic factors. Cities in developing nations need to adopt suitable policy options to ensure sustainable solid waste management. Waste management is a vital area of public policy, and modern approaches have evolved from a reliance on landfills to a more flexible waste hierarchy known as the 3Rs (reduce, reuse, recycle) (Tanaka, 1999).

The fluctuating waste management system in Lagos stems from changes in government agencies, each with distinct objectives aimed at creating a conducive environment. Over the years, nearly all fourteen government administrations from 1967 to 2019 have introduced various waste management policies. The responsible authority is

expected to manage the collection and disposal of municipal and industrial waste and provide commercial waste services, developing strategies for effective implementation to promote health and environmental well-being. However, as noted by Shehu et al. (2018), while many policies address waste management issues, their implementation remains a significant challenge. Financial constraints are often cited as a primary reason for this failure, along with inadequate policy implementation tools. Effective policy execution requires intensive monitoring, which can be costly and difficult to implement.

In various areas of Lagos State, waste is often dumped on streets and in drainage systems using open dumping methods, leading to numerous environmental, safety, and public health issues. These include clogged gutters, unpleasant odors, surface and groundwater contamination, air emissions of carbon dioxide and methane, and soil degradation. Open dumping also contributes to traffic problems, causing obstructions and accidents. Research has shown that urbanization is a major factor in the increasing volume of solid waste generated. Obirih-operah (2002) linked solid waste issues to deteriorating environmental conditions, poor working environments, and insufficient operational funding for waste management. Similarly, Oduwaye and Ilechukwu (2012) examined solid waste management in the context of urban governance, attributing the failure of technical approaches to the waste management problems in Lagos. Irregular waste collection by the Lagos State Waste Management Authority (LAWMA) and Private Sector Participants (PSP) remains a significant concern for residents. Poorly managed waste disposal impacts health, safety, and the environment, necessitating effective waste containment strategies to enhance the state's aesthetics and overall quality.

Haregu *et al.,* (2017) and Wachira (2017) emphasized that inadequate solid waste management poses critical health risks and environmental pollution threats. To mitigate these risks, policies must be implemented at various governance levels to address both health and environmental concerns in a balanced manner. Based on the study the following are the research objectives to determine the socio - economic characteristics of the respondents in the study area, to assess community satisfaction in solid waste management, and to evaluate the model's predictive capability and key factors influencing the dependent variable's estimation.

Study area

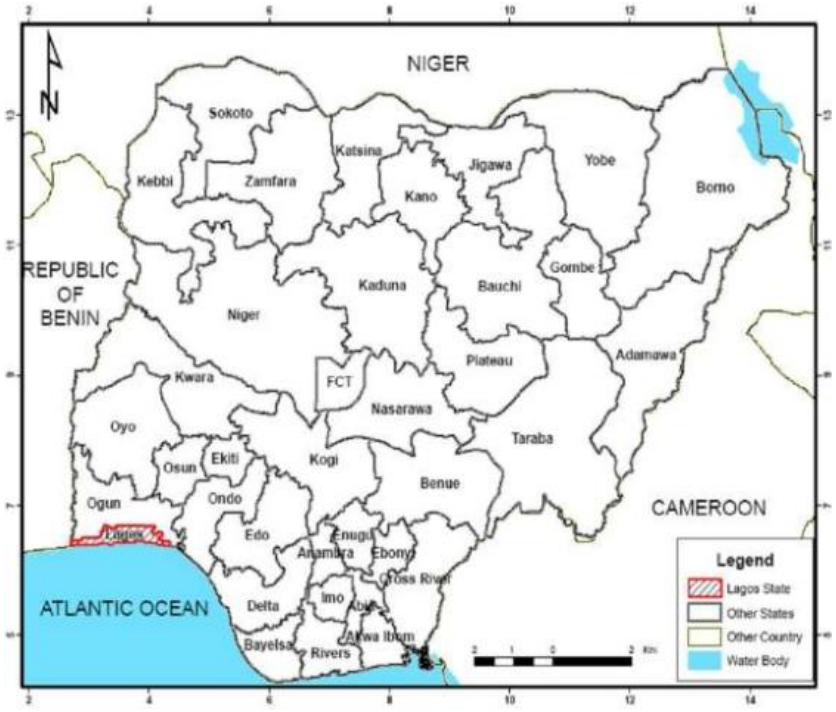
Lagos is located between latitudes 6° 23' N and 6° 41' N and longitudes 2° 42' E and 3° 42' E. The city's physical growth and development are closely linked to its expanding economic and political roles, fueled by rapid population growth. With nearly 20 million residents, Lagos is Nigeria's commercial capital and the largest city in the country. Despite its large population, it is the smallest state in Nigeria by geographical size, covering an area of 3,577 km² in the southwestern region. The city experiences an average growth rate of about 4% per year, with a population density of approximately 5,032 people per km², making it one of the fastest-growing metropolitan areas globally (Lagos Bureau of Statistics, 2010).

Lagos shares its northern boundary with Ogun State, its western boundary with the Republic of Benin, and stretches over 180 kilometers along the Guinea Coast of the Atlantic Ocean, playing a crucial role in the country's import and export activities. Established on May 27, 1967, under Decree No. 14 of 1967, Lagos was once the federal capital where all administrative activities were centralized. The state comprises 20 Local Government Councils and 57 Local Government Development Areas, contributing significantly to the country's waste generation (Oluwaleye, 2012). The Agege Local Government Area, one of these 20 local councils, has been chosen as the focus of this study due to its high concentration of households, which generate substantial waste. Agege Local Government Area (ALGA) is situated between longitude 2° 53' 60" E and latitude 6° 52' 0" N. Covering approximately 18 km², Agege is part of metropolitan Lagos. It is bordered to the north by Ifako/Ijaiye LGA, to the west by Alimosho LGA, and to the east and south by Ikeja LGA.

The Agege community predates the establishment of ALGA, having been settled since the 17th century by the Awori-Yoruba people, with their dispersal point at Isheri-Olofin. From there, some inhabitants migrated to Orile-Agege, the original home of the Agege community. By the late 19th century, a new settlement had developed near the railway station on the Lagos-Abeokuta line, constructed by the British colonial government between 1895 and 1911. This newer settlement capitalized on its strategic location, attracting a steady stream of migrants and settlers, eventually growing larger than the original homestead. As commercial opportunities around the station increased, the settlement expanded to incorporate Orile-Agege itself (Olukoju, 2006). The quantity and

rate of solid waste generation in the various states of Nigeria depends on the population, level of industrialization, socio-economic status of the citizens and the kinds of commercial activities being predominant. Sources of solid waste generation in Nigeria among others are commercial, industrial, household, agricultural and educational establishments. The solid waste types include paper, nylon, wood, dust, cloth, metal scraps, electronic gadgets, bottles, food remnants and vegetables; saw dust, ashes, rubber, bones and plastics. Several factors influence the solid waste generation in Lagos. Lack of advanced technology facility for separation at source, strength of solid waste management policy and enforcement, environmental education and awareness and income status of individuals among others.

Agege local government has heavy generation of waste because of its dense population. WithinAgege Local Government are Local Council Development Areas making Agege one of the biggest and most populated LGA in Lagos. These wastes include rubbish (organic food), unused clothes, unused shoes, household items, etc. They are generated from densely residential areas, notably Dopemu in Agege, Morkaz, Atobaje, Agodo, Oko-Oba, Abule-Egba, Alakuko, Ijaiye, Papa Ashafa communities and so on. These wastes also include rubbish (organic food), toiletries, paper, bottles, and food cans, etc, from offices and commercial enclaves in the project area such as Pen Cinema, Isale Oja, Dopemu Roundabout, Agbotikuyo, Abule-Egba and Agbado-Kollington.



Source: State of the Environmental Report-Lagos, 2010

Figure 1. Lagos State in the National Setting

Types of Data Utilized

To align with the study's objectives, the data collected encompassed, Provisions of solid waste management policies in Lagos State, Institutional frameworks for policy implementation. Waste management practices adopted by the Lagos State Waste Management Authority (LAWMA). Characteristics of policies aimed at improving environmental sanitation. Operations, strategies, enforcement, and monitoring for compliance with policy guidelines. Successes and constraints of the policies in waste management

Sources of Data

The research utilized both primary and secondary data sources. Primary data were gathered through: Administration of questionnaires to household respondents, structured interviews with waste management agencies operating in the area.

Method of Data Analyses

Data analysis employed descriptive statistical methods, including frequency tables and charts. Inferential statistical methods, such as Pearson's Product Moment Correlation Coefficient and Analysis of Variance (ANOVA), were utilized to assess the relationships between study variables and their impacts on one another. The findings were further supported by photographs and maps.

RESULTS AND DISCUSSION

Socio-economic Characteristics of the respondents

Table 1 reveals key insights into the demographic composition of the sample population: The largest age group comprises individuals aged 41-50, accounting for 30.8% of the sample. This group is typically in their prime working years and often holds responsible positions. Following closely, 29.5% are aged 51-60, indicating that nearly 60% of the population is approaching retirement, which may raise concerns regarding healthcare and retirement planning. Those aged 30-40 represent 11.5%, suggesting that younger adults may be focused on education or are underrepresented. Individuals under 30 make up 17.9%, reflecting a trend towards an aging population. Lastly, the segment over 60 constitutes 10.3%, indicating a need for specific healthcare and elder care services.

Males represent 60.3% of the sample, possibly reflecting occupational trends in male-dominated sectors. In contrast, females account for 39.7%, raising concerns about gender equity in employment and education. This imbalance highlights the necessity for policies that promote gender equality, such as initiatives that support women in leadership roles and address the unique needs of women in the workforce. Married individuals dominate at 56.4%, suggesting a stable family structure with specific economic needs, including housing and childcare. A significant portion, 32.1%, is single, indicating a trend of delayed marriage as individuals prioritize education or careers. Smaller groups of divorced (5.1%) and widowed individuals (6.4%) underscore the diverse family dynamics, suggesting the need for family-oriented policies and support services for those who are divorced or widowed to ensure emotional and financial stability.

Nearly half of the population (47.4%) have attained tertiary education, which is crucial for developing a skilled workforce. A significant portion (33.3%) have completed secondary education, laying the groundwork for further education or vocational training. However, 15.4% have only primary education, highlighting potential gaps in educational attainment that could impact employability. A small percentage (3.8%) lack any formal education, suggesting that the majority are educated, which is a positive indicator for future workforce development. These findings emphasize the need for targeted educational programs aimed at those with lower attainment levels to reduce inequality and improve job prospects. A significant portion of the population is employed in the public sector (32.1%), underscoring the importance of government jobs in the local economy. Private sector employment constitutes 26.9%, indicating opportunities for entrepreneurship and innovation. Self-employed individuals make up 23.1%, reflecting a robust entrepreneurial culture. However, the unemployment rate is concerning at 17.9%, indicating that nearly one in five individuals is without work, which could lead to economic strain. This data underscores the urgent need for employment initiatives, including job training programs and support for entrepreneurship. The majority of households (67.9%) consist of 6-10 members, suggesting a prevalence of larger family units, which can impact resource allocation and community services. A notable portion (19.2%) have more than ten members, potentially reflecting cultural practices of extended family living. Conversely, only 12.8% of households have fewer than five members, indicating some diversity in household sizes. Larger households may require more resources, highlighting the need for policies that consider their specific needs in community planning and resource allocation.

Table 1: Distribution based on the socio-economic Characteristics

Socio economic characteristics	Frequency	Percentages
Age		
< 30	14	17.90
31-40	9	11.50
41-50	24	30.80
51-60	23	29.50
>60	8	10.30
Sex		
Male	47	60.30
Female	31	39.70
Marital status		
Single	25	32.10
Married	44	56.40
Divorced	4	5.10
Widowed	5	6.40
Educational Background		
No formal education	3	3.80
Primary education	12	15.40
Secondary education	26	33.30
Tertiary education	37	47.40
Occupational distribution		
Private sector employed	21	26.90
Public sector employed	25	32.10
Self employed	18	23.10
Unemployed	14	17.90
Household size		
< 5	10	12.80
6-10	53	67.90
>10	15	19.20

Source: Field Survey, 2024.

Community satisfaction in solid waste management

Table 2 indicate the correlation coefficients and significance levels that examine the relationship between satisfaction levels and the implementation of solid waste management policies. A very strong positive correlation of 0.929 indicates that an effective solid waste collection system is associated with high satisfaction levels. The significance level of 0.010 confirms that this relationship is statistically significant, suggesting that the observed correlation is unlikely to be due to random chance. Enhancing solid waste collection services could greatly improve community satisfaction. Policymakers should focus on optimizing collection schedules, ensuring service reliability, and addressing logistical challenges. A correlation of 0.330 reflects a moderate positive relationship between the courtesy of waste collectors and satisfaction levels. With a significance level of 0.003, this

relationship is statistically significant, emphasizing the importance of positive interactions with waste collection staff. Implementing training programs aimed at enhancing the professionalism and courtesy of collectors could significantly boost overall satisfaction, fostering community trust in the waste management system.

A correlation of 0.327 suggests a moderate positive relationship between public awareness of the positive impacts of the waste collection system and satisfaction levels. The significance level of 0.004 indicates statistical significance, implying that increased awareness contributes to higher satisfaction. Efforts to promote the benefits of an effective waste collection system—such as improved public health and cleaner neighborhoods—could enhance public satisfaction. Community engagement initiatives that highlight these benefits may lead to increased support for solid waste management efforts. The correlation of 0.270 indicates a weak to moderate positive relationship, with a significance level of 0.017 demonstrating statistical significance. This suggests that involving stakeholders in the waste management process can influence satisfaction levels. Engaging community members, local businesses, and environmental groups in waste management discussions could enhance satisfaction. Policymakers should facilitate stakeholder input and collaboration throughout the planning and implementation phases.

A correlation of 0.191 indicates a weak positive relationship. Although the significance level of 0.093 approaches conventional significance, it does not meet the common threshold of 0.05. This implies that while the condition of waste management equipment may somewhat influence satisfaction, it is not a primary factor. Investments in equipment should be balanced with improvements in service delivery to boost overall satisfaction. A correlation of 0.000 suggests no relationship between satisfaction levels and solid waste fees. The significance level of 0.529 is well above the typical threshold of 0.05, indicating that the fee structure does not significantly impact satisfaction. Since fees do not correlate with satisfaction levels, policymakers are encouraged to prioritize service quality improvements rather than fee adjustments, as users may value service delivery more than cost considerations.

Table 2: Community satisfaction in solid waste management

Satisfaction Level		Solid Waste Management Policy Implementation Rating
Solid Waste Collection	Pearson correlation	0.010
	Sig. (2-tailed)	0.929
Solid Waste Fee	Pearson correlation	0.529
	Sig. (2-tailed)	0.000
Solid Waste Equipment	Pearson correlation	0.191
	Sig. (2-tailed)	0.093
Waste Collectors Courtesy	Pearson correlation	0.330
	Sig. (2-tailed)	0.003
Positive Effects of Waste Collection System	Pearson correlation	0.327
	Sig. (2-tailed)	0.004
Stakeholder Role	Pearson correlation	0.270
	Sig. (2-tailed)	0.017

Source: Field Survey, 2024.

Model's predictive capability

The R value of 0.413 indicates a moderate positive correlation between the independent variables and the dependent variable, reflecting a solid waste management policy implementation rating that is somewhat effective. This suggests that as the independent variables increase, the dependent variable tends to also increase, although the correlation is not particularly strong. The moderate correlation implies that other factors may be influencing the dependent variable that are not accounted for in this model. Exploring additional independent variables or interactions could enhance the model's predictive power.

The R Square value of 0.171 indicates that approximately 17.1% of the variability in the dependent variable can be explained by the independent variables included in the model. This suggests that the solid waste management policy implementation is only partially effective, as the model does not explain a substantial portion of the variance. The relatively low R Square value highlights the model's insufficiency in explaining the dependent variable. Stakeholders or researchers should consider including additional

predictors or exploring different modeling approaches to improve explanatory power, possibly by collecting more data or utilizing advanced modeling techniques.

The Adjusted R Square value of 0.100 reflects that only 10% of the variability in the dependent variable is explained after adjusting for the number of independent variables. This indicates that the solid waste management policy implementation requires improvement. The adjusted value being significantly lower than the R Square suggests that adding more independent variables does not substantially enhance the model's performance. This may signal the need to reconsider the relevance and quality of the predictors being used and their theoretical justification for inclusion.

The standard error of the estimate, at 1.332, provides a measure of the average distance that observed values fall from the regression line. This indicates that the predictions made by the model are, on average, about 1.332 units away from the actual values, suggesting uncertainty in the current solid waste management policy implementation rating. A larger standard error indicates lower precision in the model's predictions, which could be problematic for practical applications. This emphasizes the need to refine the model by improving data collection, including relevant variables, or utilizing more sophisticated modeling techniques.

Table 3: Model's predictive capability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.413[a]	0.171	0.100	1.332

Source: Field Survey, 2024.

CONCLUSION

This study evaluated the effectiveness of solid waste management policies and their implementation in the Agege Local Government Area of Lagos State, Nigeria. Utilizing both primary and secondary data, the research highlights significant challenges in waste management and provides actionable recommendations for improvement.

The demographic analysis revealed that the largest age segment of respondents is individuals aged 41-50, comprising 30.8% of the sample, followed closely by those aged 51-60 at 29.5%. This indicates that a significant portion of the population is nearing retirement, which could raise concerns regarding healthcare and retirement planning. Gender distribution showed a predominance of males (60.3%), suggesting potential gender

equity issues in employment and education opportunities. The marital status data indicated that 56.4% of respondents are married, highlighting a stable family structure with specific economic needs. Additionally, nearly half (47.4%) of the respondents have attained tertiary education, beneficial for skilled workforce development. However, the unemployment rate of 17.9% underscores the need for targeted employment initiatives to mitigate economic strain.

The analysis of community satisfaction revealed a very strong positive correlation (0.929) between effective solid waste collection and community satisfaction levels. This suggests that enhancements in waste collection services could significantly boost public satisfaction with solid waste management policies. Furthermore, the courtesy of waste collectors demonstrated a moderate positive correlation (0.330) with satisfaction, indicating the importance of positive interactions in the waste management process. Public awareness of the positive impacts of the waste collection system also contributed to satisfaction levels (correlation of 0.327). Conversely, the study found no significant relationship between satisfaction levels and solid waste fees (correlation of 0.000), indicating that service quality is prioritized over cost by community members.

The predictive model demonstrated a moderate positive correlation ($R = 0.413$) between the independent variables and the dependent variable, reflecting a solid waste management policy implementation rating that is somewhat effective. The R Square value of 0.171 indicates that approximately 17.1% of the variability in the dependent variable can be explained by the independent variables included in the model, suggesting that other factors may also influence policy implementation. The Adjusted R Square value of 0.100 reflects that only 10% of the variability is explained after adjusting for the number of independent variables, indicating the need for additional predictors or alternative modeling approaches to enhance the model's predictive power.

Recommendations

1. There is a pressing need to review and strengthen existing solid waste management policies to enhance their effectiveness. Policies should incorporate sustainability principles and community feedback to ensure they address the specific needs of the population.
2. Increasing public awareness regarding the roles of compliance agencies and the benefits of effective waste management is essential. Educational programs should

be developed to foster community engagement and cooperation, emphasizing the importance of proper waste disposal and the consequences of neglect.

3. Enhancing the reliability and frequency of waste collection services should be prioritized. Investment in the necessary infrastructure, resources, and logistics can address current deficiencies and improve overall community satisfaction.

4. Encouraging collaboration among community members, local businesses, and environmental organizations can lead to more comprehensive waste management strategies. Active stakeholder involvement in planning, implementation, and monitoring processes is crucial for achieving effective waste management.

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