© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1722796

Evaluation of Municipal Solid Waste Collection and Transportation Methods at Ojota, Lagos

OLUFUNMILOLA A. OBAKIN[1], TOLULOPE M. ADEAGA[2], OPEYEMI I. ADESOYE[3], OLUWAFEMI S. ODEDINA[4]

[1,2,3,4]*Department of Architecture, Faculty of Environmental Design and Management, University of Ibadan, Ibadan, Nigeria.*

Abstract- ***Effective municipal solid waste collection and transportation are essential to maintaining environmental quality and urban liveability, particularly in rapidly urbanising cities such as Lagos. This study evaluates waste collection and transportation practices in Ojota, Lagos, Nigeria, with emphasis on service reliability, collection conditions, transportation challenges, and factors affecting operational effectiveness. A descriptive survey design with quantitative and qualitative components was adopted. Primary data were obtained through a structured questionnaire administered to 53 residents, traders, and commuters in Ojota, while open-ended responses were thematically analysed to complement descriptive statistics. The findings indicate persistent weaknesses in the waste-management system. Collection services were characterised by irregular schedules, frequent missed collections, inadequate collection points, and limited communication of service changes. Respondents also reported poor vehicle conditions, traffic-related delays, vehicle breakdowns, waste spillage, and pollution associated with transportation activities. Inadequate infrastructure, poor road conditions, insufficient manpower and equipment, weak household disposal practices, and limited community participation further constrained service effectiveness. Overall satisfaction with waste collection and evacuation was low, reflecting the relationship between unreliable collection and dissatisfaction with service delivery. The study recommends improving collection scheduling and communication, strengthening vehicle maintenance and collection infrastructure, improving route planning and operational monitoring, increasing public awareness and source segregation, and establishing appropriate mechanisms for coordinating informal waste collectors. These measures provide a context-specific basis for improving the reliability and efficiency of waste collection and transportation in Ojota.***

Keywords: Lagos, Municipal Solid Waste, Nigeria, Transportation, Urban Waste management, Waste Collection.

I. INTRODUCTION

Population growth, rapid urbanisation, and economic prosperity has driven waste generation globally. In 2016, global waste generation was estimated at 2.01 billion tonnes per annum (Kaza et al., 2018). This is a 54.62% increase from the generation rate of 1.3 billion tonnes per annum in 2012 (Hoornweg & Bhada-Tata, 2012). In sub-Saharan Africa (SSA), the volume of waste generated annually grew from 81 million tonnes to 174 million tonnes between 2012 and 2016, and is estimated to hit 269 million tonnes by 2030 (Adedara et al., 2023). Data from the World Bank projects that waste generation in sub-Saharan countries like Nigeria will triple by 2050, mirroring population growth and elevated rates of consumption (Kaza et al., 2018). In Lagos, Nigeria's commercial capital, per capita generation ranges between 0.60 and 0.65 kg/day (Maiha & Yusuf, 2025).

The generation of municipal solid waste (MSW) would not pose a challenge if it were accompanied by effective and sustainable systems for its collection, transportation, and management. Unfortunately, much of the generated waste in developing climes remains uncollected or improperly disposed (Ogwueleka, 2009). The resulting effects manifest as environmental deterioration and intensified threats to public health, which are further aggravated by deficiencies in institutional frameworks and strategic logistics; (Omokaro et al., 2024). The lack of collection often stem from improper disposal of MSW, restricted service coverage for collection, infrastructural deficits, a deficiency in political commitment across all tiers of governance, subpar environmental awareness and education, inadequate financial resources, and the lack of a robust waste management (WM) policy framework (Mlilo et al.,

2021). Residents, consequently resolve to open burning (Ekanem et al., 2024), driving elevated air pollution and greenhouse gas emissions (United Nations Environment Programme [UNEP], 2018). Another prevalent and unhealthy culture that has emerged from these aforementioned problems is scavenging. Recycling industries have deployed strategies to informally collect MSW through scavengers. (Nambuli et al., 2021).

This paper aims to analyze the existing waste collection and transportation methods in Ojota to identify gaps in operations and study solutions being implemented, if any. The paper collects data from residents through questionnaires, to investigate the effectiveness or difficulty of the waste collection and transportation systems, and determine the environmental and infrastructural influences on waste logistics.

This study contributes to the wider discussion on sustainable urban development and environmental management in fast-paced urban centres.

II. LITERATURE REVIEW

2.1 Municipal Solid Waste Management

Effective management of municipal solid waste (MSW) continues to be a formidable hurdle for burgeoning urban landscapes, particularly within developing nations. Rapid industrialisation, population surges, and evolving consumption behaviors have significantly amplified both the volume and intricacy of waste produced. In numerous urban centres, the expansion of waste generation has outpaced advancements in collection networks, logistics, processing plants, and landfill capacities. Consequently, a substantial portion of refuse remains unaddressed or poorly handled, precipitating environmental degradation and heightened public health vulnerabilities (Hoornweg & Bhada-Tata, 2012; Kaza et al., 2018).

Within the broader waste management framework, the stages of collection and haulage are of paramount importance, serving as the vital conduit between generation points and final processing sites. These stages are also among the most resource-intensive components of the system, often accounting for approximately 60–80% of total waste-management costs, largely because of labour requirements, vehicle operation and maintenance, fuel consumption, and logistical demands (Sulemana et al., 2018; Abarca Guerrero et al., 2013). Therefore, the operational efficiency of these activities profoundly impacts the overall viability and sustainability of municipal management frameworks.

The crisis is especially acute in rapidly expanding African metropolises, where management systems frequently grapple with financial, institutional, and infrastructural deficits. Assessing the actual volume of waste produced alongside the efficacy of current collection and transportation strategies is vital for evaluating the functional status of these municipal systems.

2.2 Municipal Solid Waste Generation

Annual waste generation across sub-Saharan Africa has climbed dramatically, propelled by urbanisation and economic growth. However, this upward trajectory has generally surpassed the development of necessary infrastructure. As a result, regional collection coverage remains insufficient, with average rates hovering around 44 percent. The resulting accumulation of uncollected waste triggers environmental decline, public health crises, and urban flooding through blocked drainage channels (Adedara et al., 2023).

Nigeria’s landscape mirrors these regional struggles. While the nation produces roughly 44.5 million metric tonnes of MSW every year, formal collection systems capture less than 20 percent of this volume. The informal sector consequently bridges a significant gap in material recovery and transport (World Bank, 2024). This reliance places intense strain on existing logistics, especially in high-density metropolitan hubs where commercial activity generates immense waste quantities.

Lagos State serves as a primary example of this immense challenge. As a premier African urban centre, its population is approximately 15.4 million people (WorldStats, 2026). This demographic scale, coupled with vibrant commercial operations, results

in approximately 13,000 tonnes of daily MSW generation (World Bank, 2024).

Despite this volume, the reliability of collection in Lagos varies significantly. Efficiency estimates range from 30% to 70%, with some data suggesting only 33% to 54% of waste reaches approved disposal sites (World Bank, 2024; Rocky Mountain Institute [RMI], 2025). The disparity between generation and collection leads to waste build-up in public spaces, markets, and waterways. This situation highlights that escalating waste production must be managed in tandem with the logistical capacity of collection and transportation networks.

2.3 Municipal Solid Waste Collection

Collection is the cornerstone of MSW management, determining the success of moving refuse from its source into the broader processing system. In Lagos, this is primarily achieved through door-to-door services and stationary container methods, although techniques differ based on neighbourhood accessibility and settlement patterns.

House-to-house collection generally involves residents placing waste bags at designated roadsides for retrieval by compactor trucks or open vehicles (Ogwueleka, 2009; Afon & Okewole, 2007). This method offers direct household access and is most effective in regions where road infrastructure supports the movement of heavy machinery.

Additionally, many informal neighborhoods utilize the bell-ringing system, where trucks signal their arrival, prompting residents to manually deliver their waste. This is a practical solution for dense areas where standard door-to-door access is difficult. Furthermore, hauled-container systems are frequently deployed to address large refuse heaps that accumulate when routine schedules falter (Ojolowo et al., 2019).

However, the success of these methods hinges on factors beyond technology, such as vehicle uptime, road conditions, and workforce consistency. Consequently, collection performance must be evaluated in close connection with the subsequent transportation phase.

2.4 Municipal Solid Waste Transportation

Transportation acts as the critical bridge from collection points to final disposal or treatment zones. In Lagos, various vehicles including compactor trucks and bulk trailers facilitate this movement. Depending on the distance, waste may travel directly to landfills or move through Transfer Loading Stations (TLS) to optimize long-distance haulage.

In a sprawling metropolis like Lagos, TLS facilities are vital for reducing the number of trips collection trucks must take to distant sites. By consolidating waste into larger trailers, these stations enhance operational efficiency and vehicle use. Several such facilities are operational across the state to streamline the movement of metropolitan refuse (World Bank, 2024; Rocky Mountain Institute [RMI] , 2025).

The Tapa Transfer Loading Station and the Lagos Island facility are notable examples of infrastructure designed to manage significant waste volumes. Garbage trucks and bulk trailers, carrying tons, move this consolidated waste to major sites like Olusosun in Ojota or Solous in Igando. This high-capacity transport reduces the logistical burden of managing large-scale refuse accumulation.

Historically, the Olusosun dumpsite in Ojota has been one of the major disposal facilities serving Lagos and has received substantial quantities of municipal solid waste. However, its operation is plagued by bottlenecks, including poor access roads and vehicle queues that hinder efficiency (World Bank, 2024). Furthermore, traffic congestion in Lagos significantly increases turnaround times, often limiting operators to a single trip per day and inflating costs. This illustrates the deep link between traffic management and waste logistical success.

2.5 Institutional Framework for Municipal Solid Waste Management in Lagos

The effectiveness of waste logistics in Lagos is heavily dictated by institutional structures. The Lagos Waste Management Authority (LAWMA), formerly known as Lagos State Refuse Disposal Board (LSRDB) established in 1977, centralizes the coordination, regulation, and oversight of both public

and private waste management activities within the state (Olukanni & Oresanya, 2018).

Private Sector Participation (PSP) became a key strategy in 1997, where licensed operators manage household and commercial collection through franchise models (Akiyode, 2006). This partnership was intended to widen service reach and boost the state's total operational capacity.

Available estimates indicate that the Lagos waste management system operates with several hundred licensed private-sector operators and a fleet of approximately 920 compactor vehicles undertaking more than 800 collection circuits daily (World Bank, 2024). LAWMA typically manages public highways and major markets on a multi-shift basis, while PSPs focus on private residences, often with weekly collection schedules (Olukanni & Oresanya, 2018). The persistence of informal players suggests that formal frameworks still struggle to fully address service gaps across the metropolis.

2.6 Informal Waste Management Practices

The municipal solid waste management system in Lagos has progressively moved towards more formalised household collection and greater private-sector participation, although informal waste management activities continue to form an important part of the waste-management chain (Agunwamba, 2003). Informal waste collectors, including cart pushers and scavengers, often provide collection and recovery services in areas where formal operators have limited access or where the cost of conventional collection is relatively high. Their activities can therefore help to extend waste-collection coverage, particularly in low-income and densely populated communities where narrow roads, poor accessibility and inadequate formal collection infrastructure may constrain the operations of conventional waste vehicles (Agunwamba, 2003).

Informal collectors commonly use wheelbarrows, hand-pushed carts, sacks and other simple equipment to move waste over relatively short distances before transferring it to larger collection points or disposal facilities. Although these activities contribute to the movement and recovery of waste, they are frequently characterised by limited regulation, inadequate occupational safety measures and inconsistent environmental controls (Agunwamba, 2003). The absence of formal integration can also result in duplication of collection activities, uncontrolled disposal and variations in service quality. Nevertheless, the informal sector provides an important service by recovering recyclable materials and reaching locations that may be difficult for conventional collection vehicles to access (World Bank, 2024).

The continued involvement of informal operators therefore presents both an opportunity and a challenge for improving waste collection and transportation in Lagos. Rather than viewing informal activities solely as a problem, their contribution to collection coverage and material recovery suggests the need for better coordination and possible integration into the formal waste-management system. Such an approach could improve service coverage while strengthening environmental and occupational standards. For high-throughput areas such as Ojota, where formal collection, transportation and disposal activities interact with informal recovery practices, understanding this relationship is important for evaluating the overall efficiency of the waste-management system.

2.7 Factors Affecting Waste Collection and Transportation

The effectiveness of municipal solid waste collection and transportation in Lagos is influenced by a combination of operational, infrastructural, financial, institutional and behavioural factors. One of the major operational challenges is the availability and condition of collection vehicles. Inadequate vehicle numbers, frequent breakdowns and the use of ageing fleets can reduce collection capacity and increase the time required to complete collection rounds (World Bank, 2024). Vehicle downtime also increases maintenance costs and can result in accumulated waste when replacement vehicles are not readily available.

Road conditions and accessibility constitute another important factor affecting collection and transportation. Densely populated neighbourhoods,

informal settlements and areas with narrow or poorly maintained roads can restrict the movement of conventional waste-collection vehicles. Where vehicles cannot reach collection points directly, waste may have to be moved manually or through smaller-scale informal collection systems before it can be transferred to larger vehicles. These additional handling stages can increase collection time and operating costs while reducing the efficiency of the overall system (World Bank, 2024).

Traffic congestion is particularly important in Lagos because waste-collection vehicles operate within a highly congested metropolitan transport network. Delays along collection routes and on routes leading to transfer loading stations or disposal facilities can increase vehicle turnaround time, fuel consumption and operating costs. In high-traffic locations such as Ojota, these delays may be particularly significant because of the interaction between waste vehicles, general traffic and other commercial activities. Consequently, the distance travelled by a vehicle alone may not adequately describe transportation efficiency; travel time, waiting time and the number of trips completed within a working day are also important indicators.

The absence of effective source segregation further affects collection and transportation efficiency. When organic waste, recyclable materials and residual waste are mixed at the point of generation, collection vehicles are required to transport heterogeneous waste loads, reducing opportunities for material recovery and increasing the quantity requiring final disposal (World Bank, 2024). The lack of standardised vehicles with separate compartments also limits the practical separation of different waste streams during collection and transportation (RMI, 2025).

Financial factors also influence the reliability of waste collection services. Low compliance with user charges can undermine the financial viability of private-sector participation, particularly where operators face increasing fuel, labour, vehicle maintenance and disposal costs (World Bank, 2024). Where revenue does not adequately cover operating expenses, service frequency may decline and operators may have difficulty maintaining their fleets. The financial sustainability of collection therefore has implications for both service reliability and transportation efficiency.

Route planning is another factor that can influence collection performance. Poorly planned routes may result in unnecessary travel distances, increased fuel consumption, longer collection times and inefficient utilisation of vehicles. Geographic information system (GIS)-based route optimisation has therefore been proposed as a means of improving waste collection and transportation by identifying more efficient routes and reducing unnecessary travel within Lagos (Afolabi, 2020). Such approaches are particularly relevant to high-traffic areas where route selection and travel time can significantly influence the number of trips a vehicle can complete.

Overall, the factors affecting waste collection and transportation are interrelated. Vehicle availability, road accessibility, traffic conditions, waste characteristics, financing, route planning and informal-sector participation can collectively determine the quantity of waste collected, the time required for transportation and the cost of providing the service. A meaningful assessment of waste-management performance in Ojota should therefore consider these factors together rather than examining individual operational problems in isolation.

2.8 Efficiency of Municipal Solid Waste Collection and Transportation

The efficiency of municipal solid waste collection and transportation can be assessed in terms of the extent to which available resources are used to provide reliable waste services at reasonable cost and within an acceptable period. Common indicators include collection coverage, collection frequency, quantity of waste collected, vehicle utilisation, travel distance, travel time, fuel consumption, operating cost and turnaround time. These indicators provide a basis for determining whether collection and transportation systems are capable of meeting waste-generation demands without unnecessary expenditure of time and resources (Coffey & Coad, 2010).

2.8.1 Collection Efficiency

Collection efficiency relates to the ability of a waste-management system to collect the quantity of waste generated within its service area at an appropriate frequency and with minimal service failures. Important indicators include the proportion of households or premises covered, frequency of collection, quantity of waste collected and reliability of service. A system may have a large fleet but still perform poorly if vehicles do not operate according to schedule or if significant quantities of generated waste remain uncollected. Collection efficiency should therefore be considered in relation to both the physical capacity of the system and the level of service actually received by users.

In Lagos, variations in collection coverage can be associated with differences in neighbourhood accessibility, population density, road conditions and the availability of collection vehicles. Areas that are difficult to access may experience irregular collection or may depend on informal collectors to move waste to accessible points. This suggests that the evaluation of collection efficiency should account not only for the quantity of waste collected but also for the spatial distribution and reliability of the service.

2.8.2 Transportation Efficiency

Transportation efficiency concerns the movement of collected waste from collection points to transfer stations, treatment facilities or final disposal sites using the least possible time and resources. Key indicators include travel distance, travel time, vehicle capacity, number of trips per day, waiting time and turnaround time. Efficient transportation allows vehicles to complete more collection cycles within a given working period and reduces unnecessary fuel and maintenance expenditure.

Transfer Loading Stations (TLS) can contribute to transportation efficiency by allowing smaller collection vehicles to discharge waste closer to their service areas, after which larger vehicles transport consolidated loads over longer distances. This arrangement can reduce the number of long-distance trips undertaken by smaller collection vehicles and potentially improve vehicle utilisation. However, the benefits of TLS facilities depend on their location, capacity, accessibility and operational efficiency. Delays at loading or unloading points can reduce the expected gains from the transfer system.

Traffic congestion is another important determinant of transportation efficiency in Lagos. A vehicle may have adequate carrying capacity but still operate inefficiently if it spends a substantial proportion of its working time in traffic or waiting at disposal facilities. This is particularly relevant in Ojota, where waste transportation activities occur within a busy metropolitan environment. Consequently, transportation efficiency should be evaluated using both distance-based and time-based indicators.

2.8.3 Cost Efficiency

Cost efficiency refers to the ability to achieve required waste collection and transportation outputs without unnecessary expenditure. Major cost components include labour, fuel, vehicle acquisition, maintenance, repairs, transfer operations and disposal-related expenses. Since collection and transportation constitute major components of municipal waste-management expenditure, improvements in route planning, vehicle utilisation and operational coordination can have significant financial implications (Sulemana et al., 2018).

High fuel consumption, frequent vehicle breakdowns and long transportation distances can increase the cost of waste collection. Similarly, prolonged waiting times caused by traffic congestion or delays at transfer and disposal facilities can increase labour and vehicle operating costs without increasing the quantity of waste transported. Assessing cost efficiency is therefore important for determining whether existing collection and transportation practices are financially sustainable.

2.8.4 Operational Efficiency

Operational efficiency considers how effectively the physical and human resources available to waste-management operators are converted into service outputs. It includes vehicle availability, loading and unloading time, number of trips completed, route organisation, workforce utilisation and coordination between collection and disposal activities. A system with adequate infrastructure may still perform poorly

when these operational components are not properly coordinated.

For Lagos, operational efficiency is particularly important because the movement of waste involves several interconnected stages, including household or commercial collection, transfer, transportation and final disposal. Delays at any stage can affect subsequent activities and reduce the number of collection cycles that can be completed. This means that evaluating efficiency at Ojota should consider the entire collection and transportation process rather than focusing only on the performance of individual vehicles.

Overall, the literature indicates that efficiency in municipal solid waste collection and transportation is multidimensional. It cannot be adequately assessed using a single indicator such as the quantity of waste collected. A comprehensive assessment should consider service coverage, frequency, travel time, vehicle utilisation, route efficiency, operating cost and reliability. These indicators provide a suitable basis for examining the performance of waste collection and transportation methods within the Ojota area.

2.9 Sustainable Waste Collection and Transportation

Sustainable municipal solid waste collection and transportation require approaches that balance environmental protection, economic viability, operational efficiency and social needs. In developing cities, waste-management systems need to reflect local waste characteristics, available financial resources, institutional capacity and existing infrastructure rather than relying entirely on models developed for high-income countries (Coffey & Coad, 2010). The suitability of a collection or transportation method therefore depends not only on its technical performance but also on whether it can be maintained and operated effectively within the local context.

From an environmental perspective, sustainable collection and transportation should minimise unnecessary vehicle movements, fuel consumption, emissions and uncontrolled waste disposal. Efficient route planning can reduce travel distances and fuel use, while appropriate transfer facilities can reduce the number of long-distance journeys undertaken by smaller collection vehicles. The recovery of recyclable materials before final disposal can also reduce the volume of residual waste transported to disposal facilities and contribute to resource conservation (Coffey & Coad, 2010).

Economic sustainability is equally important. Collection and transportation systems require continuous expenditure on fuel, labour, vehicle maintenance, infrastructure and equipment. A system that provides short-term improvements but cannot be financially maintained is unlikely to deliver sustainable waste-management services. Financial viability is therefore closely connected to vehicle availability, collection frequency, route efficiency and the ability of operators to recover their operating costs.

Social sustainability also requires attention to equitable access to waste services. Low-income and difficult-to-access communities should not be systematically excluded because they are more expensive or difficult to serve. Informal waste collectors can contribute to wider service coverage and material recovery, suggesting that sustainable waste-management strategies may benefit from appropriate forms of coordination or integration rather than complete exclusion of informal actors (Agunwamba, 2003). Such integration would need to be accompanied by appropriate standards for occupational safety, environmental protection and service quality.

Institutional coordination is another important element of sustainable waste collection and transportation. Effective coordination among LAWMA, private-sector participants, local communities, informal operators and disposal-facility managers can reduce duplication, improve information flow and strengthen service reliability. The development of transfer facilities and improvements in material recovery are also part of the broader transition towards more integrated waste-management systems in Lagos (World Bank, 2024).

In Lagos, sustainable waste collection and transportation therefore require more than increasing

the number of collection vehicles. Improvements need to address the wider system, including route planning, vehicle maintenance, transfer infrastructure, waste segregation, financing, informal-sector participation and institutional coordination. These considerations are particularly relevant to Ojota because its role in waste collection and transportation is influenced by high traffic volumes, the movement of waste vehicles and its connection with major disposal and transfer activities. A systematic assessment of these factors can provide evidence for improving the efficiency, reliability and sustainability of waste collection and transportation in the area.

III. METHODOLOGY

3.1 Research Design

This study used descriptive survey research design with a mixed method using quantitative and qualitative methods. The descriptive design was found to be appropriate because it is used to describe the existing waste collection and transportation practice in Ojota as it exists in nature, without manipulating any variable. Results from the structured questionnaires were quantitatively analyzed to capture the frequency, reliability and satisfaction from the waste collection and transportation services and the open-ended responses of the residents were quantitatively analyzed to capture the observations, challenges encountered and recommendations of the residents. This combination yielded a wider and a more comprehensive knowledge of the subject matter than either method could obtain alone.

3.2 Study Area

The study was carried out in Ojota, part of the Kosofe area in Lagos State, Nigeria, where the population is dense and a major commercial and transportation hub in Nigeria. Ojota was chosen for its location as a major bus terminal and market axis, its close proximity to the Olusosun landfill—a one of the largest dumpsites in Africa, and the amount of solid waste produced daily in the markets and informal settlements, as well as the transit activities, which occur in the area. The attributes of Ojota render it as a good microcosm to study the operational challenges of waste collection and transportation in Lagos State.

3.3 Population of the Study

The population assessed includes residents, traders and workers in Ojota who have direct contact with the current waste collection and transportation system which includes households, market operators and commuters in the axis. This population was deemed to be adequate because these are the most affected and direct users of the waste management services provided by the Lagos Waste Management Authority (LAWMA) and its Private Sector Participants (PSPs).

3.4 Sample Size and Sampling Technique

Fifty three (53) respondents participated in the study. In this study, respondents were selected using a convenience (accidental) sampling technique, meaning the researcher had easy access to, and willing consent of, the residents and traders within the study area at the time of data collection. This method does not claim to be statistically representative, however, it was deemed appropriate for the time and resources available to the study, and is widely recognized as appropriate for exploratory studies of this type (Kothari, 2004). It was a sample of 31 males (58.5%) and 22 females (41.5%), and the population consisted of individuals from diverse age groups, with the largest number 31 (58.5%) in the age group 26-35 years old. The respondents also featured people from diverse occupational and educational backgrounds, the majority of whom had some tertiary or postgraduate education.

3.5 Research Instrument

Structured questionnaires designed and administered in the Google Forms were used to collect data. The questionnaire consisted of six sections: (a) the respondents' demographic information, (b) household waste generation, storage and disposal practices, (c) waste collection practices frequency, dependability, communication of schedules, (d) waste transportation practices condition of collection vehicles, traffic congestion and spillage, (e) environmental and infrastructural challenges associated with waste management, (f) respondents' overall satisfaction and recommendations for improvement. Closed-ended, multiple choice and rating scale questions were used

to help the instrument be quantitative so that data could be analysed quantitatively, while open-ended questions were used so that the data could be analysed qualitatively because the observer could observe the opinions and suggestions expressed by the respondents freely.

3.6 Validity and Reliability of the Instrument
All the sections of the questionnaire were checked for content validity by ensuring that for each section of the questionnaire there is one or more objectives of the study being asked. The instrument was pre-tested before administration to verify the clarity, relevance and language appropriateness for the target respondents. Since the study was completed using one administration only it was not possible to carry out formal test retest reliability procedures, but most of the items used were structured and closed with the aim of reducing ambiguity and increasing consistency of answers.

3.7 Method of Data Collection
A set of questions was sent to the residents, traders and commuters of Ojota via electronic questionnaire using a Google Forms link which was shared with them over a specified period. The respondents filled the questionnaire without being coerced or influenced by the interviewer, which helped reduce interviewer bias. All responses were automatically collated into a spreadsheet and this served as the key data that was used for the study.

3.8 Method of Data Analysis
The data compiled from the questionnaire was analysed descriptively which involved the presentation of frequency counts and simple percentages to provide a summary of the demographic characteristics of the respondents and their attitude to waste collection and transportation in Ojota. The findings were reported in tables and graphs for interpretation and comparison by collection frequency, reliability ratings and overall satisfaction with waste management services by variables. Open-ended responses were analysed thematically, by summarising and categorising similar comments and recommendations into common themes, these were then used to support and contextualise the quantitative data.

3.9 Ethical Considerations
The study was voluntary and respondents were told what the study was about before answering the questionnaire. No personal details (including names or addresses) were gathered and all answers were treated with complete confidentiality and kept for academic research purposes only. Participants could stop participating at any time prior to the completion of the survey without penalty.

3.10 Limitations of the Study
The small sample size used (53 respondents) and the sampling technique used which is convenience sampling make the results of this study non-representative of the total population of Ojota or Lagos State in general. Furthermore, the data were self-reported by the respondents, which means that there may be some individual bias or recall errors. In spite of these constraints, the data collected provide useful context-specific information on waste collection and moving practices, challenges and potential improvements in Ojota.

The survey results are presented below using descriptive statistics and visual summaries. The analysis is based on 53 respondents and focuses on waste generation, collection practices, service reliability, and transportation-related problems in Ojota. Figures 1–4 provide visual summaries of the reported waste types, collection personnel, waste-type frequency, and collection frequency.

IV. RESULTS

The findings are based on responses from 53 participants and describe waste generation, storage and collection practices, service reliability, transportation conditions, and environmental and infrastructural challenges reported in Ojota. Because convenience sampling was used, the findings are interpreted as context-specific observations rather than statistically representative estimates for the wider Ojota or Lagos population.

4.1 Respondent Characteristics and Waste Generation
The respondents represented a range of age groups, occupations, educational backgrounds, and residential circumstances. The largest age group was

26–35 years, comprising 31 respondents (58.5%), while respondents aged 18–25 years accounted for 16 (30.2%). Males constituted 31 respondents (58.5%) and females 22 (41.5%). Private-sector employees formed the largest occupational group at 20 respondents (37.7%), followed by students at 14 (26.4%). The sample was relatively highly educated, with 30 respondents (56.6%) reporting tertiary education and 21 (39.6%) postgraduate education. Most respondents lived in flats or apartments (43; 81.1%), with 23 (43.4%) reporting one to three years of occupancy.

The principal waste streams reported were food waste, plastics, paper and cartons, metals and cans, and mixed waste. Daily household waste generation was predominantly between 1 and 2 kg, reported by approximately 60% of respondents, while 25% reported generating less than 1 kg per day. These findings indicate that the respondents primarily encountered routine household and mixed municipal waste rather than specialised waste streams.

4.2 Waste Storage and Collection Practices

Waste storage at the household level relied primarily on plastic bags and lidded waste bins, while open containers were less frequently reported. However, access to appropriate waste-storage facilities appeared limited. Only approximately 40% of respondents indicated that they had adequate bins supplied by LAWMA or private collectors, with many respondents instead relying on bins purchased privately or provided by landlords. This suggests that responsibility for temporary waste storage is frequently transferred to households where formal provision is inadequate.

Collection services were provided through a combination of private collectors, LAWMA, informal cart pushers, and self-disposal. Private collectors represented the most frequently reported formal collection option, accounting for approximately 25–30% of responses, followed by LAWMA at approximately 15–20%. Informal cart pushers accounted for approximately 10–15%, while approximately 25–30% of respondents reported self-disposal or having no regular collection arrangement. Some respondents reported using more than one collection option.

Collection frequency was generally irregular. Weekly or unpredictable collection was commonly reported, whereas daily or every-two-to-three-day collection was less frequent. Collection times were also described as unpredictable, with respondents reporting morning, afternoon, and evening collection periods. The findings further indicate that informal collectors play a supplementary role where formal collection services do not consistently meet users' needs. However, reliance on informal collection may also be associated with uncontrolled disposal practices where collected waste is not subsequently transferred through an organised disposal chain.

4.3 Reliability and Accessibility of Collection Services

The assessment of service reliability revealed predominantly negative perceptions. Most respondents rated the reliability of waste collection as poor or very poor, while fewer respondents rated the service as fair, reliable, or very reliable. Missed collections were commonly reported, indicating that the existence of a collection service did not necessarily translate into consistent service delivery.

The availability and functionality of designated collection points were also inconsistent. Respondents reported that appropriate collection points were not uniformly available, while communication concerning changes to collection schedules was limited. These findings suggest that service reliability in Ojota is influenced not only by the frequency of collection but also by the predictability of schedules, availability of appropriate collection points, and communication between service providers and users.

The findings further indicate an association between perceived collection reliability and overall satisfaction. Respondents who rated collection reliability poorly were more likely to report dissatisfaction with the service. Because the study employed descriptive analysis and a small convenience sample, this relationship should be interpreted as an observed association rather than evidence of a statistically established causal relationship.

4.4 Transportation Conditions and Operational Challenges

Transportation-related problems constituted a significant component of the reported weaknesses in waste management. Many respondents rated the condition of waste collection vehicles as poor or very poor, with fewer describing the vehicles as being in fair condition. Respondents frequently associated waste transportation with traffic congestion, particularly when collection vehicles operated within already congested areas. Vehicle breakdowns and operational delays were also reported as occurring frequently or occasionally. Spillage and leakage from collection vehicles were also frequently reported. These incidents have implications for the cleanliness of collection routes and may contribute to unpleasant environmental conditions around areas through which waste vehicles travel. Respondents additionally identified vehicle exhaust and fumes as sources of air pollution. Taken together, the findings indicate that transportation is not merely a final stage in the movement of collected waste but an operational component that can introduce additional environmental and traffic-related problems when vehicle condition, route management, and collection timing are inadequate.

Satisfaction with the speed of waste evacuation was similarly low, with dissatisfaction and strong dissatisfaction more frequently reported than satisfaction. Overall satisfaction with waste collection and evacuation was predominantly neutral or negative. This finding is consistent with the reported problems of irregular collection, missed collections, vehicle breakdowns, and delays.

4.5 Environmental and Infrastructural Factors

Respondents identified several environmental conditions associated with inadequate waste-management practices in the study area. These included unpleasant odour, increased presence of flies and rodents, open dumping, blocked drainage, flooding, and air pollution associated with waste-collection vehicles. The reported occurrence of these conditions indicates that weaknesses in collection and transportation extend beyond service dissatisfaction and have implications for the environmental quality of the study area. The principal factors identified as hindering effective waste collection and transportation included irregular collection schedules, inadequate waste bins and collection points, poor road conditions, outdated collection vehicles, poor communication, inadequate manpower, inappropriate household disposal practices, and traffic congestion. Respondents also indicated limited community involvement in waste-awareness activities and inadequate provision of bins or designated collection points.

Overall, the results point to an interconnected set of operational and infrastructural weaknesses rather than a single cause of poor service performance. Irregular collection can increase the quantity of waste requiring temporary storage or alternative disposal; inadequate collection infrastructure can encourage uncontrolled disposal; and poor vehicle condition and traffic congestion can contribute to delays and spillage during transportation. The findings therefore suggest that improvements to collection reliability need to be accompanied by improvements in storage, collection-point provision, vehicle management, communication, and user participation.

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1722796

Figure 1. Frequency of waste collection reported by respondents

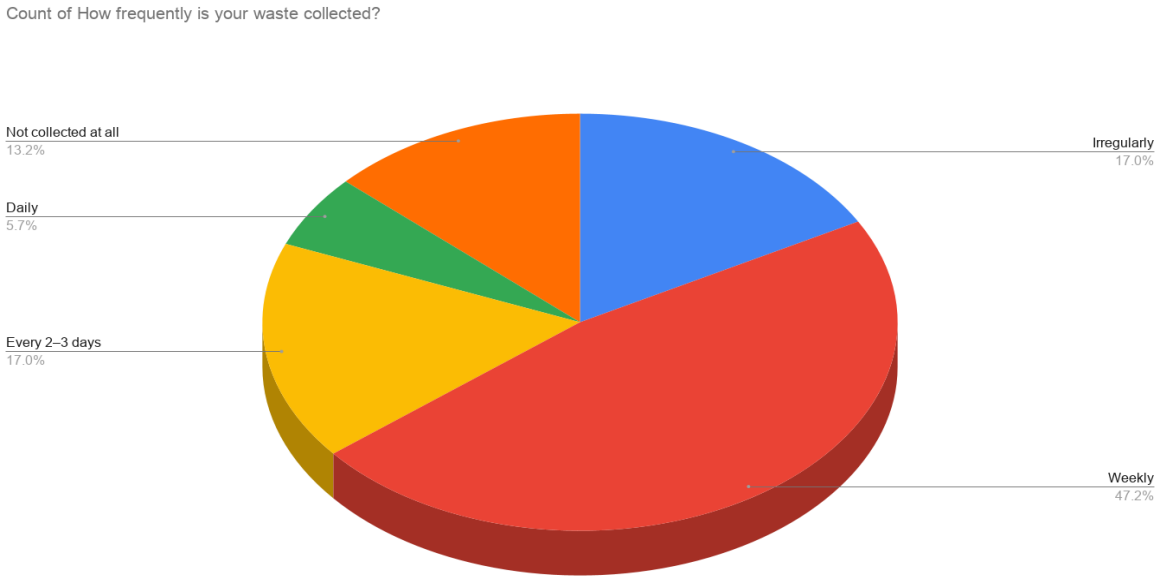
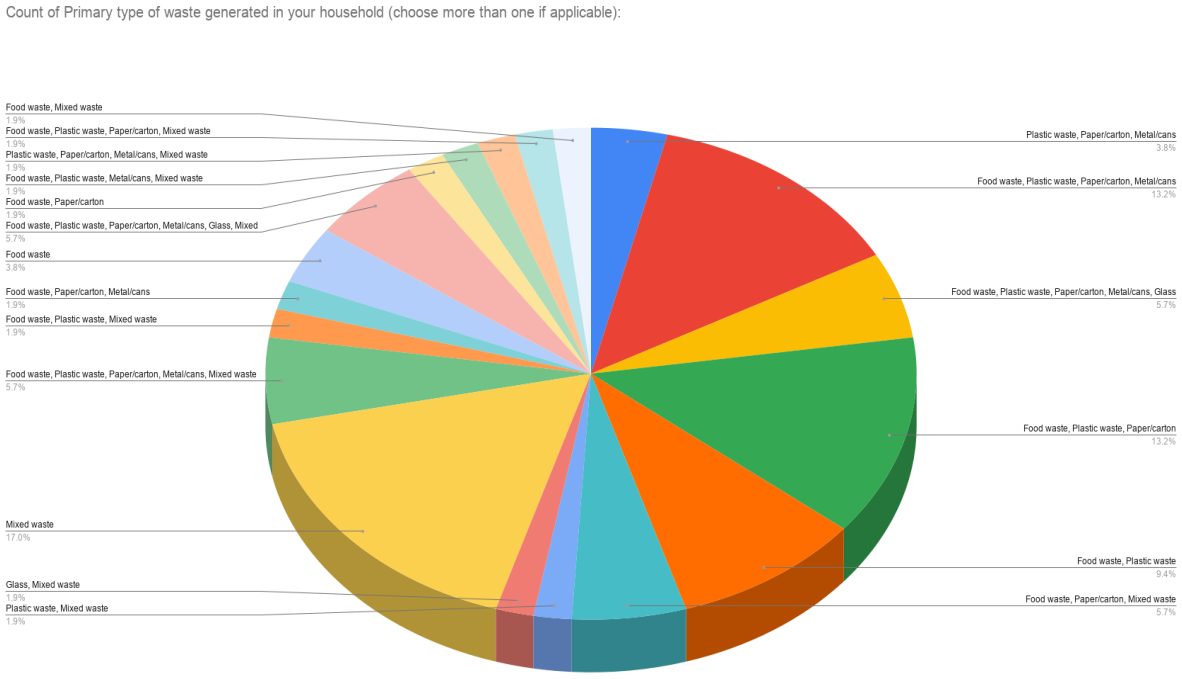


Figure 2. Distribution of primary household waste types reported by respondents.



© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1722796

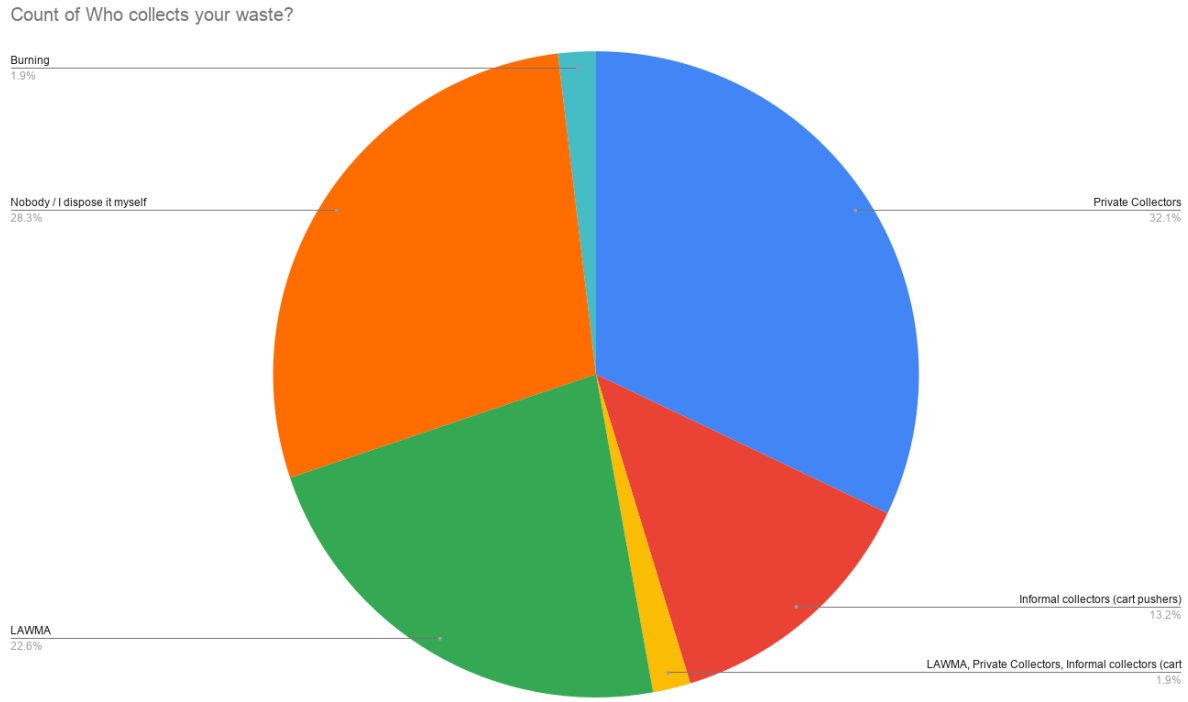
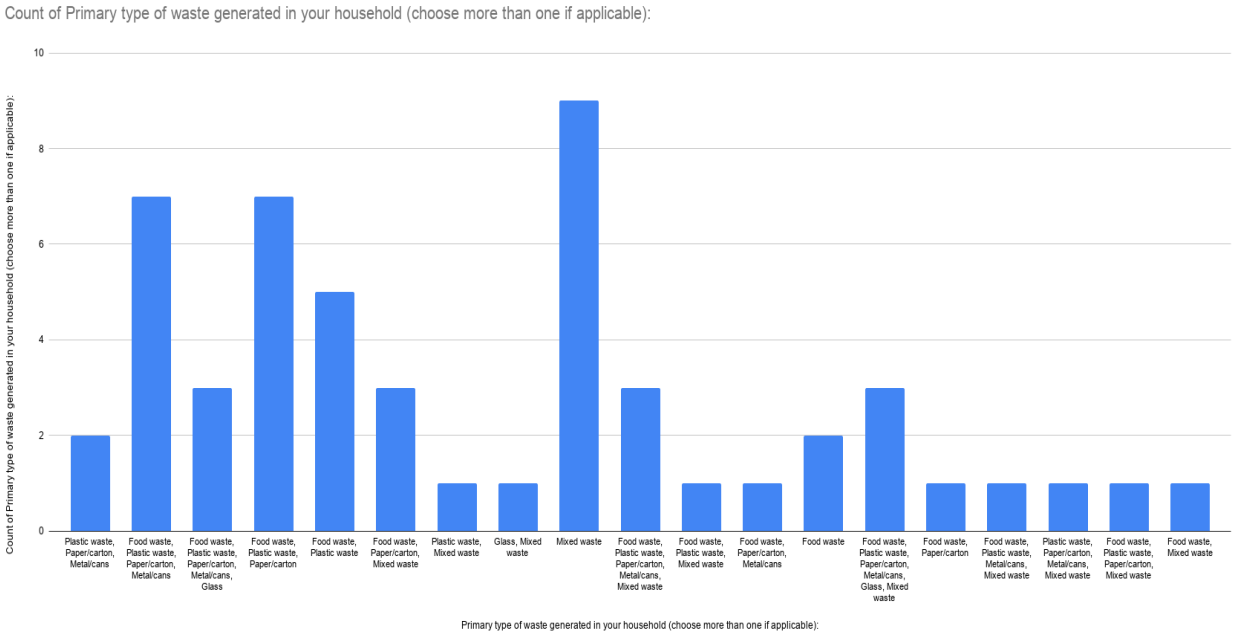


Figure 3. Waste collection personnel reported by respondents.

Figure 4. Frequency distribution of primary household waste types



© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1722796

V. RECOMMENDATIONS AND CONCLUSION

5.1 Recommendations

Based on the findings, improvements to waste collection and transportation in Ojota should focus on service reliability, infrastructure, vehicle performance, community participation, and coordination among formal and informal service providers.

1. Improve collection scheduling and communication. LAWMA and private-sector participants should establish and maintain clearly defined collection schedules and communicate them consistently to residents, traders, and other service users. Where schedules change because of operational constraints, users should receive timely notification through accessible channels such as SMS, social-media platforms, community representatives, or other locally appropriate communication systems. Improved schedule visibility would address the reported unpredictability of collection times and limited communication of service changes.

2. Strengthen collection-point and waste-storage infrastructure. The provision and maintenance of adequate household bins and designated collection points should be prioritised, particularly in locations where respondents reported inadequate facilities. Collection points should be appropriately located, maintained, and monitored to discourage open dumping and minimise the accumulation of waste in undesignated areas. Where feasible, clearly differentiated bins may also be introduced to encourage basic separation of recyclable and residual materials.

3. Improve the condition and maintenance of collection vehicles. The reported poor condition of collection vehicles, together with breakdowns, delays, congestion, and spillage, indicates a need for more systematic vehicle maintenance and replacement planning. Collection vehicles should be maintained to appropriate operational standards and fitted or managed to minimise leakage and spillage during transportation. Preventive maintenance schedules should be implemented to reduce avoidable breakdowns and interruptions to collection services.

4. Improve route planning and transportation management. Waste collection routes and operating times should be reviewed in relation to traffic conditions within Ojota. Where operationally feasible, collection activities should be scheduled to reduce conflict with peak traffic periods. Route planning should also consider the location of collection points, waste-generation areas, road accessibility, and onward transportation requirements. This approach could help reduce delays and unnecessary vehicle movement while improving service efficiency.

5. Establish a coordinated framework for informal waste collectors. The findings indicate that informal cart pushers provide an alternative collection channel where formal services are inadequate. Rather than treating these actors solely as a problem, their activities could be incorporated into a regulated framework involving registration or licensing, basic training, defined collection areas, appropriate disposal requirements, and environmental and occupational-safety standards. Such coordination should ensure that waste collected by informal operators enters an appropriate disposal or recovery pathway rather than being transferred to uncontrolled disposal locations.

6. Strengthen public awareness and community participation. The reported prevalence of inappropriate disposal practices and limited community participation in awareness activities indicates a need for sustained public education. Awareness programmes should address proper waste storage, disposal practices, waste separation, the consequences of open dumping and burning, and the importance of using designated collection arrangements. Community associations, landlords, market groups, residents, and waste-service providers should be involved in these activities so that waste-management responsibilities are shared rather than placed exclusively on service providers.

7. Strengthen monitoring and performance evaluation. Waste-management agencies and service

providers should establish simple mechanisms for routinely monitoring collection frequency, missed collections, vehicle breakdowns, spillage incidents, complaints, and the condition of collection points. These indicators can provide a basis for identifying recurring service failures and evaluating whether interventions improve reliability over time. Future assessments should also use larger and more representative samples and, where possible, incorporate operational records from service providers to complement user-reported data.

5.2 Conclusion

This study assessed waste collection and transportation practices in Ojota, Lagos, using responses from 53 residents, traders, and commuters. The findings indicate that the principal weaknesses experienced by respondents relate to irregular and unpredictable collection, inadequate waste-storage and collection-point infrastructure, poor communication, and weaknesses in transportation operations. These challenges were accompanied by reported problems with the condition of collection vehicles, traffic congestion, vehicle breakdowns, waste spillage and leakage, and pollution from vehicle exhaust. Respondents also reported environmental conditions including unpleasant odour, increased flies and rodents, open dumping, blocked drainage, and flooding.

The findings further indicate that dissatisfaction with waste services is closely associated with perceptions of poor collection reliability. Informal collectors appear to provide an important supplementary service where formal collection arrangements are insufficient, although their activities require appropriate coordination to minimise uncontrolled disposal. The evidence therefore suggests that improving waste-management performance in Ojota requires a systems-based approach rather than reliance on increased collection frequency or additional vehicles alone.

Priority should be given to establishing predictable collection schedules, improving communication with service users, providing adequate storage and designated collection infrastructure, maintaining and upgrading collection vehicles, and improving route and transportation management. Greater coordination with informal collectors and stronger community participation should complement these operational measures. Given the convenience sampling and small sample size, the findings should be interpreted as context-specific evidence from Ojota rather than as representative of Lagos State as a whole. Nevertheless, they provide a useful basis for identifying practical areas for improvement and for designing more comprehensive future assessments of municipal solid waste collection and transportation in the area.

REFERENCES

[1] Abarca-Guerrero, Lilliana & Maas, Ger & Hogland, William. (2012). Solid waste management challenges for cities in developing countries. Waste management (New York, N.Y.). 33. https://doi.org/10.1016/j.wasman.2012.09.008

[2] Adedara, M. L., Taiwo, R., & Bork, H.-R. (2023). Municipal Solid Waste Collection and Coverage Rates in Sub-Saharan African Countries: A Comprehensive Systematic Review and Meta-Analysis. Waste, 1(2), 389-413. https://doi.org/10.3390/waste1020024

[3] Afolabi, O.J. (2020). Solid Waste Management and Transport Route Optimization Using Geographic Information System in Lagos Metropolis, Nigeria. Nigerian Journal of Technological Research, 15(3), 96-101. https://doi.org/10.4314/njtr.v15i3.13

[4] Afon, A.O. (2007). Informal sector initiative in the primary sub-system of urban solid waste management in Lagos, Nigeria. Habitat International, 31, 193-204. https://doi.org/10.1016/j.habitatint.2007.02.007

[5] Agunwamba, Jonah. (2003). Analysis of Scavengers' Activities and Recycling in Some Cities of Nigeria. Environmental management. 32, 116-27. https://doi.org/10.1007/s00267-002-2874-5

[6] Akiyode, Oluwole & Sojinu, Oolasunkanmi. (2006). Assessment of Private Sector

Participation (PSP) in Solid Waste Management Practices in Nigeria (Case Study of Lagos State, Nigeria).

[7] Breukelman, H., Krikke, H., & Löhr, A. (2019). Failing Services on Urban Waste Management in Developing Countries: A Review on Symptoms, Diagnoses, and Interventions. Sustainability, 11(24), 6977. https://doi.org/10.3390/su11246977

[8] Coffey, M. and Coad, A. (2010) Collection of Municipal Solid Waste in Developing Countries. UN-HABITAT, Malta.

[9] Ekanem , I. I., Ikpe, A. E., & Ikpe , E. O. (2024). The Menace of Plastic Waste in Nigeria and Its Management Techniques in the 21st Century. Systemic Analytics, 2(2), 200-217 https://doi.org/10.31181/sa22202418

[10] Hoornweg, Daniel; Bhada-Tata, Perinaz. 2012. What a Waste : A Global Review of Solid Waste Management. Urban development series;knowledge papers no. 15. http://hdl.handle.net/10986/17388

[11] Idowu, O., Omirin, M. M., & Osagie, J. (2011). Outsourcing for sustainable waste disposal in Lagos Metropolis: Case study of Agege Local Government, Lagos. Journal of Sustainable Development. 4. 116-116. https://doi.org/10.5539/jsd.v4n6p116

[12] Kaza, Silpa; Yao, Lisa C.; Bhada-Tata, Perinaz; Van Woerden, Frank; Levine, Daniel. 2018. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Urban Development;. © World Bank. http://hdl.handle.net/10986/30317

[13] Maiha, A. I., & Yusuf, F. I. . (2025). Evaluation of Solid Waste Generation Trends Across Nigeria for Sustainable Management . Dutse Journal of Pure and Applied Sciences, 11(1b), 142–148. https://doi.org/10.4314/dujopas.v11i1b.16

[14] Mlilo, Philani & Chigugudhlo, Patronellah Nelly & Marufu-Dzangare, Ian Takunda & Chitongo, Leonard & Mutale, S & Muyambo, Nkosinathi. (2022). Waste Management in Cowdray Park Suburb of Bulawayo, Zimbabwe. Journal of Public Administration and Development Alternatives. 6. 48-64. https://doi.org/10.55190/DUBY5447

[15] Nambuli, F., Togarepi, C., & Shikongo, A. (2021). Waste Scavenging a Problem or an Opportunity for Integrated Waste Management in Namibia: A Case of Keetmanshoop Municipality, Namibia. Environment and Pollution, 10, 47. https://doi.org/10.5539/ep.v10n2p47

[16] Ogwueleka, T.C. (2009) Municipal Solid Waste Characteristics and Management in Nigeria. Iranian Journal of Environmental Health Science & Engineering, 6, 173-180. https://doi.org/10.12691/env-5-3-1

[17] Ojolowo, Saeed & Kalmadeen, & Onifade, Victor. (2019). Assessing Contemporary Solid Waste Management Practices in Lagos Metropolis, Nigeria. Journal of Environmental Studies. Vol 9.

[18] Olukanni, D. O., & Oresanya, O. O. (2018). Progression in Waste Management Processes in Lagos State, Nigeria. International Journal of Engineering Research in Africa, 35, 11–23. https://doi.org/10.4028/www.scientific.net/jera.35.11

[19] Omokaro, G. O., Michael, I., & Evgenievich, P. V. (2024). Assessing the Environmental and Health Implications of Waste Disposal: A Case Study of Africa's Largest Dumping Site. Journal of Geography, Environment and Earth Science International, 28(5), 16–30. https://doi.org/10.9734/jgeesi/2024/v28i5767

[20] Rocky Mountain Institute RMI. (2025). Mitigating methane emissions from municipal solid waste: A playbook for Lagos, Nigeria. Rocky Mountain Institute.

[21] Shahmoradi, B. (2013). Collection of municipal solid waste in developing countries. International Journal of Environmental Studies, 70(6), 1013–1014. https://doi.org/10.1080/00207233.2013.853407

[22] Sulemana, Alhassan, Donkor, Emmanuel A., Forkuo, Eric K., Oduro-Kwarteng, Sampson, Optimal Routing of Solid Waste Collection Trucks: A Review of Methods, Journal of

Engineering, 2018, 4586376, 12 pages, 2018. https://doi.org/10.1155/2018/4586376

[23] The Nation (2018, May 3) Visionscape positions TLS for waste efficiency. The Nation.

[24] United Nations Environment Programme. (2018). Africa waste management outlook. https://wedocs.unep.org/handle/20.500.11822/25514

[25] World Bank. 2024. Improving Solid Waste and Plastics Management in Lagos State: A Way Forward. World Bank Group. https://doi.org/10.1596/42374