

HOUSEHOLD WASTE MANAGEMENT PRACTICES AND BARRIERS IN LOKOJA, NIGERIA: IMPLICATIONS FOR SUSTAINABLE URBAN DEVELOPMENT

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Abstract

Sustainable urban development in Nigerian cities is increasingly constrained by ineffective household waste management. This study examined household waste management practices and the barriers that shape them in Lokoja, Nigeria, and drew out their implications for sustainable urban development. A descriptive survey design was adopted, and structured questionnaires were administered to 200 households selected through a multistage sampling procedure across five residential areas spanning the low, middle and high income strata of the city. Data were analysed using descriptive statistics, namely frequencies and percentages. Open dumping and roadside disposal emerged as the dominant disposal practices, accounting for 35.5 percent and 32.5 percent of households respectively, while sorting, recycling and composting remained marginal at 17.5 percent, 15.5 percent and 10.5 percent. The barriers most frequently reported were inadequate waste management regulations (97.5 percent), informal sector activities and behavioural factors (95.5 percent each), economic constraints (94.0 percent), insufficient funding (91.5 percent) and limited infrastructure (84.0 percent). A pronounced disconnect was observed between educational attainment and sustainable practice, indicating that knowledge alone does not translate into behaviour where enabling infrastructure and enforcement are absent. The study concludes that improving waste management in Lokoja requires stronger regulatory frameworks, targeted infrastructure investment, integration of the informal sector, stakeholder collaboration and sustained behavioural change interventions that together advance sustainable urban development.

Keywords: household waste management; barriers; Lokoja; Nigeria; sustainable urban development; waste practices

1. Introduction

Household waste management has become one of the most pressing environmental challenges confronting urban areas in the developing world. Rapid urban population growth, shifting consumption patterns and chronically inadequate waste infrastructure have combined to generate vast quantities of household waste, much of which remains uncollected, poorly disposed of, or dumped illegally (Kaza et al., 2018; World Bank, 2024). Global municipal solid waste generation reached roughly 2.01 billion tonnes in 2016 and is projected to rise to 3.40 billion tonnes by 2050, with the steepest increases anticipated in the very regions least equipped to cope (Kaza et al., 2018). Low income countries, and those of Sub-Saharan Africa in particular, are experiencing the fastest growth in waste generation while retaining the weakest institutional capacity to manage it (Hoornweg & Bhada-Tata, 2012; World Bank, 2024).

Within Sub-Saharan Africa the challenge is especially acute. The region generates approximately 174 million tonnes of waste each year, a figure expected to reach 516 million tonnes by 2050 (Kaza et al., 2018). Despite this volume, collection services remain grossly inadequate, and in many cities fewer than one household in ten is served by a reliable collection round (Ogwueleka, 2009; Nzeadibe, 2011). Open dumping in unregulated sites, along roadsides and into drainage channels remains the prevailing practice (Nnorom & Osibanjo, 2008; Ogwueleka, 2009), with consequences that include air pollution from open burning, contamination of surface and groundwater by leachate, accumulation of heavy metals in soils and the blockage of drains that precipitates urban flooding (Mahajan, 2023; World Bank, 2024).

Households sit at the centre of this problem because they are the primary generators of municipal solid waste (Tchobanoglous et al., 1993; Hoornweg & Bhada-Tata, 2012). The quantity and composition of the waste a household produces are shaped by income, education, household size, consumption habits and cultural practice (Mazzanti & Zoboli, 2009; Beigl et al., 2008). Understanding these household level dynamics is therefore essential to designing interventions that reach the behavioural roots of poor disposal rather than merely treating its symptoms.

In Nigeria the situation is critical. As the most populous country in Africa, with more than 200 million inhabitants and a rapid rate of urbanisation, Nigeria generates an estimated 32 million tonnes of waste annually (Dataphyte, 2025). Collection services nonetheless remain thin, and many urban areas receive no regular service at all. Through the National Environmental Standards and Regulations Enforcement Agency, the federal government has issued instruments such as the National Environmental (Waste Management) Regulations of 2011 (NESREA, 2008); yet enforcement is weak and compliance is low, most of all in the secondary cities where institutional capacity is thinnest.

Lokoja, the capital of Kogi State, exemplifies the predicament of Nigeria's secondary cities. Since its designation as state capital in 1991 the city has grown rapidly, outpacing the capacity of municipal authorities to provide adequate services (Okoje, 2016; Opaluwa & Ibrahim, 2022). Its residential fabric mixes high, medium and low density neighbourhoods that mirror the socioeconomic stratification of the population. Responsibility for waste rests chiefly with the Kogi State Sanitation and Waste Management Board, an agency beset by inadequate funding, insufficient personnel, a shortage of equipment and weak coordination (Opaluwa & Ibrahim, 2022; Amos et al., 2024).

1.1 Statement of the Problem

Despite a growing literature on waste management in Nigerian cities, understanding of household level practices and barriers in secondary cities such as Lokoja remains limited. Existing work has addressed waste infrastructure, institutional capacity and the spatial distribution of dumpsites (Okoje, 2016; Opaluwa & Ibrahim, 2022; Agada et al., 2020; Adewumi et al., 2019; Amos et al., 2024), but none has systematically examined the socioeconomic determinants of household practice or the obstacles that prevent households from adopting effective waste management. This gap matters, because households are the primary generators of waste and their choices directly govern environmental quality. Without a clear account of the factors that shape household behaviour, it is difficult to design interventions that genuinely promote sustainability at the point of generation (Conke & Do Nascimento, 2018; Oduro-Appiah et al., 2022; Slavik et al., 2021).

1.2 Aim and Objectives

The study aimed to examine household waste management practices and the barriers influencing effective waste management in Lokoja, and to draw out their implications for sustainable urban development. It specifically sought to (i) assess household waste generation, storage, processing and disposal practices; (ii) identify the major challenges limiting effective household waste management; and (iii) examine the implications of prevailing practices for sustainable urban development in the city.

1.3 Significance of the Study

By providing empirical evidence on household practices and barriers, the study contributes to the literature on waste management in Nigerian secondary cities and offers an evidence base for policy. Its findings are directly relevant to policymakers, to the Kogi State Sanitation and Waste Management Board and to local government authorities seeking to design targeted interventions that promote sustainable waste management at the household level.

2. Study Area

The study was conducted in Lokoja, the capital of Kogi State, Nigeria, which lies at the confluence of the Niger and Benue rivers at approximately 7°49' N and 6°44' E. The study area extends roughly between latitudes 7°45'00" N and 7°51'04" N and longitudes 6°41'55" E and 6°45'36" E. As the administrative capital of Kogi State the city is bounded by several local government areas, including Yagba East, Kabba/Bunu, Mopa-Muro, Kogi, Bassa and Dekina (Figure 1). The River Niger drains the western fringe, and a network of trunk and secondary roads links the residential neighbourhoods. The climate is the tropical wet and dry, or Aw, type in the Koppen classification. Rainfall is strongly seasonal, falling mainly between April and October with an annual average near 1,300 mm and peak totals from June to September. Wet season storms can be intense, generating surface runoff and occasional flooding that interacts directly with the accumulation and dispersal of improperly disposed waste (NearWeather, 2025).

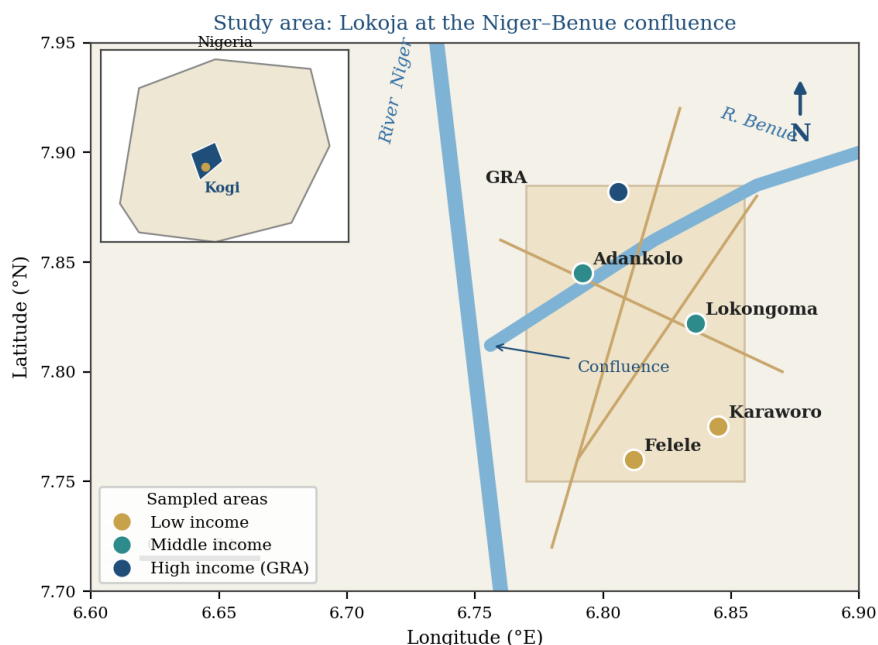


Figure 1. Study area: Lokoja metropolis at the Niger–Benue confluence, Kogi State, Nigeria, showing the five sampled residential areas by income stratum. Source: adapted from Federal University Lokoja GIS Laboratory (2025).

3. Methodology

The study adopted a descriptive survey research design to investigate household waste management practices and barriers in Lokoja. Data were collected from 200 households through a structured questionnaire administered across selected residential areas. The instrument captured respondents' socioeconomic characteristics, the types of waste generated, storage methods, processing practices, disposal methods and the perceived challenges affecting waste management. Descriptive statistics, namely frequencies and percentages, were used to summarise household characteristics, practices and identified barriers, and the results were presented in tables and interpreted for their implications for sustainable urban development.

3.1 Research Design

A survey research design was adopted because it permits the collection of data from a representative sample of households and supports description of the characteristics, behaviours and attitudes of the population of interest (Creswell & Creswell, 2018).

3.2 Sampling Technique

A multistage sampling technique was employed. In the first stage, Lokoja was stratified into three income zones, high, middle and low, on the basis of the socioeconomic character of its residential areas. In the second stage, purposive sampling selected communities representative of each zone: Felele and Karaworo from the low income stratum; Adankolo and Lokongoma Phases One and Two from the middle income stratum; and the Government Reserved Area from the high income stratum. In the third stage, simple random sampling selected households within each community, with 40 households drawn from each of the five communities to yield a total sample of 200 households.

3.3 Sample Size Determination

The sample size was determined using a combination of Yamane's formula (1967) and Cohen's formula for proportions (1988). Based on the 2006 National Population Census, the population of Lokoja was 195,261 (Federal Republic of Nigeria, 2007). It is acknowledged that the population has grown considerably since 2006, but the absence of more recent census data necessitated the use of the 2006 figure. Yamane's formula expresses the required sample as

$$n = N / [1 + N(e)^2] \quad (1)$$

where n is the sample size, N is the population and e is the margin of error. Cohen's formula for a single proportion complements this as

$$n = Z^2 p(1 - p) / e^2 \quad (2)$$

where Z is the standard normal deviate at the chosen confidence level, p is the expected proportion and e is the margin of error. Applying a 95 percent confidence level ($Z = 1.96$) and a 7 percent margin of error, Cohen's formula returned a sample of approximately 196. To allow for nonresponse and incomplete questionnaires this was rounded up to 200 households.

3.4 Data Collection Instruments

Data were collected using structured questionnaires and field observation. The questionnaire comprised three sections covering demographic and socioeconomic characteristics; waste generation and management practices; and barriers to effective waste management. It was pilot tested with 20 households in Gadumo, a community not included in the main study, to identify ambiguous items, and it was subsequently refined to improve clarity and relevance.

3.5 Data Analysis

Data were analysed using SPSS version 21. Descriptive statistics, namely frequencies and percentages, summarised demographic and socioeconomic characteristics, waste generation and management practices and barriers. Results were presented in tables and interpreted to determine the implications of household practices for sustainable urban development.

3.6 Ethical Considerations

Ethical approval was obtained from the relevant institutional ethics committee. Informed consent was secured from all respondents, participation was entirely voluntary, anonymity and confidentiality were assured, and no identifying information was collected.

4. Results and Discussion

4.1 Socioeconomic Characteristics of Respondents

Table 1 summarises the demographic and socioeconomic characteristics of the 200 respondents. Women constituted the majority at 57.0 percent, most respondents were aged 40 to 49 years (37.5 percent) and the largest group was married (56.0 percent). Households of six to ten members were the most common (42.0 percent), and tertiary education was the highest qualification attained by the largest share of respondents (44.0 percent). A third of respondents earned between 70,000 and 120,000 naira monthly (33.5 percent), with most engaged in business or private employment (33.5 percent) or in the civil service (32.0 percent). Tenants slightly outnumbered landlords, at 55.5 percent against 44.5 percent. This profile of a mature, comparatively well educated and economically active population is important, because it means that the practices reported below cannot be attributed simply to ignorance or extreme poverty; they instead point to deeper structural and institutional constraints.

Table 1. Demographic and socioeconomic characteristics of respondents (N = 200).

Variable	Category	n	%
Sex	Male	86	43.0
	Female	114	57.0
Age (years)	<30	29	14.5
	30–39	44	22.0
	40–49	75	37.5
	50–59	29	14.5
	≥60	23	11.5
Marital status	Single	28	14.0
	Married	112	56.0
	Divorced	27	13.5
	Widowed	33	16.5
Household size	≤5 members	41	20.5
	6–10 members	84	42.0
	11–15 members	50	25.0
	≥16 members	25	12.5
Education	Illiterate/adult literacy	28	14.0

Variable	Category	n	%
	Primary	33	16.5
	Secondary	51	25.5
	Tertiary	88	44.0
Monthly income (₦)	<70,000	30	15.0
	70,000–120,000	67	33.5
	121,000–180,000	34	17.0
	181,000–249,000	31	15.5
	≥250,000	38	19.0
Occupation	Civil servant/government	64	32.0
	Business/private	67	33.5
	Unemployed	24	12.0
	Artisan	25	12.5
	Farmer/fisherman	20	10.0
Residential status	Tenant	111	55.5
	Landlord	89	44.5

Source: Authors' field survey, 2025.

4.2 Household Waste Management Practices

The survey data (Table 2) reveal several features of household waste generation, storage and disposal that closely mirror wider trends across urban Nigeria. Every surveyed household reported generating paper and cartons, plastic bags, bottles, food waste and tins or cans. This universal generation of mixed streams reflects how deeply packaged consumer goods, plastics and organic food waste are embedded in daily domestic life, and it establishes at the outset that no single stream can be neglected: an effective system for Lokoja must be capable of handling several distinct materials simultaneously.

Open dumping remained the predominant disposal route, with more than two thirds of households discarding waste in open spaces (35.5 percent) or along roadsides (32.5 percent). Overall, roughly 82 percent of households lacked access to a proper disposal facility, a figure consistent with earlier observations in comparable Nigerian settings. Storage was similarly improvised: old buckets (31.0 percent), baskets (23.5 percent), cartons (22.5 percent) and plastic bags (17.5 percent) were the containers most commonly used (Figure 3). Such containers are frequently uncovered, prone to leakage and attractive to pests, and their prevalence signals the limited penetration of appropriate storage infrastructure at the household level. The dominance of open dumping and roadside disposal shown in Figure 2 carries well documented environmental and health consequences, from the atmospheric emissions of open burning to leachate contamination of water, soil pollution and the propagation of vector borne disease (Mahajan, 2023; World Bank, 2024).

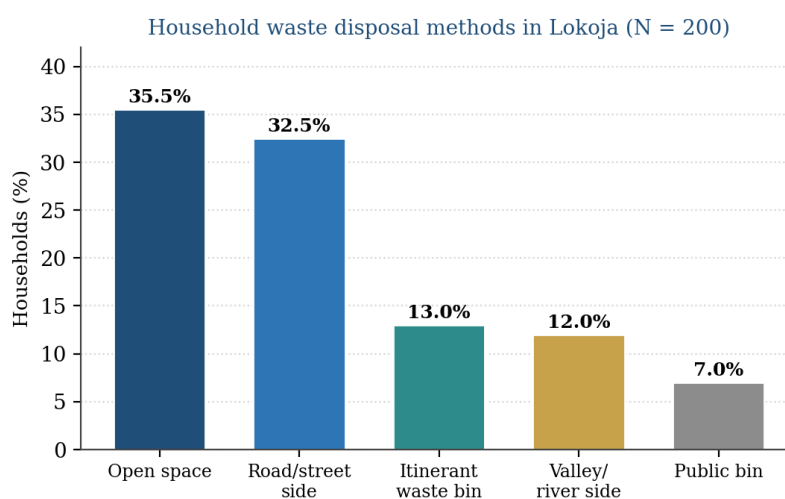


Figure 2. Household waste disposal methods in Lokoja (N = 200). Open dumping and roadside disposal together account for more than two thirds of households.

The picture is compounded by a near absence of waste processing. Only 17.5 percent of respondents practised any form of sorting, formal or informal recycling reached just 15.5 percent, and composting of organic matter was rarer still at 10.5 percent. Because organic and recyclable fractions are therefore consigned to disposal rather than recovery, materials with clear value to a circular economy are lost as undifferentiated refuse. Residents' assessment of public collection was correspondingly bleak: 53 percent rated the service as bad and the remaining 47 percent as merely fair, while not a single household rated it as good.

The complete absence of positive appraisal underscores a severe service gap and indicates that improper open space dumping is driven less by preference than by the lack of a dependable public alternative.

Waste storage containers used by households

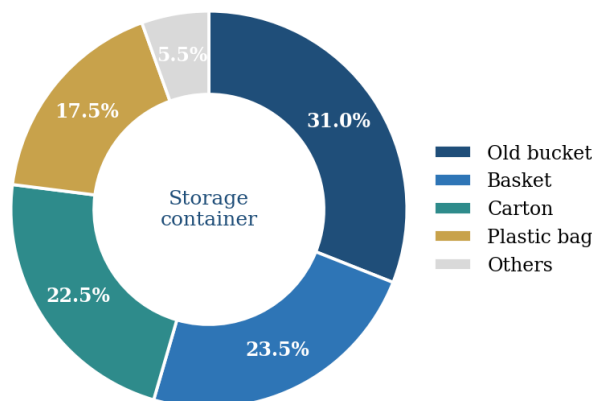


Figure 3. Distribution of waste storage containers used by households. Improvised and often uncovered containers predominate.

Table 2. Household waste generation, storage, processing, disposal and collection status in Lokoja (N = 200).

Practice domain	Category	n	%
Types of waste generated	Paper/carton	200	100.0
	Plastic bags	200	100.0
	Bottles	200	100.0
	Food waste	200	100.0
	Tins/cans	200	100.0
Storage container used	Old bucket	62	31.0
	Basket	47	23.5
	Carton	45	22.5
	Plastic bag	35	17.5
	Others	11	5.5
Processing practice	Sorting	35	17.5
	Recycling	31	15.5
	Composting	21	10.5
Disposal method	Open space	71	35.5
	Road/street side	65	32.5
	Itinerant waste bin	26	13.0
	Valley/river side	24	12.0
	Public bin	14	7.0
State of collection	Bad	112	53.0
	Fair	88	47.0
	Good	0	0.0

Source: Authors' field survey, 2025. Multiple responses were permitted for waste types generated.

4.3 Barriers to Effective Waste Management

Table 3 and Figure 4 present the challenges households identified as constraints on effective waste management. Inadequate or inconsistent regulation was cited most often, by 97.5 percent of respondents. Informal sector activities and cultural or behavioural factors followed at 95.5 percent each, ahead of economic factors (94.0 percent), insufficient funding for waste initiatives (91.5 percent), limited infrastructure (84.0 percent) and low public awareness (81.5 percent). By contrast, comparatively few respondents regarded limited access to advanced technology (41.0 percent) or population growth and urbanisation (39.0 percent) as major obstacles.

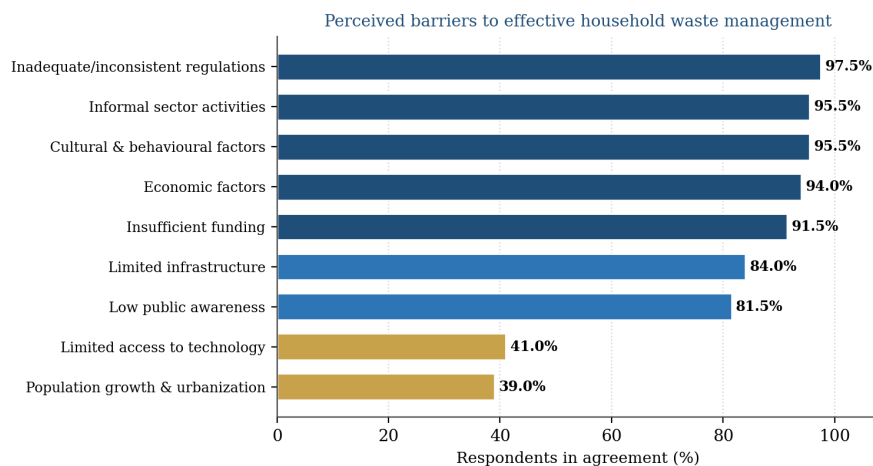


Figure 4. Perceived barriers to effective household waste management, ranked by the share of respondents in agreement. Institutional, financial and behavioural constraints dominate over technological ones.

The ordering in Figure 4 is analytically revealing. The barriers ranked highest are institutional, financial and behavioural rather than technological, which reframes the problem in an important way. Weak regulatory enforcement, thin funding and deficient infrastructure undermine collection and disposal at the same time as the informal sector, economic pressure and entrenched habit complicate any move toward sustainability. That respondents did not regard technology or demographic pressure as decisive suggests that Lokoja's difficulties are ones of governance and provision rather than of engineering know how or sheer numbers. These findings align with earlier Nigerian studies that identify weak policy implementation, inadequate institutional capacity and funding deficits as the persistent barriers to effective waste management (Amos et al., 2024; Opaluwa & Ibrahim, 2022), and they reinforce the case for stronger enforcement, greater investment and sustained behavioural change.

Table 3. Challenges to waste management in the study area, ranked by agreement.

S/N	Waste management challenge (n = 200)	Agreed (F)	%
1	Inadequate or inconsistent waste management regulations	195	97.5
2	Informal sector activities	191	95.5
3	Cultural and behavioural factors	191	95.5
4	Economic factors	188	94.0
5	Insufficient funding for waste management initiatives	183	91.5
6	Limited infrastructure	168	84.0
7	Limited public awareness of proper practices	163	81.5
8	Limited access to advanced technologies	82	41.0
9	Overpopulation and urbanisation	78	39.0

Source: Authors' field survey, 2025.

4.4 Implications for Sustainable Urban Development

Taken together, prevailing household practices pose a significant threat to sustainable urban development in Lokoja. The widespread reliance on open dumping and roadside disposal, combined with improvised storage and unreliable collection, drives environmental degradation through soil and water pollution and blocked drainage, elevates public health risk and adds to the burden on already stretched urban infrastructure. These conditions erode environmental quality, reduce the livability of neighbourhoods and, by consigning recoverable materials to disposal, forfeit the resource and employment dividends that a circular approach could deliver.

The single most instructive result is the disconnect between education and practice illustrated in Figure 5. Although 44 percent of respondents hold tertiary qualifications, only 17.5 percent sort their waste, 15.5 percent recycle and 10.5 percent compost. This gulf demonstrates that knowledge alone does not produce behaviour. Awareness may be a necessary condition for sustainable practice, but its translation into action is evidently blocked by structural factors, namely inadequate infrastructure, weak enforcement and the absence of accessible services. The pattern is consistent with the knowledge to practice gap documented elsewhere (Debrah et al., 2021; Oduro-Appiah et al., 2022) and supports the central conclusion of this study, that institutional and structural barriers, rather than individual shortcomings, are the primary obstacles to sustainable waste management in Lokoja.

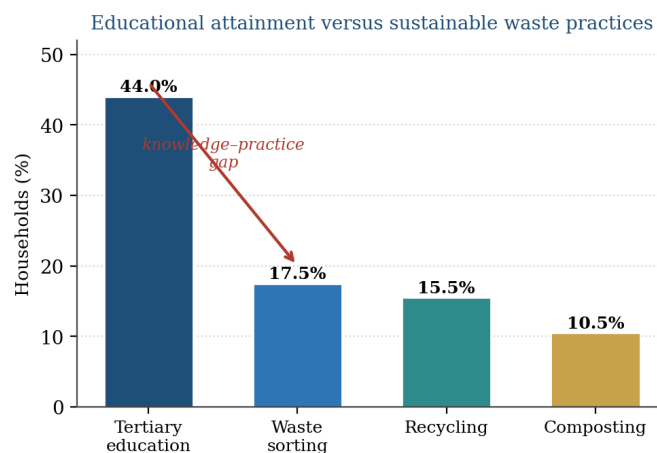


Figure 5. The knowledge to practice gap: high tertiary educational attainment coexists with low uptake of sorting, recycling and composting.

The policy implication follows directly. Because the constraints are structural, interventions pitched solely at individual awareness will underperform unless they are matched by enabling provision. Strengthening regulatory enforcement, investing in collection and disposal infrastructure, expanding access to regular collection and promoting household participation through environmental education are all necessary. Integrating the informal waste sector into the formal system and encouraging public and private partnership could further improve service delivery, create employment and support resource recovery. Such measures would contribute to cleaner urban environments, better public health, greater environmental resilience and the attainment of sustainable development objectives in Lokoja and cities like it.

5. Conclusion

This study examined household waste management practices and barriers in Lokoja and their implications for sustainable urban development. Household waste management remains inadequate: open dumping, roadside disposal and improvised storage are still commonplace, and despite the relatively high educational attainment of respondents the uptake of sorting, recycling and composting is low. Weak and inconsistent regulation, inadequate funding, limited infrastructure, informal sector dynamics, economic constraint and behavioural factors emerged as the principal obstacles to effective management.

The persistence of these challenges points to the need for a more integrated and sustainable approach. Improving urban waste management in Lokoja will require stronger institutional frameworks, effective enforcement, increased investment in collection and disposal, and greater public participation through environmental education and awareness. Incorporating informal operators into the formal system and fostering collaboration among government, the private sector and communities can enhance service delivery and resource recovery. Addressing these issues is essential to reducing environmental and public health risk and to advancing sustainable urban development in Lokoja and other emerging Nigerian cities.

Declarations

Conflict of Interest

The authors declare no conflict of interest.

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Authors' Contributions

Olajumoke Titilayo Olatunde: conceptualisation, data collection, formal analysis, investigation, writing of the original draft. Idris Audu Jaiyeoba: supervision, validation, writing through review and editing. Samuel Ibbi Ibrahim: supervision, validation, writing through review and editing. Alex Folorunsho: review and editing.

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