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Barriers to plastic waste management in urban Nigeria: a systematic review of Lagos state evidence

ABSTRACT

Urban plastic waste management in sub-Saharan Africa remains a major environmental governance challenge, yet barriers to effective management in Nigerian cities remain insufficiently understood. This systematic review synthesised primary empirical evidence on barriers to plastic waste management in urban Nigeria, with particular focus on Lagos State, to inform policy and identify evidence gaps. Following PRISMA 2020 guidelines, four electronic databases were searched, and six primary empirical studies published between 2014 and 2025 were included. Data were extracted using a standardised framework and synthesised through narrative analysis by barrier category. Six categories were identified: infrastructural, behavioural, financial, awareness and knowledge, policy and legislative, and governance and institutional. Infrastructural barriers were most consistently reported, followed by financial and behavioural barriers. Although governance and institutional barriers had the lowest weighted frequency score, they appeared to influence other categories. Barriers were broadly consistent across urban Nigerian contexts, but their manifestations differed. Lagos showed service inadequacy within a formally developed system, while Ilorin exhibited more acute infrastructure gaps. The findings indicate that plastic waste management failure reflects interconnected barriers rather than isolated constraints. Integrated responses addressing infrastructure, affordability, regulation and public awareness are required. Future research should prioritise governance, comparative multi-city evidence and longitudinal evaluation.

Keywords: plastic waste management; barriers; systematic review; urban Nigeria; Lagos State; waste governance

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Barreras para la gestión de residuos plásticos en la Nigeria urbana: revisión sistemática de evidencia del estado de Lagos

RESUMEN

La gestión de residuos plásticos urbanos en el África subsahariana sigue siendo un importante desafío de gobernanza ambiental, aunque las barreras para una gestión eficaz en las ciudades nigerianas aún se comprenden insuficientemente. Esta revisión sistemática sintetizó evidencia

empírica primaria sobre las barreras a la gestión de residuos plásticos en la Nigeria urbana, con especial atención al estado de Lagos, para informar políticas e identificar vacíos de evidencia. Siguiendo las directrices PRISMA 2020, se buscaron cuatro bases de datos electrónicas y se incluyeron seis estudios empíricos primarios publicados entre 2014 y 2025. Los datos se extrajeron mediante un marco estandarizado y se sintetizaron a través de un análisis narrativo por categoría de barrera. Se identificaron seis categorías: infraestructurales, conductuales, financieras, de conciencia y conocimiento, políticas y legislativas, y de gobernanza e institucionales. Las barreras infraestructurales fueron las más consistentemente reportadas, seguidas de las financieras y conductuales. Aunque las de gobernanza e institucionales tuvieron la puntuación de frecuencia ponderada más baja, parecieron influir en las demás categorías. Las barreras fueron ampliamente consistentes en los contextos urbanos nigerianos, pero sus manifestaciones diferían. Lagos mostró insuficiencia de servicios dentro de un sistema formalmente desarrollado, mientras que Ilorin presentó vacíos de infraestructura más agudos. Los hallazgos indican que el fracaso de la gestión de residuos plásticos refleja barreras interconectadas más que limitaciones aisladas. Se requieren respuestas integradas que aborden infraestructura, asequibilidad, regulación y conciencia pública. La investigación futura debe priorizar la gobernanza, evidencia comparativa multi-ciudad y evaluación longitudinal.

Palabras clave: gestión de residuos plásticos; barreras; revisión sistemática; Nigeria urbana; Estado de Lagos; gobernanza de residuos

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Barreiras à gestão de resíduos plásticos na Nigéria urbana: uma revisão sistemática de evidências do estado de Lagos

RESUMO

A gestão dos resíduos plásticos urbanos na África Subsaariana continua a ser um grande desafio para a governação ambiental, mas as barreiras à gestão eficaz nas cidades nigerianas ainda não são suficientemente compreendidas. Esta revisão sistemática sintetizou evidências empíricas primárias sobre as barreiras à gestão de resíduos plásticos na Nigéria urbana, com um foco particular no estado de Lagos, para subsidiar as políticas públicas e identificar lacunas de conhecimento. Seguindo as diretrizes PRISMA 2020, foram pesquisadas quatro bases de dados eletrônicas e foram incluídos seis estudos empíricos primários publicados entre 2014 e 2025. Os dados foram extraídos através de uma estrutura padronizada e sintetizados através de uma análise narrativa por categoria de barreira. Foram identificadas seis categorias: infraestrutural, comportamental, financeira, sensibilização e conhecimento, política e legislativa, e governação e institucional. As barreiras infraestruturais foram as mais consistentemente reportadas, seguidas pelas barreiras financeiras e comportamentais. Embora as barreiras de governação e institucionais tenham apresentado a pontuação de frequência ponderada mais baixa, pareceram influenciar outras categorias. As barreiras foram amplamente consistentes em todos os contextos urbanos nigerianos, mas as suas manifestações diferiram. Lagos apresentou inadequação de serviços dentro de um sistema formalmente desenvolvido, enquanto Ilorin exibiu lacunas de infraestruturas mais acentuadas. Os resultados indicam que o insucesso na gestão de resíduos plásticos reflecte barreiras interligadas, em vez de restrições isoladas. São necessárias respostas integradas que abordem as infraestruturas, a acessibilidade, a regulamentação e a sensibilização do público. A investigação futura deve priorizar a governação, a evidência comparativa entre várias cidades e a avaliação longitudinal.

Palavras-chave: gestão de resíduos plásticos; barreiras; revisão sistemática; Nigéria urbana; Estado de Lagos; governação de resíduos

INTRODUCTION

Plastic waste has become a major environmental governance challenge, particularly in rapidly urbanising countries where consumption is increasing faster than waste management capacity. Global plastic production has risen from approximately two million tonnes in 1950 to more than 400 million tonnes annually, while only about 9% of all plastic produced has been recycled (Kibria et al., 2023; OECD, 2022). Poorly managed plastic waste contributes to blocked drainage systems, water pollution, harm to aquatic ecosystems and potential human health risks. Without significant changes to current production and disposal practices, global plastic waste generation is projected to nearly triple by 2060 (OECD, 2022). Nigeria faces significant exposure to these challenges. Nigeria has been identified as one of the world's major contributors to plastic pollution, with Lagos among the urban centres associated with substantial plastic emissions (Velis et al., 2024). The country generates an estimated 2.5 million tonnes of plastic waste annually, while less than 12% is recycled (Yalwayi et al., 2022). Much of the remaining waste is managed through open dumping, open burning and disposal into drainage systems and waterways (Yalwayi et al., 2022; Omokaro et al., 2026). Lagos State is particularly important because of its population, commercial activity and extensive network of rivers, canals and lagoons. The state generates more than 13,500 tonnes of municipal waste daily, creating substantial pressure on existing collection and treatment systems (UNIDO, 2022). Mismanaged plastic waste also contributes to drainage blockage, flooding and the movement of waste into the Lagos Lagoon and the Atlantic Ocean (Velis et al., 2024; Omokaro et al., 2026).

The persistence of inadequate plastic waste management cannot be explained by infrastructure deficits alone. Evidence points to interconnected institutional, governance, behavioural, financial and infrastructural barriers. Although Lagos State has the Lagos Waste Management Authority (LAWMA) and Nigeria has a National Policy on Plastic Waste Management (2020), challenges remain in enforcement, producer responsibility, institutional coordination, waste segregation and public compliance (Ezeudu et al., 2024; Onungwe et al., 2023; Omokaro et al., 2026). Identifying these barriers is therefore important for developing more effective environmental policies and management responses. Previous reviews have addressed important aspects of waste and plastic pollution in Nigeria, but their scopes differ from the present study. Yalwayi et al. (2022) reviewed plastic pollution across Nigeria, focusing mainly on pollution sources, distribution, biological effects and policy needs. Onungwe et al. (2023) examined circular economy transition in municipal solid waste management, while Ezeudu et al. (2024) reviewed plastic production, consumption and end-of-life management. Omokaro et al. (2026) examined wider systemic failures in Nigerian waste management through a PRISMA-ScR approach. However, these reviews do not provide a focused synthesis of primary empirical evidence on barriers to plastic waste management in urban Nigerian contexts, with Lagos as a focal setting.

This review addresses this gap by systematically synthesising primary empirical evidence on barriers to effective plastic waste management in urban Nigeria, with particular attention to Lagos State. The review follows the PRISMA 2020 statement and uses the PICo framework to structure the review question and eligibility criteria. Three research questions guide the review:

- RQ1: What categories of barriers, including infrastructural, governance, financial, behavioural and policy-related barriers, are most consistently reported in primary empirical studies of plastic waste management in urban Nigeria?
- RQ2: To what extent do barriers documented in Lagos State reflect or differ from those reported in other urban Nigerian settings?
- RQ3: What strategies and policy responses are identified in the literature for addressing these barriers, and what evidence gaps remain for future research?

Methods

Study Design and Methodological Justification

This study employed a systematic literature review design and was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement (Page et al., 2021). The PICO framework, comprising Population, phenomenon of interest, and Context, was used to structure the review question and eligibility criteria (Lockwood et al., 2015). A systematic review was selected because the study addresses a focused question concerning barriers to effective plastic waste management and requires a transparent and reproducible approach to searching, screening and synthesising primary empirical evidence.

The Population comprised urban residents, waste managers, policymakers, informal sector workers and households in Nigerian urban settings. The phenomenon of Interest was barriers to effective plastic waste management, including infrastructural, governance, financial, behavioural, awareness and policy-related barriers. The Context was urban Nigeria, with particular attention to Lagos State. A narrative synthesis approach was adopted because the included studies differed in design, data collection methods, geographical settings and outcome measures, making quantitative pooling inappropriate. No ethical approval was required because the review used published literature only.

TABLE 1

PICO framework applied in this review.

Component	Definition	Application in this review
Population (P)	The group or setting of interest	Urban residents, waste managers, policymakers, informal sector workers, and households in Nigerian urban settings
Phenomenon of Interest (I)	The focus of the review	Barriers to effective plastic waste management, including infrastructural, governance, financial, behavioural, and policy-related barriers
Context (Co)	The setting or environment	Urban Nigeria, with particular focus on Lagos State as the principal geographical context

Search Strategy and Databases

A systematic search was conducted in August 2026 across four databases: Scopus, Google Scholar, PubMed and OpenAlex. The databases were selected to provide complementary coverage of environmental, governance, public health and interdisciplinary literature. Three search strings were developed around three concepts: plastic waste terminology, barriers or management-related terms, and Nigerian geographical identifiers. Database-specific adaptations were made where required. Google Scholar and PubMed were searched using all three strings, while OpenAlex was searched using Search 1 because broader searches produced excessively large and less targeted results. Scopus searches used all three strings in the TITLE-ABS-KEY format. The search was restricted to English-language, peer-reviewed journal articles published between January 2010 and December 2025. The complete search strings are presented in Table 2.

TABLE 2

Search strings applied across databases.

Search	Purpose	Search String (Scopus TITLE-ABS-KEY syntax; adapted for other databases)
Search 1	Captures studies explicitly discussing barriers and challenges to plastic	TITLE-ABS-KEY(("plastic waste" OR "plastic waste management" OR "plastic pollution" OR "plastic litter") AND (barrier* OR challenge* OR constraint* OR obstacle*) AND (Nigeria OR Nigerian OR Lagos OR Kano OR Abuja OR "Port

	waste management in Nigeria	Harcourt" OR Ibadan)) AND PUBYEAR > 2009 AND PUBYEAR < 2026 AND DOCTYPE(ar)
Search 2	Captures empirical management studies that may report barriers without using the word barrier	TITLE-ABS-KEY(("plastic waste" OR "plastic pollution" OR "plastic litter") AND (management OR disposal OR collection OR recycling OR segregation OR treatment) AND (Nigeria OR Nigerian OR Lagos OR Kano OR Abuja OR "Port Harcourt" OR Ibadan)) AND PUBYEAR > 2009 AND PUBYEAR < 2026 AND DOCTYPE(ar)
Search 3	Captures governance, policy, and institutional barrier evidence	TITLE-ABS-KEY(("plastic waste" OR "plastic waste management" OR "plastic pollution") AND (governance OR policy OR legislation OR regulation OR institution* OR infrastructure OR finance OR behaviour* OR awareness) AND (Nigeria OR Nigerian OR Lagos OR Kano OR Abuja OR "Port Harcourt" OR Ibadan)) AND PUBYEAR > 2009 AND PUBYEAR < 2026 AND DOCTYPE(ar)

As indicated in Table 3 below, the searches produced 496 records before deduplication: 39 from Scopus within the specified date range, 342 from Google Scholar, 12 from PubMed and 95 from OpenAlex.

TABLE 3

Database search results by search string.

Database	Search 1	Search 2	Search 3	Total Retrieved
Scopus (primary)	47 (39 within date range)	N/A	N/A	39
Google Scholar	81	136	125	342
PubMed	3	6	3	12
OpenAlex (Search 1 only)	95	N/A	N/A	95
Grand Total (before deduplication)				496

Eligibility Criteria

Eligibility criteria were established before screening and structured around the PICO framework. Studies were eligible if they were primary empirical studies using quantitative, qualitative or mixed methods; published in peer-reviewed journals between January 2010 and December 2025; conducted in Nigerian urban settings; and examined barriers, challenges or constraints affecting plastic waste management or solid waste management in ways relevant to effective waste governance. Review articles, systematic reviews, scoping reviews, narrative reviews, protocols, editorials, opinion pieces, book chapters, conference papers, grey literature and studies conducted outside Nigeria or exclusively in rural settings were excluded.

TABLE 4

Inclusion and exclusion criteria.

Criterion	Inclusion	Exclusion
Study type	Primary empirical studies, whether quantitative, qualitative, or mixed methods, that collected and analysed original data	Review articles, systematic reviews, scoping reviews, narrative reviews, study protocols, editorials, opinion pieces, book chapters, conference papers, grey literature
Geography	Studies conducted in Nigerian urban settings, including studies with a	Studies conducted exclusively outside Nigeria; studies conducted in entirely

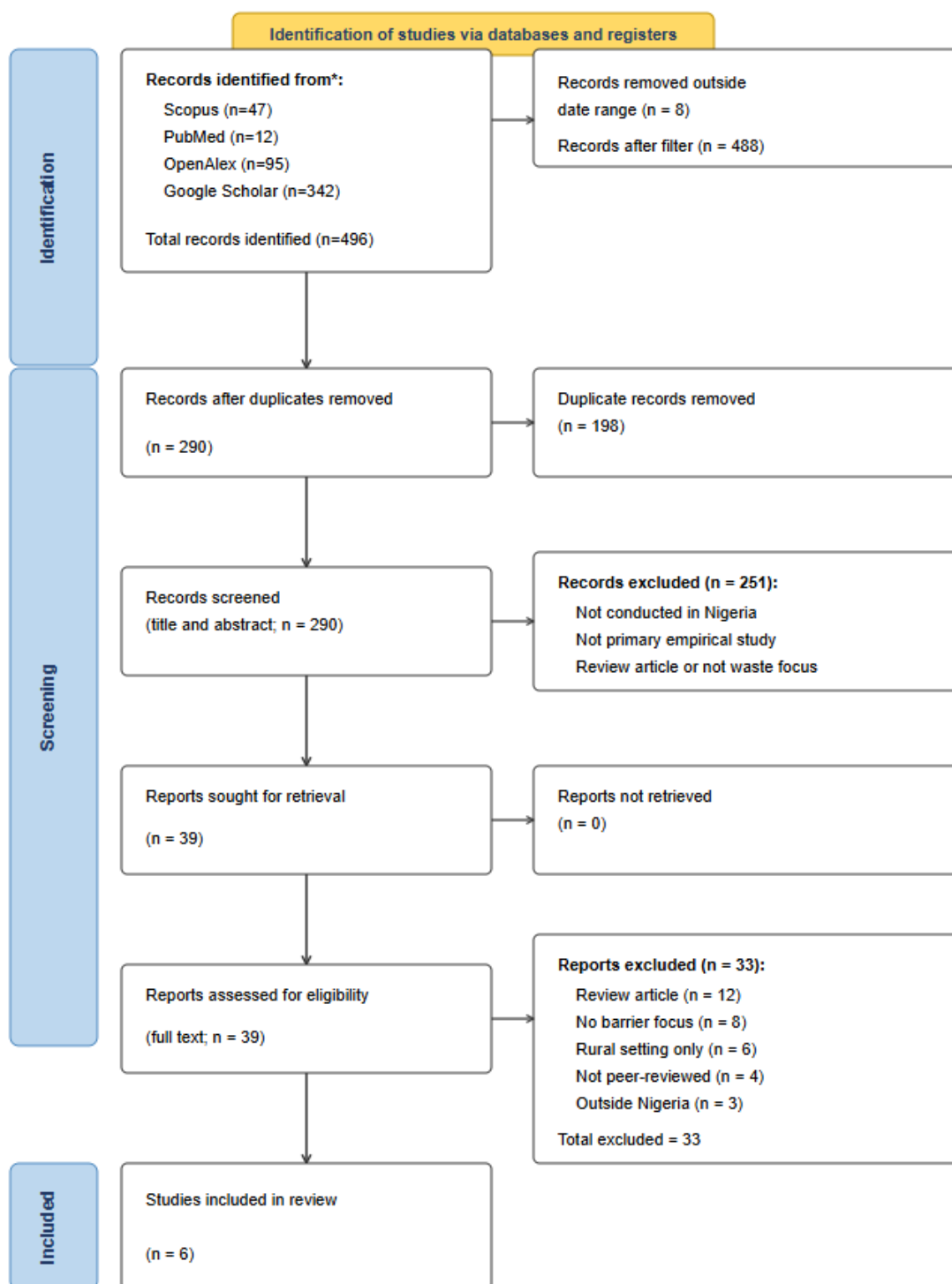
	national scope that incorporate substantial urban evidence	rural settings with no urban component
Topic	Studies that examine, identify, or report barriers, challenges, constraints, or obstacles to plastic waste management or solid waste management in ways that illuminate constraints on effective plastic waste governance	Studies focused solely on plastic pollution sources, microplastic contamination, or ecological impacts without addressing management barriers
Language	Studies published in English	Studies published in languages other than English
Publication type	Peer-reviewed journal articles	Non-peer-reviewed publications; grey literature; conference proceedings
Date range	Studies published between January 2010 and December 2025	Studies published before January 2010 or after December 2025

Study Selection and Screening

Records retrieved from the four databases were combined and duplicates were removed before screening. Titles and abstracts were then assessed against the eligibility criteria. Records that clearly failed to meet the criteria were excluded, while uncertain records were retained for full text assessment. Full texts were subsequently assessed against the complete eligibility criteria, with reasons for exclusion recorded. Studies meeting all criteria were included in the final synthesis. The selection process is presented in the PRISMA 2020 flow diagram (Figure 1).

FIGURE 1.

PRISMA 2020 flow diagram



Data Extraction and Synthesis

A standardised extraction framework was used to record author and publication year, journal and Scopus indexing status, study location, study design, data collection method, sample size or unit of analysis, and reported barriers. Reported barriers were extracted and coded into six categories: infrastructural; governance and institutional; financial; behavioural; policy and legislative; and awareness and knowledge. The first five categories were informed by the review framework and existing literature, while awareness and knowledge emerged as a distinct category during coding because it represented an upstream influence on

behaviour. Each barrier was coded as explicitly reported (1.0), partially reported or implied (0.5), or not reported (0). Scores were summed across the six included studies to produce a weighted frequency score, with a maximum of 6.0. This score was used to compare the frequency with which barriers were reported and was not interpreted as a measure of barrier severity or structural importance. Findings were synthesised narratively and organised by barrier category. Particular attention was given to the frequency of reported barriers, their mechanisms and the extent to which evidence from Lagos State aligned with evidence from other Nigerian urban settings. Quantitative pooling was not undertaken because of heterogeneity across the included studies.

Quality Assessment

The methodological quality of included studies was assessed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018), which permits appraisal of quantitative, qualitative and mixed methods studies within a single review. Quality assessment was used to inform interpretation of the evidence rather than as an automatic basis for study exclusion. Scopus indexing status was also recorded as part of the quality documentation. The assessment results are presented with the characteristics of the included studies in the Results section.

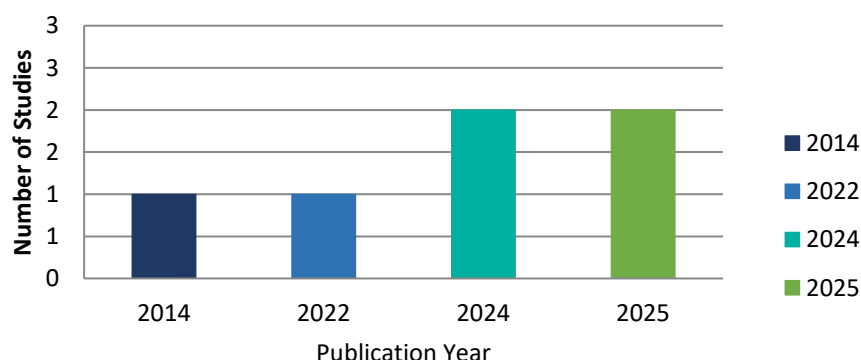
RESULTS

Characteristics of Included Studies

Following application of the eligibility criteria, six primary empirical studies were included in the final synthesis. The studies were published between 2014 and 2025, with five published between 2022 and 2025, indicating growing empirical attention to plastic waste management barriers in Nigeria. Aliu et al. (2014) was retained because it provides primary evidence on household waste collection performance in Lagos and offers relevant evidence on infrastructure, affordability and governance constraints. Figure 2 presents the distribution of studies by publication year.

FIGURE 2.

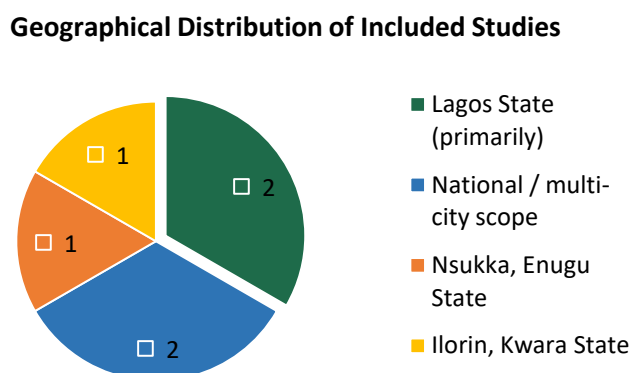
Distribution of included studies by publication year



The geographical distribution is presented in Figure 3. Two studies focused primarily on Lagos State (Chukwuone et al., 2022; Aliu et al., 2014), while two adopted national or multi-city perspectives (Ezeudu et al., 2024; Tyllianakis et al., 2025). Chilote and Dhakal (2025) focused on Nsukka, Enugu State, with a national stakeholder dimension, while Oladipupo et al. (2024) examined Ilorin, Kwara State. The concentration of evidence in Lagos and Lagos-inclusive studies reflects the prominence of the state in Nigerian waste management research but limits comparison with other major urban centres.

Figure 3.

Geographical distribution of included studies within Nigeria



The studies employed varied designs. Four used quantitative cross-sectional approaches, while Chilote and Dhakal (2025) used mixed methods and Ezeudu et al. (2024) adopted a multiple case study approach with focus group perspectives. Sample sizes ranged from 121 survey respondents plus six stakeholders to 600 households, with Aliu et al. (2014) covering 480 households across nine Lagos LGAs. All six studies generated primary empirical evidence and met the study type inclusion criterion. Detailed characteristics are presented in Table 5.

Table 5.

Characteristics of the Included Studies

Study	Study Design	Sample	Location	Scopus Indexed	Primary Barrier Focus
Chukwuone et al. (2022)	Quantitative cross-sectional household survey with econometric analysis	600 households	Lagos State	Yes (PLOS One, Q1)	Infrastructural; awareness; behavioural
Chilote and Dhakal (2025)	Mixed methods: quantitative survey with qualitative semi-structured interviews	121 survey respondents; 6 key stakeholders	Nsukka, Enugu State; national stakeholder dimension	Yes (Environments MDPI, Q2)	Awareness; infrastructure; collection and sorting; behavioural
Oladipupo et al. (2024)	Quantitative cross-sectional survey with field observation and physical waste measurement	100 questionnaires; 10 households per study area for waste weighing	Ilorin, Kwara State	Yes (Journal of Umm Al-Qura University, Springer)	Infrastructure; financial; disposal behaviour; recycling capacity
Ezeudu et al. (2024)	Multiple case study with focus group perspectives	Four end-of-life product cases; focus group participants (number not reported in accessible record)	Nigeria (national; multi-city)	Yes (Circular Economy and Sustainability, Springer)	Legislative; governance; data absence; financial; institutional
Tyllianakis et al. (2025)	Quantitative cross-sectional survey with Heckman two-step regression	242 SME managers	Nigeria (Kano, Oyo, Abuja, Lagos)	Yes (Journal of Cleaner Production, Q1)	Financial; awareness; behavioural and organisational
Aliu et al. (2014)	Quantitative cross-sectional survey of household waste collection service performance with OLS regression and ANOVA	480 households across 9 LGAs	Lagos Megacity	Yes (Waste Management and Research, SAGE)	Infrastructure; affordability; PPP service delivery; governance

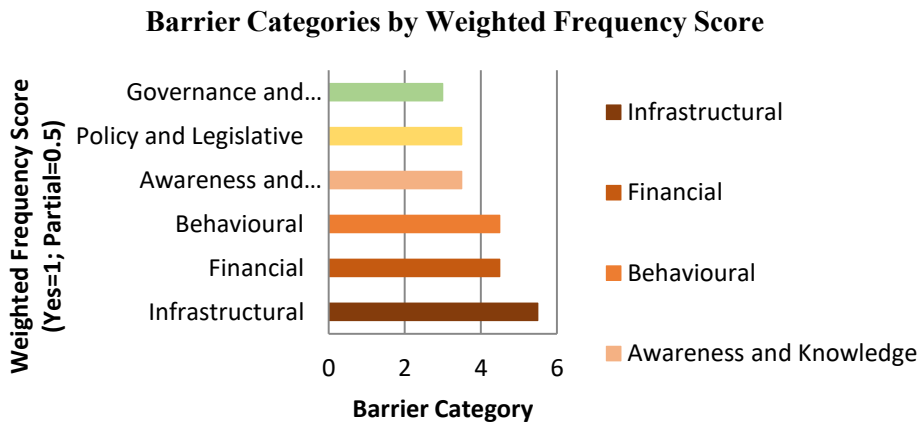
Quality Assessment

All six studies were assessed using the Mixed Methods Appraisal Tool (MMAT) 2018, applying design-specific criteria. Chukwuone et al. (2022) and Tyllianakis et al. (2025) met all applicable criteria and demonstrated strong methodological quality. Ezeudu et al. (2024) met the applicable qualitative and case study criteria, although the accessible record did not report the number of focus group participants. Chilote and Dhakal (2025) met the mixed-methods criteria, with partial performance in addressing divergence between qualitative and quantitative findings. Oladipupo et al. (2024) had minor limitations relating to sample size and a reported inconsistency in the waste measurement period, while Aliu et al. (2014) focused primarily on general waste collection service performance rather than plastic-specific barriers. No study was excluded on quality grounds, as all provided relevant empirical evidence for the review.

Barrier Categories

Six barrier categories emerged from the synthesis: infrastructural, behavioural, awareness and knowledge, financial, policy and legislative, and governance and institutional. Figure 4 presents the weighted reporting frequency across the six studies. A score of 1.0 was assigned where a barrier was explicitly reported and 0.5 where it was partially reported or implied. The scores indicate reporting frequency rather than barrier severity or importance.

Figure 4.
Weighted frequency of barrier categories reported across included studies



Infrastructural barriers recorded the highest weighted frequency score (5.5), followed by financial and behavioural barriers (4.5 each). Awareness and knowledge and policy and legislative barriers each scored 3.5, while governance and institutional barriers recorded the lowest score (3.0). The lower frequency of governance and institutional barriers should not be interpreted as evidence of lower importance, as these barriers were more evident in studies examining national or policy-level processes.

Table 6.
Barrier categories reported across included studies.

Barrier Category	Chukwuone et al. (2022)	Chilote and Dhakal (2025)	Oladipupo et al. (2024)	Ezeudu et al. (2024)	Tyllianakis et al. (2025)	Aliu et al. (2014)	Weighted Total
Barriers to plastic waste management in urban Nigeria: a systematic review of Lagos state evidence.							
Infrastructural	Yes	Yes	Yes	Yes	Partial	Yes	5.5
Behavioural	Yes	Yes	Yes	No	Yes	Partial	4.5
Awareness and knowledge	Yes	Yes	No	No	Yes	Partial	3.5
Financial	No	Partial	Yes	Yes	Yes	Yes	4.5
Policy and legislative	No	Yes	Partial	Yes	Yes	No	3.5
Governance and institutional	No	Yes	No	Yes	No	Yes	3.0

Infrastructural Barriers

Infrastructural barriers were the most consistently reported category, receiving a weighted score of 5.5. The evidence centred on inadequate collection infrastructure and limited recycling capacity. In Lagos, Chukwuone et al. (2022) found that the presence of a dumpster significantly reduced the likelihood of illegal disposal among 600 households. Oladipupo et al. (2024) reported that only 11% of respondents in Ilorin used municipal collection bins, partly because of insufficient collection points. In Lagos, Aliu et al. (2014) identified vehicle numbers, maintenance, capacity, collection frequency and trip rate as major determinants of collection service quality, collectively explaining 93.7% of variation in the operational quality index. Infrastructure limitations were also identified beyond household collection. Chilote and Dhakal (2025) reported inadequate collection infrastructure and insufficient scale of existing initiatives, while Ezeudu et al. (2024) identified inadequate collection and segregation channels across the product cases examined. Tyllianakis et al. (2025) similarly found that infrastructure constraints limited SMEs' ability to adopt more advanced plastic waste management practices.

Behavioural Barriers

Behavioural barriers were reported explicitly by four studies and partially by one, producing a weighted score of 4.5. Indiscriminate disposal, open burning and open dumping were consistently identified across the study settings. Chukwuone et al. (2022) reported illegal disposal among 67.42% of the 600 Lagos households surveyed and found that attitudes towards single-use plastic restrictions were associated with disposal behaviour. In Ilorin, Oladipupo et al. (2024) found that burning was the dominant disposal method (51%), while 10% reported open dumping. Chilote and Dhakal (2025) documented routine disposal of bottles and sachets at consumption points and reported that sachet water waste was often perceived as having little value. At the organisational level, Tyllianakis et al. (2025) found that only 31% of SME managers considered themselves effective in addressing plastic waste management, indicating limited organisational engagement. Aliu et al. (2014) provided partial contextual evidence concerning public attitudes towards waste management.

Awareness and Knowledge Barriers

Awareness and knowledge barriers received a weighted score of 3.5. Chukwuone et al. (2022) found that receiving waste management information reduced the likelihood of illegal disposal among Lagos households. Chilote and Dhakal (2025) reported a substantial gap between general awareness of plastic pollution and knowledge of related concepts: approximately 80% recognised plastic pollution as a global environmental problem, compared with 9.6% awareness of microplastics, 12.2% of the circular economy and 36.5% of sustainability. Social media was identified as the most frequently preferred channel for improving awareness (48.3%), followed by school education (23.3%) and mass media (21.7%). Tyllianakis et al. (2025) also identified limited awareness of plastic waste impacts and circular economy practices among SMEs, while Aliu et al. (2014) provided partial contextual evidence concerning inadequate public enlightenment.

Financial Barriers

Financial barriers received a weighted score of 4.5 and operated at both household and business levels. Oladipupo et al. (2024) found that 69% of respondents in Ilorin did not use

waste management agency services, with perceived cost identified as a significant barrier. Aliu et al. (2014) similarly identified affordability and payment flexibility as important determinants of household waste collection service reliability in Lagos, with service reliability variables explaining 91.4% of variation in the service reliability index. At the business and policy level, Tyllianakis et al. (2025) identified limited access to funding as the primary barrier to SME adoption of improved plastic waste management and circular economy practices. Ezeudu et al. (2024) identified inadequate financial capacity among SMEs as a barrier to implementing Extended Producer Responsibility in three of the four product cases. Chilote and Dhakal (2025) also reported concerns among retailers regarding the operational and space costs associated with a Deposit Return Scheme.

Policy and Legislative Barriers

Policy and legislative barriers received a weighted score of 3.5. Ezeudu et al. (2024) identified ineffective legislation across all four end-of-life product cases and reported producer unavailability for Extended Producer Responsibility implementation in three cases. Tyllianakis et al. (2025) identified inadequate compliance monitoring and enforcement as a major barrier within the SME sector. Chilote and Dhakal (2025) proposed adapting a Deposit Return Scheme to Nigeria, while Oladipupo et al. (2024) recommended stronger enforcement of existing waste management policies.

Governance and Institutional Barriers

Governance and institutional barriers received the lowest weighted score (3.0), although their potential structural influence was evident. Ezeudu et al. (2024) identified the absence of waste and economic data across the four product cases and reported producer unavailability in three cases, limiting effective implementation of Extended Producer Responsibility. Aliu et al. (2014) identified weaknesses in public-private partnership arrangements in Lagos, including inadequate funding, poor equipment maintenance, weak worker commitment and limited monitoring. Chilote and Dhakal (2025) identified inadequate coordination among government, NGOs, educational institutions and private-sector actors as a further institutional constraint.

Lagos State Evidence Compared with Other Urban Nigerian Settings

The evidence indicates that the broad barrier categories were similar across the urban Nigerian settings represented in the review, but their manifestations differed. The two Lagos studies identified inadequate infrastructure, disposal behaviour and affordability as important constraints. Chukwuone et al. (2022) reported illegal disposal among 67.42% of households, while Aliu et al. (2014) identified infrastructure quality, payment flexibility and collection frequency as major determinants of service reliability. In Ilorin, Oladipupo et al. (2024) reported a stronger reliance on burning, used by 51% of respondents, while only 11% used municipal collection bins. Although infrastructure and financial barriers were also evident, the findings suggest a less developed formal collection baseline than in Lagos. The national and multi-city studies identified legislative, governance, financial and awareness barriers that appear to extend beyond individual cities. Overall, the findings suggest that while barrier categories are broadly shared, their manifestation varies with the availability and maturity of local waste management services.

DISCUSSION

Summary of Principal Findings

The review identified six interconnected barrier categories: infrastructural, behavioural, financial, awareness and knowledge, policy and legislative, and governance and institutional. Infrastructural barriers had the highest weighted frequency score (5.5), followed by financial and behavioural barriers (4.5 each), while governance and institutional barriers had the lowest score (3.0). However, reporting frequency should not be interpreted as importance. The findings suggest that governance and policy conditions may influence resource

availability, infrastructure, awareness and disposal behaviour. Although the broad barriers were consistent across urban Nigerian settings, their manifestations varied with city size and service maturity, with Lagos characterised by inadequacies within an existing formal system and Ilorin by more limited infrastructure.

Infrastructural and Behavioural Barriers

Infrastructural barriers were the most consistently documented constraint, consistent with previous reviews of Nigerian plastic and waste management (Yalwayi et al., 2022; Omokaro et al., 2026). The included studies identified inadequate collection points, recycling facilities and operational capacity as key limitations. Chukwuone et al. (2022) showed that access to dumpsters reduced illegal disposal in Lagos, while Oladipupo et al. (2024) found that only 11% of respondents in Ilorin used municipal collection bins. Aliu et al. (2014) further showed that collection capacity, maintenance and frequency were important determinants of service quality in Lagos. Infrastructure and behaviour also appeared mutually reinforcing. Limited access to formal facilities can encourage burning and dumping, while the normalisation of these practices may reduce pressure for improved services. Thus, infrastructure investment alone may be insufficient where maintenance, service accessibility and behavioural conditions remain weak.

Governance, Financial and Awareness Barriers

Governance and institutional barriers received the lowest weighted frequency score (3.0), but this does not necessarily indicate lower importance. Ezeudu et al. (2024) identified ineffective legislation, absence of waste and economic data, and limited producer participation as barriers to Extended Producer Responsibility, while Aliu et al. (2014) identified weaknesses in public-private partnership arrangements in Lagos. These findings suggest that governance conditions may influence the infrastructure and financial constraints observed elsewhere in the evidence base (Ezeah & Roberts, 2014; Nzeadibe & Ejike-Alieji, 2020). However, because most included studies were cross-sectional, these relationships should be understood as potential structural relationships rather than established causal effects. Financial barriers were also prominent, with a weighted score of 4.5. At household level, Oladipupo et al. (2024) found that 69% of respondents in Ilorin did not use formal waste management services because of perceived cost, while Aliu et al. (2014) identified affordability and payment flexibility as important in Lagos. At business level, Tyllianakis et al. (2025) identified limited funding as a major constraint, while Ezeudu et al. (2024) reported inadequate SME financial capacity for EPR implementation. Awareness barriers further demonstrate that knowledge does not automatically translate into appropriate behaviour. Chilote and Dhakal (2025) found that although approximately 80% of respondents recognised plastic pollution as a global problem, awareness of microplastics (9.6%), circular economy (12.2%) and sustainability (36.5%) was substantially lower. This suggests that awareness interventions should focus not only on environmental problems but also on practical waste management practices.

Lagos State Compared with Other Urban Nigerian Contexts

The review found broadly similar barrier categories across urban Nigerian settings, but their manifestations differed. In Lagos, Chukwuone et al. (2022) reported illegal disposal among 67.42% of households, while Aliu et al. (2014) identified infrastructure, affordability and collection frequency as important determinants of service reliability. Together, these findings indicate service inadequacy within an existing formal waste management system. In Ilorin, Oladipupo et al. (2024) found greater reliance on burning, reported by 51% of respondents, alongside limited use of municipal collection bins. The 69% non-use of formal services because of perceived cost also indicates a stronger affordability constraint. National studies identified governance, legislative and financial barriers that extend beyond individual cities. Thus, while the categories of barriers are broadly shared, their specific manifestations depend on local service maturity and capacity.

Contribution and Policy Implications

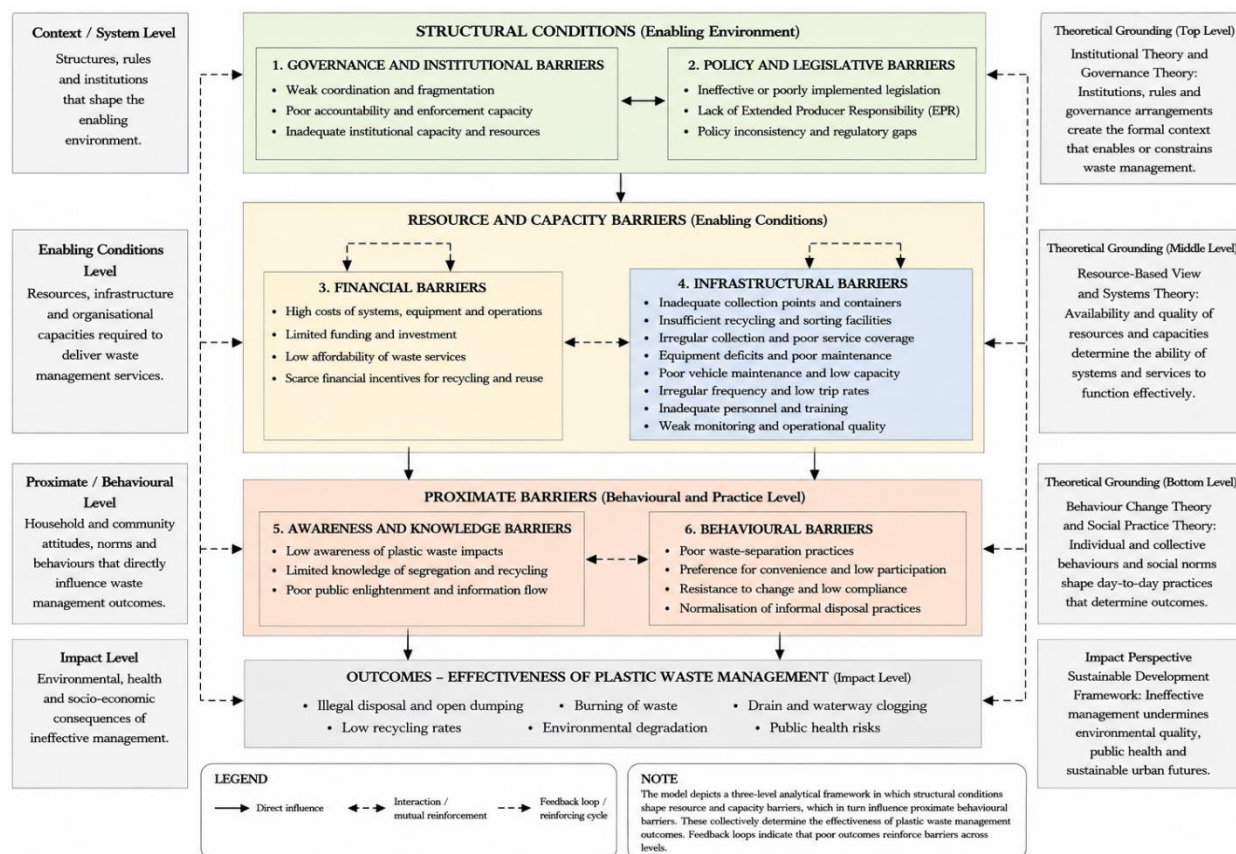
This review contributes to the existing literature by focusing specifically on barriers to plastic waste management in urban Nigeria, with Lagos as the principal focal setting. Unlike broader reviews of plastic pollution, municipal waste or circular economy transitions, it organises primary empirical evidence around the barriers that constrain effective management. It also identifies a gap in the evidence base: research is concentrated on household and business-level experiences, while institutional and governance processes remain less extensively studied. The findings support an integrated policy response. Priority should be given to accessible collection and recycling infrastructure, affordable formal waste services, stronger regulatory enforcement and targeted public education. Enforceable Extended Producer Responsibility mechanisms could improve producer participation and financing, while community-based and digital awareness initiatives may complement infrastructure improvements. Policy interventions should also recognise differences between Lagos and less developed urban waste management systems rather than assuming that one approach will suit all cities.

Conceptual Synthesis

The findings indicate that the six barrier categories are interconnected rather than independent. Governance and institutional conditions may shape the availability of financial resources, infrastructure and regulatory capacity, while these conditions influence awareness and disposal behaviour. Figure 5 presents a conceptual synthesis of these relationships, organised across structural, resource and behavioural levels. The framework represents relationships suggested by the evidence rather than established causal pathways, given the cross-sectional nature of the included studies.

Figure 5.

Conceptual synthesis of barriers to effective plastic waste management in urban Nigeria.



Limitations and Future Research

The review is limited by the small evidence base of six studies and its geographical concentration in Lagos and Ilorin. The inclusion of Aliu et al. (2014), which focuses on general waste collection rather than plastic-specific barriers, also requires cautious interpretation. In addition, the cross-sectional nature of most evidence limits conclusions about causality. Future research should therefore examine governance and institutional processes through policy analysis and multi-stakeholder research, generate comparative evidence across more Nigerian cities, and evaluate the effectiveness of existing plastic waste interventions longitudinally. These approaches would strengthen the evidence available for city-specific and national policy development.

CONCLUSION

This systematic review synthesised evidence from six studies on barriers to effective plastic waste management in urban Nigeria, with particular focus on Lagos State. Six interconnected barrier categories were identified: infrastructural, behavioural, financial, awareness and knowledge, policy and legislative, and governance and institutional. Infrastructural barriers were most consistently reported, followed by financial and behavioural barriers. The findings indicate that these barriers are interconnected, with governance and policy conditions potentially influencing infrastructure, resources, awareness and disposal behaviour. Their manifestations also vary across urban contexts, highlighting the need for locally appropriate responses. Effective management therefore requires an integrated approach combining improved infrastructure, affordable services, stronger regulation, public education and effective Extended Producer Responsibility. Future research should strengthen evidence on governance, expand comparative research across Nigerian cities, and evaluate interventions over time.

Author contributions

MEO and FOW: Conceptualisation, methodology, formal analysis, investigation, writing (original draft), writing (review and editing). All authors read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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