

ASSESSMENT OF SOLID WASTE MINIMIZATION PRACTICES AMONG HOUSEHOLDS IN SHENDAM TOWN, PLATEAU STATE

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Abstract Solid waste minimization remains a significant challenge in developing countries due to rapid urbanization, infrastructural deficits, and weak institutional frameworks. This study investigated household solid waste minimization practices in Shendam Town, Plateau State, Nigeria, focusing on socio-demographic determinants, waste generation and storage, adoption of minimization strategies, and knowledge and awareness barriers. A structured questionnaire was administered to 238 households across six neighborhoods, selected using Taro Yamane's formula, was conducted. Descriptive statistics revealed a predominantly male (90.34%), middle-aged (52.72% aged 46–60 years), and highly educated population (71.01% with tertiary education), with large households (62.61% with ten or more members) and long-term residency (70.59% over 20 years). Organic waste was the most generated fraction (45.07%), followed by plastics (26.83%) and paper (18.45%), with open containers (41.42%) as the main storage method. Adoption of waste minimization practices varied: reuse (73.11%), reduction (71.01%), recycling (69.27%), composting (65.97%), and segregation (56.49%). Environmental concern motivated 58.54% of respondents, whereas inadequate collection services (27.11%) and lack of awareness (24.97%) were key barriers. While policy awareness was high (92.44%), technical knowledge of composting (65.97%) and recycling (65.55%) remained limited. Institutional challenges included insufficient personnel (53.78%) and weak enforcement (26.89%). The study concludes that households exhibit potential for sustainable waste management, yet progress is constrained by knowledge gaps, infrastructural limitations, and institutional weaknesses. Recommendations include improving collection infrastructure, establishing recycling facilities, providing targeted technical education, enhancing institutional capacity, and leveraging community structures to foster sustainable practices.

Keywords: Solid waste minimization, household practices, waste segregation, recycling, composting, Shendam Town

1.0 Introduction

Solid waste minimization is a fundamental aspect of sustainable waste management that focuses on reducing waste generation at source, thereby minimizing its environmental, social, and economic impacts (Chiang et al., 2024). Globally, waste generation continues to increase due to population growth, urbanization, and changing consumption patterns. Waste production reached

approximately 20 billion tonnes in 2017, and municipal solid waste generation is projected to rise significantly by 2050 (Maalouf & Mavropoulos, 2022). While developed countries such as Sweden have made notable progress through recycling programmes, public awareness campaigns, and zero-waste initiatives, many developing countries continue to face challenges related to inadequate infrastructure, weak institutional capacity, and low public participation in waste management (Bissmont, 2020).

In Nigeria, rapid urbanization and population growth have intensified waste management challenges. Urban areas currently generate about 66,828 tonnes of solid waste daily, a figure expected to increase substantially by 2040 (Ezeudu et al., 2021). Despite the introduction of Integrated Solid Waste Management strategies and regulatory frameworks such as the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act of 2007 and the National Policy on Solid Waste Management (2020), waste management remains largely dependent on landfilling due to poor policy implementation, inadequate funding, and weak enforcement mechanisms (Bako & Ali, 2023; Ugwu et al., 2021).

In Plateau State, waste generation is influenced by factors such as household income, educational level, family size, and economic activities (Usman & Bawa, 2017). However, many communities continue to experience poor waste handling and disposal practices. In Shendam Town, limited attention has been given to household waste minimization despite growing environmental and public health concerns. Common practices such as indiscriminate waste disposal, open burning, inadequate storage, and poor waste segregation contribute to environmental pollution and place additional pressure on the existing waste management system.

Previous studies have highlighted the importance of sustainable waste management interventions. Gumau et al. (2019) emphasized the need for improved waste storage facilities, while Abubakar et al. (2022) advocated integrated approaches involving recycling, efficient collection systems, and environmentally sound disposal methods. Similarly, Maderu and Omona (2021) and Ejike-Alieji et al. (2024) identified inadequate awareness and low compliance with waste management guidelines as major barriers to sustainable waste practices.

Recent studies have also demonstrated the potential of technological innovations, such as IoT-enabled smart waste bins, to improve waste monitoring and collection efficiency (Savale et al., 2024). However, their adoption is often limited by high costs and infrastructural constraints (Rathoure, 2024). In addition, public awareness, behavioural change, community participation, and institutional support remain critical factors in promoting effective waste minimization practices (Trushna et al., 2024; Nguyen et al., 2023).

Despite increasing research on waste minimization, there is limited empirical evidence on household waste minimization practices in Shendam Town, Plateau State. This study therefore seeks to assess the knowledge and practices of households regarding solid waste minimization and

provide evidence that can support the development of sustainable waste management strategies within the area.

Study Area

Shendam Local Government Area is located in southern Plateau State, Nigeria, covering approximately 2,477 square kilometers with Shendam town as its administrative headquarters. The economy is predominantly agrarian, with major crops including ginger, millet, guinea corn, beans, rice, and peanuts. Trade occurs through the main market in Shendam town and the Yelwa livestock market, while mineral resources such as gypsum and salt are also present. The Goemai people are the predominant indigenous group, with Shendam considered the heart of Goemai territory, governed by a traditional chieftaincy system headed by the Long Gamai. Other ethnic groups in the area include the Jarawa, Fulani, Ngas, and Tarok peoples.

3.0 Materials and Methods

Study Design and Administration of Survey Questionnaires

The study adopted household survey procedures recommended by the National Bureau of Statistics (NBS, 2012). A structured questionnaire was used to collect information on respondents' socio-demographic characteristics and household waste management practices, including waste generation, storage, reduction, reuse, recycling, composting, segregation, and awareness of waste minimization.

The questionnaire was pre-tested through a pilot survey in Jos North to ensure clarity and feasibility. Necessary revisions were made before administering the final questionnaire.

The target population consisted of households in six neighbourhoods of Shendam: Shendam Central, Ungwan Hausawa, G.R.A (Government Reserved Area), Federal Lowcost, Yargam Street, and Kolong, with an estimated population of 5,000 households. The sample size was determined using the formula proposed by Taro Yamane (1967):

$$n = N / (1 + N(e)^2)$$

Where n = sample size, N = population size, and e = margin of error (0.05). The calculation produced a minimum sample size of 370 households.

Between November and December 2025, 295 questionnaires were distributed across the selected neighbourhoods. Out of these, 238 questionnaires were returned and considered valid for analysis, representing 64.3% of the intended sample size after incomplete responses were discarded. Household heads were primarily targeted; however, knowledgeable adult household members were allowed to respond when necessary to improve the response rate.

Results and Discussion

1. Socio-Demographic Characteristics of Respondents

The demographic profile of respondents constitutes the essential backdrop against which all subsequent findings on waste management behaviour must be interpreted. Six characteristics were examined: gender, age, educational attainment, household size, monthly income, and duration of residence. Collectively, these variables shape household capacity, awareness, and motivation to adopt sustainable waste management practices, and their distribution within the study sample is therefore reported and discussed in turn.

1.1 Gender Distribution

The gender distribution of respondents is illustrated in Figure 1. A pronounced imbalance was recorded, with males accounting for 90.34% of the sample and females constituting only 9.66%. This disparity most plausibly reflects prevailing socio-cultural norms within the study area, wherein men predominantly occupy the role of household head and serve as the primary decision-making authority on domestic matters, including waste management. The underrepresentation of women is nonetheless a methodological limitation of note. Research consistently shows that women are more directly involved in the day-to-day management of household waste and may therefore hold distinct perspectives on minimisation practices that this study was unable to fully capture.

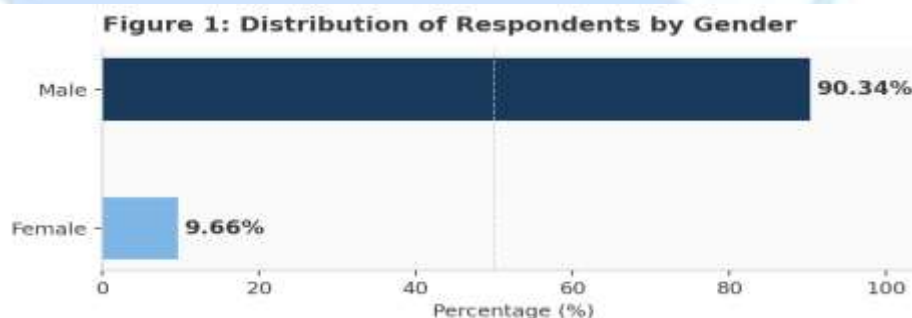


Figure 1: Distribution of Respondents by Gender

Source: Field survey data 2026.

1.2 Age Distribution

Figure 2 presents the age distribution of respondents across three categories. The majority (52.72%) fell within the 46–60 years bracket, followed by those aged 31–45 years (28.03%) and 18–30 years (19.25%). No respondents above the age of 60 years were recorded, a gap that likely reflects the practical difficulties of reaching elderly household members during field data collection. The predominance of middle-aged adults is analytically significant, as this cohort typically bears primary responsibility for household domestic activities, including waste storage

and disposal. Their lived experience of local environmental conditions and institutional waste management arrangements lends particular credibility to the findings reported throughout this study.

Figure 2: Distribution of Respondents by Age Category

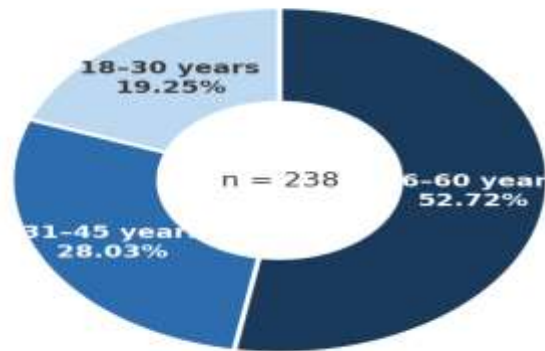


Figure 2: Distribution of Respondents by Age Category

Source: Field survey data 2026.

1.3 Educational Attainment

Table 1 presents the educational attainment of respondents. The overwhelming majority held tertiary-level qualifications (71.01%), with smaller proportions having completed primary (19.33%) or secondary (9.66%) education. No respondent lacked formal education entirely. This highly educated sample profile warrants careful interpretation. On one hand, elevated educational attainment is generally associated with greater environmental awareness and a stronger propensity to adopt sustainable behaviours such as recycling and composting (Scott & Weaver, 2018). On the other hand, the persistence of unsustainable disposal practices within this same population evidenced in subsequent sections points unambiguously to structural rather than cognitive barriers as the primary impediments to sustainable waste management, a finding consistent with wider empirical literature on the attitude-behaviour gap in environmental contexts.

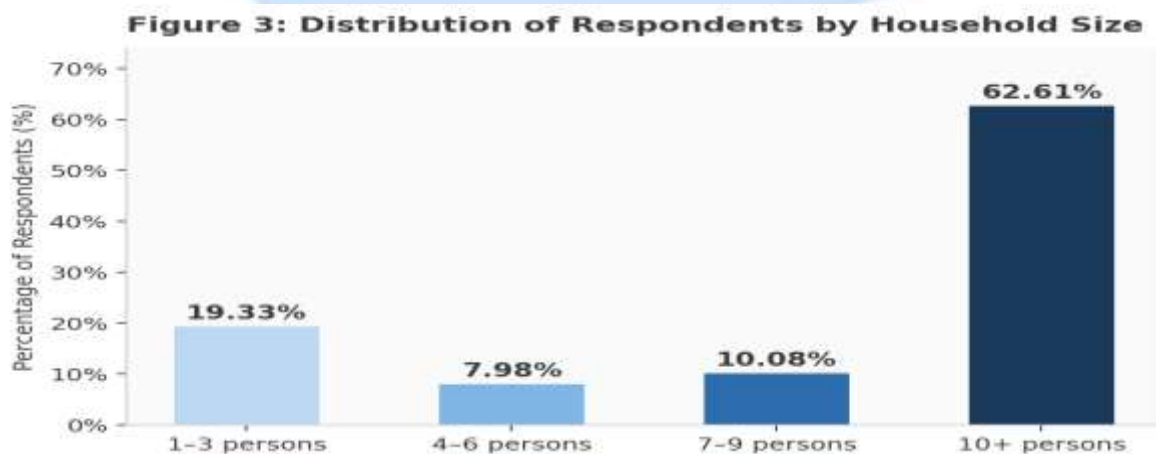
Table 1: Distribution of Respondents by Educational Level

Educational Level	Frequency (n)	Percentage (%)
No formal education	0	0.00
Primary education	46	19.33
Secondary education	23	9.66
Tertiary education	169	71.01
Total	238	100.00

Source: Field survey data 2026.

1.4 Household Size

Figure 3 illustrates the household size distribution among respondents. An overwhelming majority (62.61%) resided in households comprising ten or more persons, reflecting the prevalence of extended and multi-generational family arrangements within the study area. This finding carries material implications for solid waste management: larger households generate substantially greater volumes of waste, amplifying demands on both informal and formal disposal systems. The coordination challenges inherent in large household structures — spanning multiple adults and children with potentially varying environmental attitudes — further complicate the uniform adoption of practices such as waste segregation and composting. Effective waste management strategies for this population must therefore account for the particular social dynamics of large household units.

**Figure 3:** Distribution of Respondents by Household Size

Source: Field survey data 2026

1.5 Monthly Household Income

The monthly income distribution presented in Figure 4 reveals that the majority of respondents (53.36%) earned between ₦60,001 and ₦100,000, placing most households within the middle-income bracket. A further 19.75% earned between ₦30,000 and ₦60,000, while 17.23% exceeded ₦100,000 per month and 9.66% fell below the ₦30,000 threshold. Income is widely recognised as a determinant of waste management behaviour, shaping households' capacity to procure appropriate waste storage containers, afford formal collection services, and invest in waste minimisation technologies (Agbebaku et al., 2022). While the predominant middle-income profile suggests a moderate capacity for engagement with sustainable practices, the presence of a low-income segment in the sample highlights the risk of financial exclusion from sustainable waste management, a dynamic likely to exacerbate reliance on open dumping or informal burning.

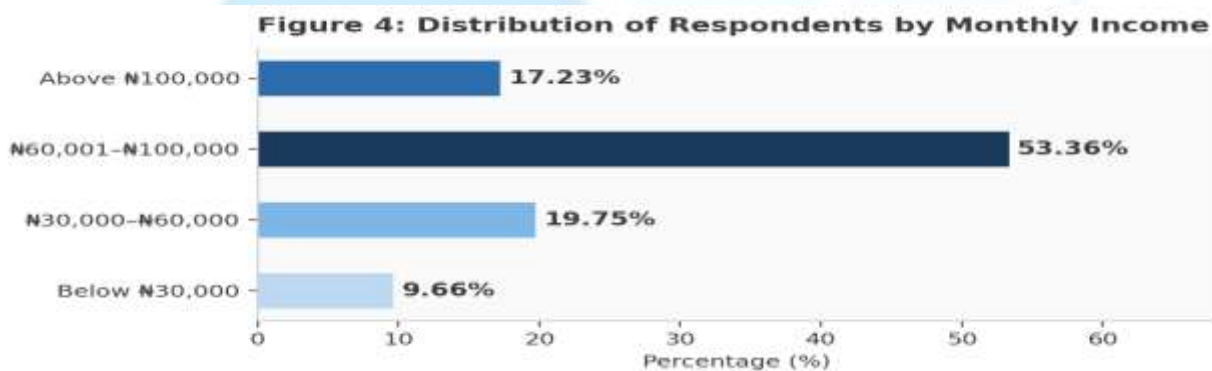


Figure 4: Distribution of Respondents by Monthly Income

Source: Field survey data 2026

1.6 Duration of Residence

Table 2 presents the duration of residence among respondents. A substantial majority (70.59%) had resided in the study area for more than 20 years, with an additional 19.33% having lived there for between 11 and 20 years, and 10.08% for between five and ten years. No respondents had resided in the area for fewer than five years. The dominance of long-term residents is methodologically advantageous, as extended community tenure is associated with deeper institutional memory, more nuanced awareness of local waste management systems, and greater familiarity with both historical practices and contemporary challenges. Their responses can therefore be interpreted as reflecting informed, experience-grounded assessments rather than superficial impressions.

Table 2: Distribution of Respondents by Years of Residence

Years of Residence	Frequency (n)	Percentage (%)
Less than 5 years	0	0.00
5–10 years	24	10.08
11–20 years	46	19.33
More than 20 years	168	70.59
Total	238	100.00

Source: Field survey data 2026.

2. Household Solid Waste Generation and Storage Practices

Understanding how households generate, store, and ultimately dispose of their solid waste provides the empirical foundation for evaluating the adequacy of existing waste management systems and identifying the points at which interventions are most urgently needed. The following subsections address waste storage methods, disposal frequency, and waste composition in turn.

2.1 Primary Methods of Waste Storage

Figure 5 illustrates the primary waste storage methods reported by households. Open containers were used most frequently (41.42%), ahead of covered containers (22.65%), plastic bags (21.04%), and metal bins (14.89%). The widespread adoption of open containers represents a significant public health concern. Uncovered waste receptacles facilitate foraging by rodents and other disease vectors, accelerate decomposition and leachate generation, and allow odour dispersal into the surrounding environment (Sangkachai et al., 2024). The limited uptake of covered containers and the low use of metal bins — the most durable and hygienic option — suggest that both affordability and awareness of best-practice storage remain constraining factors. Plastic bags, while commonly employed, are single-use and prone to tearing, rendering them an inherently temporary and hygienically inadequate storage solution.

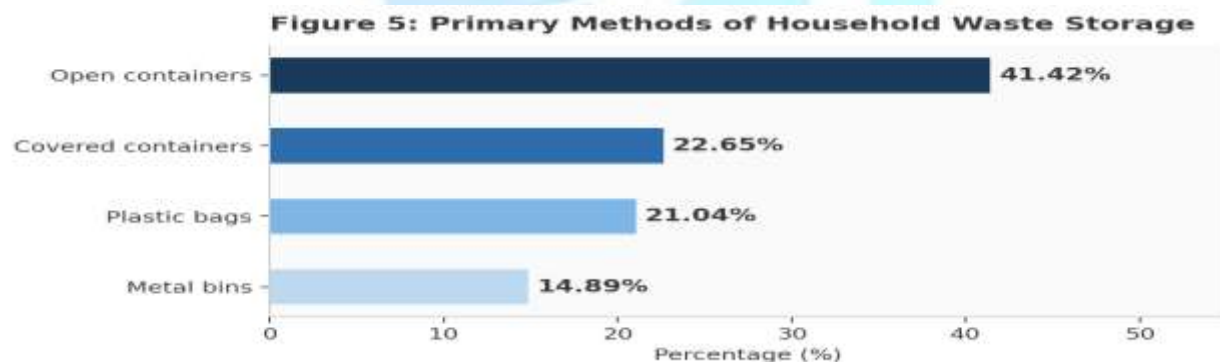


Figure 5: Primary Methods of Household Waste Storage

2.2 Frequency of Waste Disposal

Figure 6 presents the distribution of waste disposal frequencies. The largest proportion of respondents (55.88%) disposed of their household waste every two to three days, while 34.45% did so on a daily basis and 9.66% on a weekly schedule. This pattern indicates a broadly satisfactory disposal rhythm across the majority of the sample population. Daily disposal represents the ideal from a public health standpoint, as it minimises the duration of waste storage and limits opportunities for vector proliferation. The two-to-three day interval, whilst not ideal, remains within an acceptable range for maintaining sanitary conditions. Weekly disposal, however, significantly increases exposure to odour nuisance and vector-borne disease risks. The frequency of disposal is in practice determined by a confluence of factors — including formal collection service reliability, household storage capacity, and the volume of waste generated — suggesting that adaptive coping strategies are likely operative among those households relying on less frequent disposal (Rani et al., 2022).

Figure 9: Frequency of Household Waste Disposal

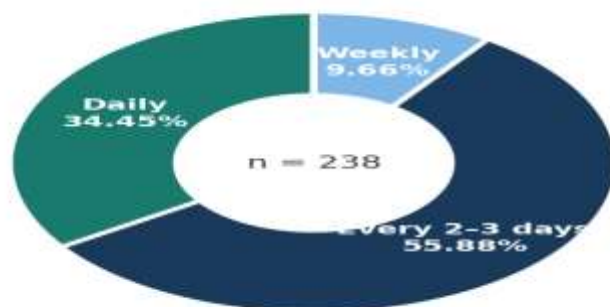


Figure 6: Frequency of Household Waste Disposal

Source: Field survey data 2026.

2.3 Composition of Household Solid Waste

The composition of solid waste generated by sampled households is illustrated in Figure 7. Organic matter constituted the single largest fraction (45.07%), followed by plastics (26.83%), paper (18.45%), metals (4.82%), and miscellaneous other materials (4.82%). No glass waste was recorded, a finding that likely reflects either low glass consumption patterns or widespread informal reuse of glass containers within the study area. The dominance of organic waste — principally food scraps and vegetable matter — presents a clear opportunity for composting as a diversion strategy, with potential co-benefits for soil fertility and the reduction of methane emissions from landfill decomposition. Conversely, improper management of organic fractions carries considerable environmental risk, as anaerobic decomposition generates both leachate and greenhouse gases (Composting as a Sustainable Alternative, 2022). The substantial plastic fraction

demands particular attention in light of its environmental persistence and contribution to land and water pollution.

Figure 6: Composition of Household Solid Waste

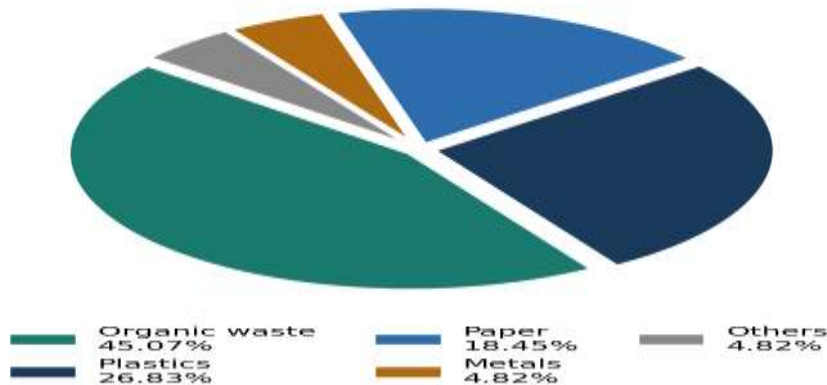


Figure 7: Composition of Household Solid Waste by Type

Source: Field survey data 2026.

3. Household Waste Minimisation Practices

Waste minimisation — encompassing all efforts to reduce the volume and hazardous character of waste at its point of generation — is a foundational principle of sustainable waste management. The following subsections present data on the adoption rates of specific minimisation practices, the motivations that drive household engagement, and the barriers that impede broader uptake.

3.1 Adoption of Waste Minimisation Practices

Figure 8 presents a stacked comparison of adoption and non-adoption rates for five key waste minimisation practices. Reuse of materials recorded the highest adoption rate (73.11%), followed by waste reduction (71.01%), recycling (69.27%), composting (65.97%), and waste segregation (56.49%). The relative prevalence of reuse and reduction can be attributed to the intuitive, low-cost nature of these behaviours and their alignment with longstanding household economic strategies. Recycling and composting, while moderately adopted, appear to be constrained by limited access to appropriate infrastructure and the technical knowledge required for their effective implementation. The notably lower adoption rate of waste segregation is a particularly concerning finding, since source separation is the indispensable precondition for meaningful recycling and composting at scale. Without it, the practical value of higher-order minimisation practices is substantially undermined. These findings confirm that whilst households are broadly receptive to waste minimisation in principle, targeted interventions addressing

knowledge, infrastructure, and behaviour change are required to translate this receptiveness into comprehensive, consistent practice (Scott & Weaver, 2018).

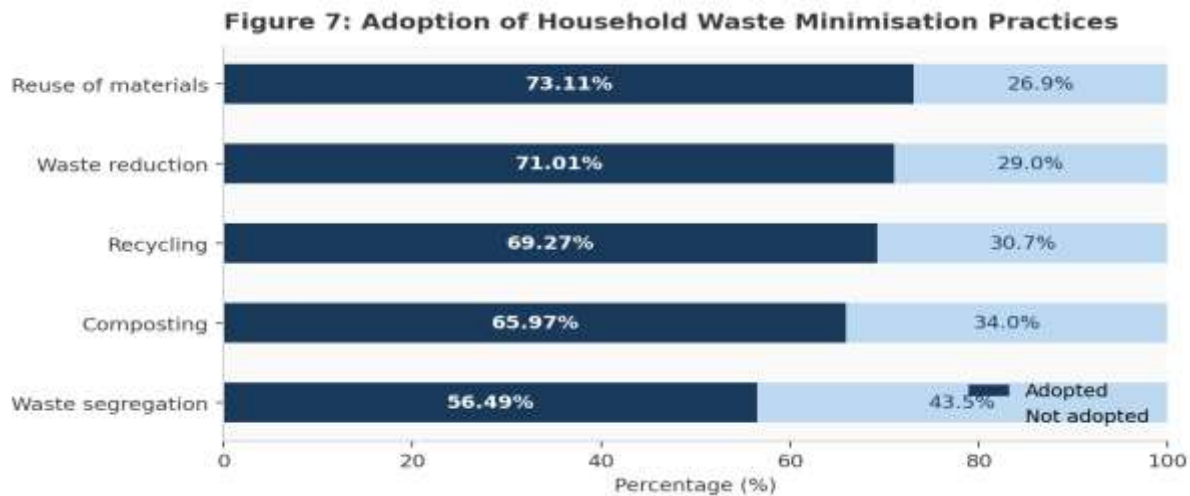


Figure 8: Adoption of Household Waste Minimisation Practices (n = 238)

Source: Field survey data 2026.

3.2 Motivations for Waste Minimisation

Table 3 presents the motivational drivers behind household engagement in waste minimisation. Environmental concern was identified as the primary motivator by the largest proportion of respondents (58.54%), followed at some distance by economic benefits (14.63%), community norms (14.33%), and religious or cultural beliefs (12.50%). No respondent reported an absence of motivation. The primacy of environmental concern is an encouraging finding, indicating that awareness of the link between individual waste behaviour and broader environmental outcomes has permeated household consciousness within the study area. Economic incentives, while less frequently cited as a primary driver, constitute a particularly actionable lever: financial rewards or cost savings associated with recycling, composting, or reduced disposal fees could reinforce environmentally motivated behaviour while simultaneously reaching households whose engagement is primarily economic. The role of community norms and religious or cultural values further signals that social and symbolic dimensions of waste behaviour warrant serious attention in the design of behaviour change programmes (Begho & Fadare, 2023).

Table 3: Reported Motivations for Engaging in Waste Minimisation Practices

Motivation	Frequency (n)	Percentage (%)
Environmental concern	192	58.54
Economic benefits	48	14.63
Community norms	47	14.33
Religious/cultural beliefs	41	12.50
No specific motivation	0	0.00
Total	328	100.00

Source: Field survey data 2026.

3.3 Barriers to Waste Minimisation

Figure 9 presents the principal barriers identified by respondents as limiting household waste minimisation. Inadequate waste collection services topped the list (27.11%), followed by lack of awareness (24.97%), absence of recycling facilities (18.41%), limited government support (15.51%), and time constraints (13.99%). The prominence of inadequate collection services speaks directly to the infrastructural dependency of household-level waste management: without reliable formal systems to receive and process separated or minimised waste, even the most motivated household has limited practical recourse. The continued identification of awareness as a significant barrier — despite the high educational attainment of the sample — underscores the gap between general literacy and specific knowledge of waste minimisation techniques and best practices. The absence of recycling infrastructure and the perception of limited institutional support further illuminate the structural constraints that prevent the conversion of positive attitudes into sustainable action. Time constraints, cited by approximately one in seven respondents, reflect a practical reality for households managing large numbers of members and competing domestic responsibilities.

Figure 8: Key Challenges Limiting Household Waste Minimisation

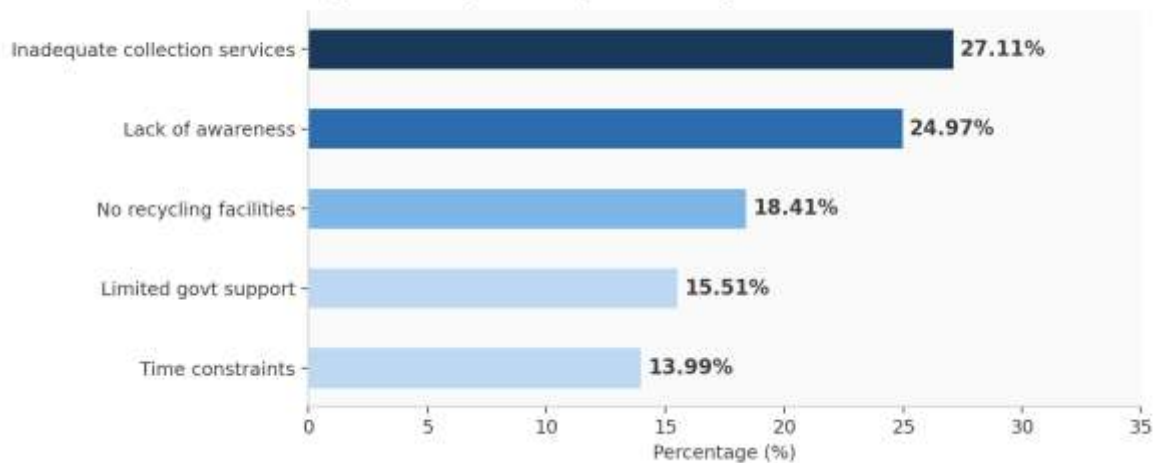
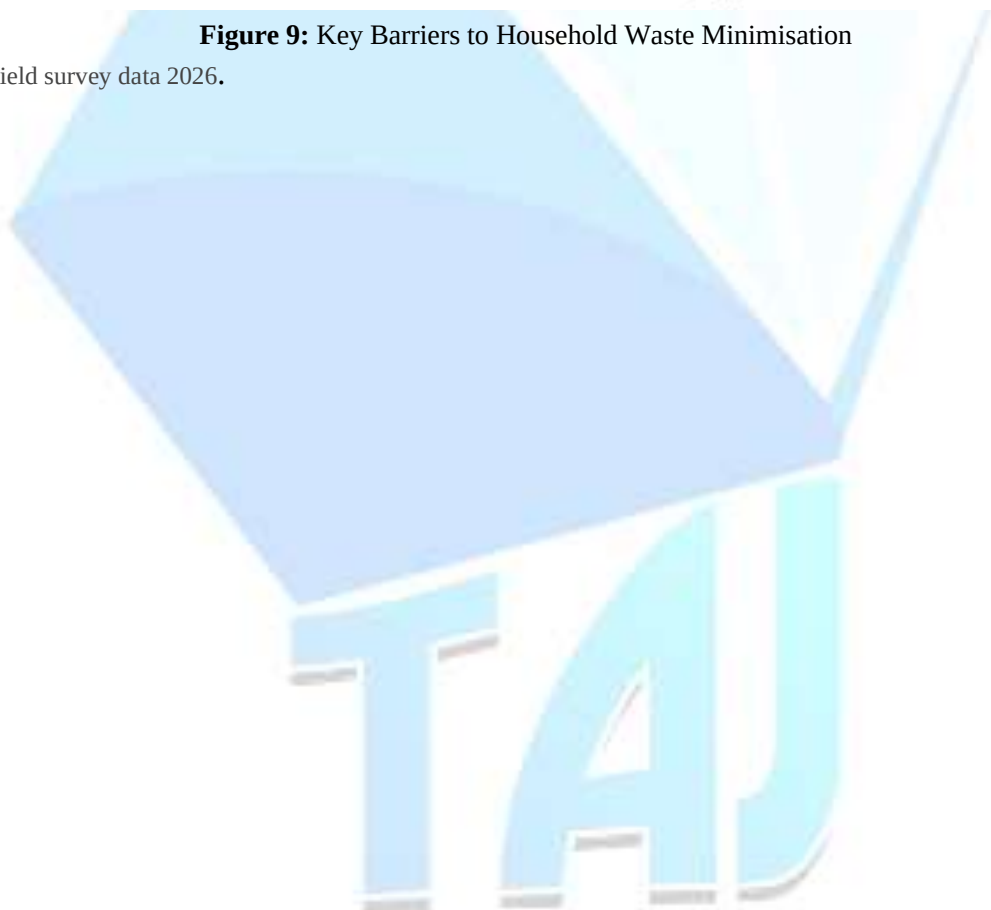


Figure 9: Key Barriers to Household Waste Minimisation

Source: Field survey data 2026.



4. Knowledge and Awareness of Waste Minimisation

Behavioural change in the domain of household waste management is fundamentally contingent upon adequate knowledge and awareness. This section examines the extent to which respondents were informed about waste minimisation programmes, the channels through which they received relevant information, their self-assessed familiarity with specific practices, and the importance they ascribed to waste minimisation for environmental health.

4.1 Awareness of Waste Minimisation Training Programmes

Table 4 shows that 80.25% of respondents were aware of waste minimisation training programmes operating within their community, while 19.75% reported no such awareness. The relatively high awareness rate suggests that outreach efforts have achieved reasonable penetration across the study population (Rani et al., 2022). However, awareness of a programme's existence does not necessarily indicate participation in or substantive benefit from that programme. The near one in five respondents who remained unaware of training initiatives represent a segment of the population not yet reached by existing educational channels. Ensuring the inclusivity of future outreach particularly with respect to those in more peripheral urban locations or with lower media exposure must be a priority for waste management authorities and civil society organisations alike.

Table 4: Respondent Awareness of Waste Minimisation Training Programmes

Response	Frequency (n)	Percentage (%)
Aware of training programme	191	80.25
Not aware of training programme	47	19.75
Total	238	100.00

Source: Field survey data 2026.

4.2 Sources of Waste Minimisation Information

Table 5 identifies the channels through which respondents received information on waste minimisation. Radio and television emerged as the leading sources (38.81%), followed by government agencies (36.36%), community leaders (16.08%), and NGOs or civil society organisations (8.04%). Schools and social media were not identified as information sources by any respondent in the sample, a notable absence given the growing global emphasis on school-based environmental education and the ubiquity of digital communications among younger urban populations. The continued dominance of broadcast media reflects both its reach and the relative accessibility of radio and television in areas where internet connectivity remains uneven. The role of government agencies as information intermediaries reinforces the importance of institutional

communication strategies, while the contribution of community leaders speaks to the enduring influence of trusted local figures in shaping community behaviour.

Table 5: Primary Sources of Waste Minimisation Information

Information Source	Frequency (n)	Percentage (%)
Radio/Television	111	38.81
Government agencies	104	36.36
Community leaders	46	16.08
NGOs/Civil society organisations	23	8.04
Schools	0	0.00
Social media	0	0.00
Total	286	100.00

Source: Field survey data 2026.

4.3 Familiarity with Waste Minimisation Concepts

Table 6 presents self-reported familiarity with five key waste minimisation concepts. Waste reduction and reuse were most commonly rated as concepts with which respondents felt "somewhat familiar," with 151 and 133 respondents respectively selecting this descriptor. These patterns suggest that awareness campaigns and community messaging have been comparatively successful in communicating the more intuitive, everyday practices. By contrast, recycling and composting attracted the largest numbers of "not familiar" responses 157 and 150 respectively indicating that households lack substantive understanding of these more technically complex interventions. This asymmetry is directly mirrored in the adoption rate data presented in Section 3.1, wherein recycling and composting recorded comparatively lower uptake. These findings signal the urgent need for practice-oriented educational initiatives that move beyond conceptual awareness to equip households with the practical knowledge, skills, and resources needed to implement recycling and composting effectively and consistently (Composting as a Sustainable Alternative, 2022).

Table 6: Self-Reported Familiarity with Waste Minimisation Concepts

Concept	Very Familiar (n)	Somewhat Familiar (n)	Not Familiar (n)
Waste reduction	41	151	46
Waste segregation	18	174	46
Recycling	41	43	157
Reuse of materials	41	133	64
Composting	41	47	150

Source: Field survey data 2026.

4.4 Perceived Importance of Waste Minimisation for Environmental Health

Table 7 presents respondents' perceptions of the importance of waste minimisation for environmental health. The vast majority rated waste minimisation as "very important" (70.59%), with a further 19.75% considering it "moderately important" and 9.66% "slightly important." No respondent considered waste minimisation unimportant. This near-universal recognition of the significance of waste minimisation for environmental outcomes is a substantively encouraging finding, as it suggests an attitudinal foundation upon which behavioural change programmes can build. The absence of opposition to the concept in principle means that intervention design need not focus on conviction but rather on capability and opportunity translating existing environmental values into consistent, facilitated practice. The small proportion rating waste minimisation as only "slightly important" (9.66%) represents a target group for whom reinforcing the environmental stakes of waste behaviour may be particularly valuable (Begho & Fadare, 2023).

Table 7: Perceived Importance of Waste Minimisation for Environmental Health

Response	Frequency (n)	Percentage (%)
Very important	168	70.59
Moderately important	47	19.75
Slightly important	23	9.66
Not important at all	0	0.00
Total	238	100.00

Source: Field survey data 2026

5. Regulatory and Institutional Framework

The effectiveness of household waste management behaviour is substantially mediated by the regulatory and institutional environment in which households operate. The following subsections address policy awareness, familiarity with specific legislative instruments, perceptions of enforcement effectiveness, institutional constraints, and the reach of public awareness campaigns.

5.1 General Awareness of Waste Management Policies

Table 8 reveals that an exceptionally high proportion of respondents (92.44%) reported awareness of waste management policies, with only 7.56% indicating no awareness. This near-universal policy recognition likely reflects the visibility of regulatory enforcement activities including sanitation inspections, public notices, and penalties for non-compliance that serve as daily reminders of the regulatory framework governing waste behaviour. It is important to note, however, that awareness of a policy's existence does not guarantee compliance; households may remain aware of regulations whilst continuing to engage in non-compliant practices due to the absence of viable alternatives, inadequate enforcement, or the perceived low probability of sanction. The small minority of policy-unaware respondents (7.56%) may be concentrated among newly settled households, marginalised populations, or individuals outside the main reach of formal communication channels.

Table 8: Respondent Awareness of Waste Management Policies

Response	Frequency (n)	Percentage (%)
Aware of waste management policies	220	92.44
Not aware of waste management policies	18	7.56
Total	238	100.00

Source: Field survey data 2026.

5.2 Awareness of Specific Waste Management Policy Instruments

Table 9 disaggregates policy awareness by specific legislative and regulatory instrument. The Plateau State Sanitation Laws were the most widely recognised policy (56.09%), followed by the National Solid Waste Management Policy 2020 (24.36%), Local Government Bylaws (13.03%), and the NESREA Act 2007 (6.52%). The greater visibility of state-level legislation is readily explicable: state sanitation laws are operationalised through locally visible enforcement activities — waste collection schedules, sanitation drives, and public penalties — that bring regulation into direct and regular contact with household experience. National and federal

frameworks, by contrast, tend to operate at a remove from everyday household practice and are consequently less salient to ordinary residents. The limited recognition of local government bylaws represents a particular communication deficit, given that these instruments are in principle the most proximate regulatory tools for shaping household behaviour. The very low recognition of the NESREA Act is expected, as this legislation primarily targets industrial and commercial pollution sources (Composting as a Sustainable Alternative, 2022).

Table 9: Awareness of Specific Waste Management Policy Instruments

Policy Instrument	Frequency (n)	Percentage (%)
Plateau State Sanitation Laws	198	56.09
National Solid Waste Management Policy (2020)	86	24.36
Local Government Bylaws	46	13.03
NESREA Act (2007)	23	6.52
Other policies	0	0.00
Total	353	100.00

Source: Field survey data 2026.

5.3 Perceived Effectiveness of Waste Management Policy Enforcement

Table 10 presents respondents' assessments of the effectiveness of waste management policy enforcement. More than half of respondents (55.88%) characterised enforcement as "very effective," while 44.12% considered it "moderately effective." No respondent rated enforcement as either ineffective or absent. These broadly positive perceptions are substantively informative in two respects. First, they suggest that regulatory activities are sufficiently visible to generate a generalised sense of enforcement among the majority of the study population a condition that, in theory, should support compliance. Second, the nearly equal split between "very effective" and "moderately effective" categories implies that a substantial proportion of residents perceive meaningful gaps in the consistency, scope, or rigour of current enforcement efforts. Methodologically, the possibility of social desirability bias warrants acknowledgement: respondents may have been inclined to report more favourable assessments of official performance than their private experience would otherwise suggest.

Table 10: Perceived Effectiveness of Waste Management Policy Enforcement

Assessment	Frequency (n)	Percentage (%)
Very effective	133	55.88
Moderately effective	105	44.12
Ineffective	0	0.00
Not enforced at all	0	0.00
Total	238	100.00

Source: Field survey data 2026.

5.4 Institutional Challenges Affecting Waste Management

Figure 10 presents the distribution of institutional challenges identified by respondents. Insufficient personnel were the most frequently cited constraint, identified by 53.78% of respondents, followed by weak enforcement (26.89%), inadequate funding (9.67%), and political interference (9.67%). Low public awareness and logistical constraints were not identified as institutional challenges by any respondent. The prominence of personnel shortages indicates widespread recognition that waste management authorities lack the human resource capacity required to fulfil their mandated functions across collection, monitoring, enforcement, and public education. This perception is directly consistent with the household-level finding that inadequate waste collection services constitute the most significant barrier to domestic waste minimisation (Table 3.3), strongly suggesting a causal relationship between institutional under-resourcing and household-level behavioural constraints. Weak enforcement cited by over a quarter of respondents reinforces the view that regulatory frameworks, whilst present, are not consistently operationalised on the ground. The identification of political interference by approximately one in ten respondents signals that waste management institutions may also be subject to extra-administrative pressures that undermine their operational independence and effectiveness.

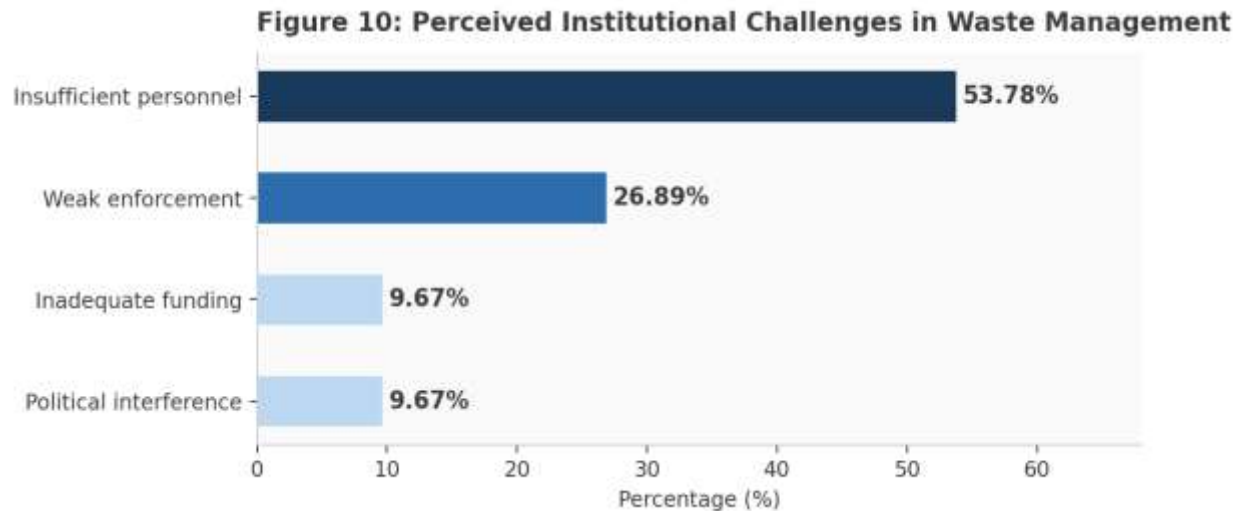


Figure 10: Perceived Institutional Challenges in Waste Management

Source: Field survey data 2026.

5.5 Public Awareness Campaigns: Existence and Frequency

Table 11 presents data on the reported existence and perceived frequency of public waste management awareness campaigns. A clear majority of respondents (82.77%) confirmed the presence of such campaigns within their community, while 17.23% indicated no awareness of any such activities. Among those who acknowledged campaign existence, the largest proportion (50.84%) characterised their occurrence as "occasional," while 39.08% described them as "regular" and 10.08% as "rare." The relatively high campaign recognition rate is broadly consistent with the elevated levels of policy awareness and training programme recognition reported in earlier subsections. However, the characterisation of campaigns as predominantly occasional rather than regular is a significant finding from a behaviour change communication standpoint. Sustained, progressive, and reinforcing communication rather than periodic bursts of information is consistently identified in the public health and environmental education literature as the modality most likely to produce durable shifts in household behaviour. Increasing campaign frequency, ensuring message continuity across broadcast media and community channels, and incorporating practical skill-building components into outreach activities are therefore essential steps toward translating awareness into consistent household practice.

Table 11: Existence and Perceived Frequency of Public Awareness Campaigns on Waste Management

Indicator	Response	Frequency (n)	Percentage (%)
Campaign existence	Yes — campaigns exist	197	82.77

Indicator	Response	Frequency (n)	Percentage (%)
Campaign existence	No — campaigns do not exist	41	17.23
Campaign frequency	Regular	93	39.08
Campaign frequency	Occasional	121	50.84
Campaign frequency	Rare	24	10.08

Source: Field survey data 2026.

Conclusion

The study demonstrates that households in Shendam Town predominantly generate organic waste, with storage often in open containers, exposing the community to environmental and health risks. While waste reduction and reuse practices are widely adopted, recycling, composting, and segregation are less common, reflecting gaps in technical knowledge, infrastructure, and institutional support. Socio-demographic factors such as household size, income, and education influence participation in waste minimization, but systemic challenges including inadequate collection services, limited recycling facilities, and inconsistent policy enforcement hinder effective implementation. Despite high awareness of waste minimization and related policies, the gap between knowledge and practice highlights the need for practical interventions and strengthened institutional capacity to achieve sustainable household waste management.

Recommendations

Enhance Waste Collection and Storage: Improve frequency and accessibility of waste collection, and provide covered, durable storage containers to minimize environmental and health risks.

Promote Recycling and Composting: Establish local recycling centers and community composting sites to facilitate practical adoption of sustainable waste management practices.

- I. Implement targeted training programs and awareness campaigns through mass media, schools, and community workshops to improve knowledge of segregation, recycling, and composting.
- II. Increase personnel capacity, ensure consistent policy enforcement, and provide financial and logistical support to waste management authorities.
- III. Introduce economic incentives to motivate households to adopt waste minimization behaviors.
- IV. Leverage community leaders and social structures to reinforce positive behaviors and foster collective responsibility for sustainable waste management.

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