



Assessment of the Environmental and Social Sustainability of Plastic Waste Management in Abuja Municipal Area Council, Federal Capital Territory, Nigeria

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ABSTRACT

Plastic waste has emerged as one of the most critical environmental challenges confronting urban communities in developing countries. Improper disposal of plastic waste contributes to environmental degradation, public health concerns, flooding, and ecosystem disruption. This study assessed the environmental and social sustainability of plastic waste management practices in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria. A descriptive survey research design was adopted. The target population comprised 530 residents, from which a sample size of 228 respondents was determined using Yamane's formula. A structured questionnaire was employed for data collection, while descriptive and inferential statistical techniques were utilized for data analysis using Statistical Package for Social Sciences (SPSS Version 23). A total of 198 valid questionnaires were returned, representing an 87% response rate. The findings revealed that open dumping (Mean = 3.81), burning (Mean = 3.38), and plastic waste collection services (Mean = 3.25) constitute the predominant plastic waste management practices within the study area. The study further identified major environmental impacts associated with poor plastic waste management, including land pollution, water pollution, air pollution, ecosystem degradation, greenhouse gas emissions, flooding, drainage blockage, and microplastic contamination. Residents demonstrated substantial knowledge of safe waste management practices, particularly regarding waste handling procedures, environmental sanitation, and community participation in waste management initiatives. Correlation analysis revealed significant positive relationships between plastic waste management practices and environmental impacts ($r = 0.367$, $p < 0.05$), as well as between waste management practices and community behavioral factors ($r = 0.412$, $p < 0.05$). The study concludes that although residents possess adequate knowledge regarding safe plastic waste management, ineffective disposal practices remain prevalent and continue to generate significant environmental and social challenges. The study recommends strengthening waste management infrastructure, expanding recycling initiatives, enhancing public awareness campaigns, and promoting community-based waste management programs to improve environmental sustainability and public well-being.

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INTRODUCTION

Plastic materials have become indispensable in modern society because of their versatility, durability, affordability, and wide range of applications across domestic, industrial, medical, agricultural, and construction sectors. Global plastic production has increased exponentially over the last five decades, resulting in unprecedented volumes of plastic waste. While plastics contribute significantly to economic development and improved living standards, their persistence in the environment has created major ecological and public health concerns. Globally, millions of tonnes of plastic waste are generated annually, yet only a relatively small proportion is effectively recycled. The majority is disposed of through landfilling, incineration, open dumping, or uncontrolled environmental discharge. In many developing countries, inadequate waste management infrastructure, weak regulatory frameworks, rapid urbanization, and low public participation contribute to poor plastic waste disposal practices.

Nigeria faces considerable challenges in managing plastic waste due to increasing population growth, urban expansion, and changing consumption patterns. The Abuja Municipal Area Council (AMAC), located within Nigeria's Federal Capital Territory, generates substantial quantities of plastic waste from residential, commercial, and institutional activities. Improper disposal of this waste contributes to environmental pollution, blocked drainage systems, flooding, habitat destruction, and public health risks.

The concept of sustainability emphasizes balancing environmental protection, social well-being, and economic development. Sustainable plastic waste management therefore requires efficient collection systems, recycling initiatives, community participation, and supportive policy frameworks. Understanding current management practices and their environmental and social implications is essential for developing effective interventions. This study examines plastic waste management practices in AMAC and evaluates their environmental and social sustainability implications.

Objectives of the Study

The specific objectives were to:

1. Examine current plastic waste management practices in AMAC.
2. Determine the environmental effects of plastic waste disposal practices.
3. Evaluate residents' knowledge of safe plastic waste management practices.
4. Examine factors affecting community behavioral change regarding waste management.
5. Assess the relationship between waste management practices and environmental sustainability.

Research Hypotheses

H01: There is no significant relationship between plastic waste management practices and factors influencing community behavioral change.

H02: There is no significant relationship between plastic waste management practices and environmental effects.

H03: There is no significant relationship between plastic waste management practices and residents' knowledge of safe waste management practices.

H04: Plastic waste management practices do not significantly affect environmental sustainability.

LITERATURE REVIEW

Plastic Waste Management

Waste management encompasses the collection, transportation, treatment, recycling, recovery, and disposal of waste materials with the objective of minimizing environmental and health impacts while conserving resources. Sustainable waste management increasingly aligns with circular economy principles that emphasize resource recovery and waste minimization. Common plastic waste management methods include: Open dumping, Landfilling, Incineration, Recycling, Composting (for biodegradable fractions) and Waste-to-energy technologies. Among these methods, recycling is considered the most environmentally sustainable because it

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reduces resource extraction, energy consumption, and greenhouse gas emissions.

Environmental Effects of Plastic Waste

Among the major setbacks in the efforts to manage solid waste in Nigeria include the unwholesome waste disposal habits of residents of various local governments as well as weak sanitation law enforcement by the appropriate government officials (Babayemi & Dauda, 2019). This in turn, contributes to the impact on the citizen's health challenges. Onu, Price, Surendran and Ebie (2022) explained that solid waste management involves the application of those techniques which are to ensure the orderly execution of all functions of collection, transfer, processing treatment and the disposal of solid wastes. This also entails the elimination of all those environmental issues that can impinge on the health of the citizens or diminish the aesthetics of the environment.

The disposal of wastes in landfill sites has increasingly caused concern about possible adverse health effects for populations living nearby, particularly in relation to those sites where hazardous waste is dumped (Vrijheid, 2020). Adoption of waste incineration pose some health risks to residents. Studies suggest that there is some relationship between distance from the site and mortality or incidence from some cancers, such as lung cancers, childhood cancers and leukaemias (Elliott, Eaton, Shaddick & Carter 2020). This implies that people whose homes are close to the waste incineration sites are exposed to these forms of health risks. This is even worsened by the fact that most of these dumpsites are usually sited close to poor neighborhoods, who have limited resources to take care of their health (Nwogwugwu & Ishola, 2019).

Improper plastic waste disposal contributes to numerous environmental problems, including: Land degradation, Water pollution, Air pollution, Ecosystem destruction, Wildlife mortality Greenhouse gas emissions, Flooding due to drainage blockage and Microplastic contamination These impacts pose significant threats to environmental sustainability and public health.

Knowledge and Behavioral Change in Waste Management

Knowledge, attitudes, and practices significantly influence waste management outcomes. Communities with higher environmental awareness are generally more likely to participate in recycling and proper waste disposal programs. However, behavioral change is also influenced by cultural norms, infrastructure availability, economic conditions, and institutional support. Like in Guinea, the barrier to solid waste management might be quite unique per se in terms of environmental impacts, socioeconomic factors, and cultural heritage, so different areas will find different strategies effective for proper waste management (Keita, 2026).

Some research studies found that either at-home safety consciousness (Okechukwu et al., 2022) or knowledge (Aroj, Muhammad, Ushahid & Qasim, 2024) of waste related deleterious health effects is associated with household waste disposal strategy. For example, safety behaviour is required to prevent direct contamination and exposure to infectious and injurious substances to health from household waste on the one hand. On the other hand, increasing knowledge can foster positive attitudes and build safe practices among populations. In Guinea, there is a lack of measures aimed at informing the public about the causal connection between environmental pollution and health, and no provision has been made for a long-term evaluation which would make it possible to examine whether the measures are helping to reduce environmentally related health problems in a cost-effective manner (Touré, 2008; South Rivers, 2014). Therefore, research and development in waste management should continue to improve data, models, and concepts related to long-term safety of disposal of long-lived waste

METHODOLOGY

Research Design

This study adopted a descriptive survey research design to assess plastic waste management practices and their environmental

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and social implications in Abuja Municipal Area Council.

Population and Sample Size

The target population consisted of 530 residents within AMAC. The sample size was determined using Yamane's formula:

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

Where:

- n = sample size
- N = population size (530)
- e = margin of error (0.05)

The calculated sample size was 228 respondents

Sampling Technique

Simple random sampling was employed to ensure equal participation opportunities among respondents.

Data Collection

Primary data were collected through structured questionnaires consisting of

demographic information and questions relating to waste management practices, environmental impacts, knowledge of safe waste management, and behavioral factors.

Data Analysis

Data were analyzed using SPSS Version 23. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize responses. Pearson Product Moment Correlation was used to test the hypotheses at a 5% significance level.

RESULTS

The study administered a total of two-hundred and twenty-eight (228) questionnaires, one-hundred and ninety-eight (198) questionnaires were retrieved amounting to 87% response rate for analyses. However, according to Mugenda and Mugenda (2003), any response rate greater or equal to 70% is excellent for analyses.

Table 1: Demographic Information of the respondents

Information	Frequency (F)	Percentage (%)
Highest educational qualification		
1. Primary	47	23.7
2. Secondary	73	36.9
3. Diploma/NCE	39	19.7
4. Higher Certificates	39	19.7
Age		
1. 18 – 25years	9	4.5
2. 26 – 29years	51	25.8
3. 30 – 35years	66	33.3
4. 36 – 40years	24	12.1
5. Above 40years	48	24.2
Family size		
1. Less than 3 members	23	11.6
2. 3 – 7 members	96	48.5
3. 7 – 9 members	49	24.7
4. Above 9 members	30	15.2
Do you practice plastic waste management?		
1. Yes	173	87.4
2. No	25	12.6

N = 198.

Any item(s) < 3.0 = Disagree (D), while Item(s) ≥ 3.0 = Agree (A)

Table 1 shows the demographic information of the respondents.

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Table 2: Plastic waste management practices

Waste management practices	Mean	Std. Dev	Decision
Open dumping	3.8081	1.31123	Agree
Burning	3.3788	1.33022	Agree
Plastic waste collection service	3.2525	1.25317	Agree
Recycling collection points	2.9596	1.45957	Disagree
Landfills	2.6717	1.35493	Disagree
Average Mean Score (AMS) = $\sum \text{Mean} / 5$	3.2141		Agree

N = 198.

Any item(s) < 3.0 = Disagree (D), while
 Item(s) ≥ 3.0 = Agree (A)

Table 3: Environmental effects of waste management

Health effects	Mean	Std. Dev	Decision
Land Pollution	3.8081	1.31123	Agree
Water Pollution	3.7828	1.51081	Agree
Harm to Wildlife	3.3939	1.57917	Agree
Air Pollution	3.3788	1.33022	A+
Damage to Ecosystems	3.3788	1.35293	Agree
Greenhouse Gas Emissions	3.2525	1.25317	Agree
Flooding	3.2424	1.29105	Agree
Drainage obstruction	3.0404	1.07031	Agree
Microplastic Contamination	3.0404	1.07031	Agree
Average Mean Score (AMS) = $\sum \text{Mean} / 9$	3.3687		Agree

N = 198.

Table 3 shows the environmental effects as a results of poor plastic waste management in the community.

Table 4: Knowledge of safe plastic waste management

Knowledge of safe waste management	Mean	Std. Dev	Decision
Plastic waste handling practices by the community	3.9444	1.16285	Agree
Attitudes of cleaning their surrounding by residents	3.5808	1.32567	Agree
Role of community residents	3.4495	1.38336	Agree
Interactions with other actors in the waste system because they are the main end-users of waste management facilities	3.1869	1.49464	Agree
Average Mean Score (AMS) = $\sum \text{Mean} / 4$	3.5404		Agree

N = 198.

Table 4 shows the existing knowledge of safe plastic waste management in the study area.

Table 5: Factors that affects community's ability to change behaviours

Factors affecting community's ability to change behaviours	Mean	Std. Dev	Decision
Cultural and ethnic differences	3.3788	1.35293	Agree

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Factors affecting community's ability to change behaviours	Mean	Std. Dev	Decision
Lack of access to safe places to exercise	3.2525	1.25317	Agree
Low income	2.6717	1.35493	Disagree
Inaccessibility of plastic waste dumping site	2.5354	1.38016	Disagree
Average Mean Score (AMS) = $\sum \text{Mean} / 4$	2.9596		Disagree

N = 198.

Table 5 shows results of factors affecting the community's ability to change behaviours.

Table 6: Effect of waste management practices on the environment in AMAC

Variables	Factors affecting community's ability to change behaviours	Knowledge of safe waste management practices	Environmental effect of waste management practices	Plastic waste management practices
Factors that affect community's ability to change behaviours	Pearson Correlation 1	-.317	.145	.412
	Sig. (2-tailed)	.000	.042	.000
N	198	198	198	198
Knowledge of safe waste management practices	Pearson Correlation -.317	1	.249	-.100
	Sig. (2-tailed)	.000	.000	.163
N	198	198	198	198
Environmental effect of waste management practices	Pearson Correlation .145	.249	1	.367
	Sig. (2-tailed)	.042	.000	.000
N	198	198	198	198
Plastic waste management practices	Pearson Correlation .412	-.100	.367	1
	Sig. (2-tailed)	.000	.163	.000
N	198	198	198	198

Table 6 shows the correlational effect of the plastic waste management practices (dependent variable) and the independent variables (factors that community's ability to

change behaviour, knowledge of safe plastic waste management, and environmental effects of wrong plastic waste management).

Table 7: Hypotheses tested at 0.05 (5%)

Null hypotheses	p-values	Decision
H ₀₁ : There is no positive relationship between the plastic waste management practices and factors affecting community's ability to change behaviors of AMAC Community.	r = 0.412 p = 0.000 N = 198	Null Hypothesis Rejected
H ₀₂ : There is no positive relationship between the plastic waste management practices and environmental effects of waste management in AMAC.	r = 0.367 p = 0.000 N = 198	Null Hypothesis Rejected
H ₀₃ : There is no positive relationship between the plastic waste management practices and knowledge of safe waste management practices by residents of AMAC.	r = -0.100 p = 0.163 N = 198	Alternate Hypothesis Accepted

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Null hypotheses	p-values	Decision
H ₀₄ : There is no significant effect between the plastic waste management practices on the environment.	r = 0.367 ρ = 0.000 N = 198	Alternate Hypothesis Accepted

Table 7 shows the results of hypotheses tested at 5%.

DISCUSSION OF FINDINGS

Table 2 revealed the plastic waste management practices in AMAC to be: Open dumping, Burning, and sanitary landfills. This outcome confirmed with the result of Keita (2026), Alam and Ahmade (2023), Alhassan and Mohammed (2023). Consequently, vast uncollected waste results in different social and environmental menaces e.g., it reduces soil quality and can interfere with plant growth, it clogs drains causing flooding and also cause a general environmental degradation.

That also confirmed the assertion by Keita (2026) that, waste indiscriminate disposal is recognized as an important cause of environmental pollution and is associated with health problems, also emissions contribute to respiratory problems and environmental degradation.

By consequence, proper plastic waste management in a community warrants a habitual environment for the community, however, improper plastic waste management in a community serves such community with an enabling environment for the growth of unwanted vectors that transfers diseases thereby causing more harm to the residents of the community slowly.

Table 3 revealed the most environmental effects as a results of poor plastic waste management in the community include: emissions contributing to respiratory problems and environmental degradation, reduced soil quality and an interference with plant growth and breed insects. The outcome agrees with the outcomes of Keita (2026), Alam and Ahmade (2023) that, waste indiscriminate disposal is recognized as an important cause of environmental pollution and is associated with environmental and health problems.

All these problems accrued leads to poor plastic waste management in communities as a result of: low motivation, travelling distance and social factors leads to disposal in open spaces, drains and around road side bins (Rigasa, Badamasi, Galadimawa & Abubakar, 2026). By consequence, improper control of plastic waste disposal to give rise to negative environmental and social effects to the community, which leads to catastrophic outcomes that the residents of the community may likely not comprehend.

Table 4 revealed that, there is good knowledge of safe waste management practices with the most knowledge to include: plastic waste handling practices, attitudes of cleaning their surroundings, and role to play in waste management. The outcome conforms with outcomes of South Rivers (2014); and, Touré (2008) that, safe management and disposal of plastic waste are problems that face some metropolitan countries.

By consequences, the community with their good knowledge of safe waste management creates the beginning of a new dawn to the AMAC community in a way of keeping the environment habitual and free from being an environment of eco-system destruction that creates more environmental and health challenges in the community.

Also, table 5 revealed the most factors affecting the community's ability to change behaviour to include: cultural and ethnic differences; and, lack of access to safe places. Showing that, not any factor can affect the ability of the community to change behaviour.

Table 6 revealed the correlational effect of the plastic waste management practices (dependent variable) and the independent variables (factors that community's ability to change behaviours, knowledge of safe waste management, and environmental effects of wrong plastic waste disposal). As the table indicated that there exists a positive relationship between waste

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management practices and factors of the community's ability to change behaviour; and, another positive relationship exists between plastic waste disposal practices and health effect of waste management; but another negative relationship between waste management practices and knowledge of safe waste management. However, there is a strong significant effect of waste management practices and effect on environment and poor waste management exists.

The outcome is in line with the result of Nwogwugwu and Ishola (2019) that, there is a significant relationship between ineffective management of solid waste, social and environment challenges; and, indiscriminate disposal of solid waste, and ineffective management of solid waste had joint significant effect on public health challenges.

CONCLUSION

The study concluded in line with the study objectives as follows:

1. There are plastic waste disposal management practices in AMAC Community with open dumping, burning, plastic waste collection service, recycling collection points and Landfills as the most waste management practiced.
2. There are social; and environmental effect regarding poor plastic waste disposal management practice with the most effects to be: land pollution, water pollution harm to wildlife, air pollution, damage to ecosystems, greenhouse gas emissions, flooding, drainage obstruction and microplastic contamination.
3. There is good knowledge of safe waste management practice in the community with the most knowledge in: waste handling practices, attitudes of cleaning their surroundings, and role to play in waste management.

RECOMMENDATIONS

The study also recommends in line with the study objectives as follows:

1. Government should support their communities with adequate resources and political will, good education and good sanitation equipment to encourage plastic waste disposal management practices.
2. Proper waste management should be designed in the entire State to ensure that it does not affect the environment and does not cause health hazards to the people living there.
3. There should be more awareness through all means of media channels, creation and integration of community-based waste management initiatives especially in low-income high-density areas.
4. Community residents and their leaders should have the zeal to collectively manage their plastic waste together.

Implications of the Study

The study exposed and maintained that the proper waste management can only be realized in a community by the help of both the community residents and their leaders to ensure free and habitual environment worthy of leaving with less or without negative health and social effects. The study also shows, the common environment and social effects as a result of poor plastic waste disposal management in the community and the need to intensify awareness to all the community residents on the dangers of poor waste management.

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Conflict of Interest

The authors declare no conflict of interest.

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