
SOLID WASTE MANAGEMENT PRACTICES AND THEIR EFFECTS ON COMMUNITY HEALTH AMONG RESIDENTS IN ENUGU METROPOLIS, ENUGU STATE, NIGERIA

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Abstract

Solid waste management remains an important environmental health concern because unsafe handling and disposal practices can create conditions that expose communities to physical, biological and chemical hazards. This study examined solid waste management practices and their effects on community health among residents of Enugu Metropolis, Enugu State, Nigeria. A community-based descriptive cross-sectional design was employed among adults aged 18 years and above who had lived in the study area for at least six months. A sample of 384 respondents was selected using a multistage sampling technique. Data were collected using a structured

interviewer-administered questionnaire and an observational checklist. Descriptive statistics, Chi-square test and logistic regression analysis were used for data analysis at a 5% level of significance. Findings showed that poor solid waste management practices were common among respondents. Most participants did not practise waste segregation, while irregular waste collection, open dumping, open burning and disposal of refuse into drainage channels were reported. More than half of the respondents experienced waste-related environmental health concerns, including mosquito infestation, offensive odour, flies, rodents, respiratory discomfort and gastrointestinal symptoms. Poor waste management practices were significantly associated with reported community health effects. The study concludes that inadequate waste management contributes to unhealthy environmental conditions and increased community health risks. Improved waste collection systems, household waste segregation, environmental health education and stronger sanitation enforcement are recommended.

Keywords: Community health; Environmental sanitation; Solid waste management; Waste disposal practices; Nigeria

Introduction

Solid waste management represents one of the continuing environmental health challenges affecting many urban communities. The process involves the generation, storage, collection, transportation, treatment, recycling, recovery and final disposal of waste materials produced through household, commercial, institutional and industrial activities. Effective management of solid waste protects environmental quality and reduces exposure to hazards, while poor management can create conditions that threaten human health.

Rapid urbanisation, population growth and changing consumption patterns have contributed to increasing volumes of municipal solid waste generation globally. The challenge is particularly significant in low- and middle-income countries where waste generation has expanded faster than the development of collection systems, treatment facilities and disposal infrastructure. The World Health Organization identifies poorly managed waste as a source of environmental contamination that can affect air, water and soil quality while exposing communities to preventable health risks (WHO, 2024; WHO, 2025). In many urban communities, unsafe waste disposal practices remain common. These practices include indiscriminate dumping, disposal of refuse into drainage channels, open burning and inadequate household storage. Such practices may contribute to blocked drainage systems, flooding, accumulation of stagnant water and increased presence of disease vectors such as mosquitoes, flies and rodents. Open burning of waste may also release smoke, particulate matter and harmful substances into the environment, creating respiratory risks for residents and waste handlers.

The health implications of poor solid waste management extend beyond infectious diseases. Exposure may occur through polluted air, contaminated water, soil contamination, direct contact with hazardous materials and consumption of food affected by environmental pollutants. Communities located close to poorly managed waste sites may experience repeated exposure to environmental hazards without adequate protection or monitoring.

Recent Nigerian evidence highlights concerns regarding unsafe waste handling and human health. Ugbede et al. (2024), in a study examining e-waste management and human health in Enugu State, reported associations between exposure to poorly managed electronic waste environments and health complaints including respiratory problems, skin irritation and neurological symptoms. Although the study focused specifically on e-waste rather than general household waste, it demonstrates the wider importance of safe waste handling practices and effective environmental management.

Solid waste management challenges are also influenced by social, economic and institutional factors. Household awareness, educational level, income, availability of waste bins, accessibility of collection services, enforcement of sanitation regulations and community participation all affect waste disposal behaviour. Therefore, addressing waste-related health risks requires both behavioural change among residents and improvements in waste-management systems.

Enugu Metropolis provides an important setting for examining these issues because it combines densely populated residential areas, commercial activities, markets, institutions and expanding urban communities. Like many Nigerian cities, the area faces challenges related to waste generation, collection and disposal. However, locally specific evidence on household waste-management practices and their effects on community health remains limited.

Problem Statement

Despite the importance of effective waste management, many communities continue to experience unsafe disposal practices, including open dumping, open burning and disposal of refuse into drainage systems. These practices may contribute to environmental pollution, unpleasant living conditions, increased disease-vector activity and exposure to harmful substances.

Although environmental sanitation programmes and waste-management policies exist, challenges such as irregular waste collection, inadequate disposal facilities, limited public awareness and weak enforcement continue to affect their effectiveness. As a result, residents may rely on unsafe disposal methods because formal alternatives are unavailable, inaccessible or unreliable. Previous studies have examined waste-management challenges and environmental health concerns in different Nigerian settings. However, there remains a need for community-based evidence that examines the specific waste-management practices adopted by residents and how these practices

relate to reported health effects. Such evidence is necessary for designing targeted interventions involving environmental agencies, public health authorities and community stakeholders.

This study therefore examined solid waste management practices and their effects on community health among residents of Enugu Metropolis, Enugu State, Nigeria.

The main objective of this study was to examine solid waste management practices and their effects on the health of residents within the community.

Literature Review

1 Conceptual Review

1.1 Concept of Solid Waste

Solid waste refers to unwanted, discarded or abandoned materials generated from human activities that exist in solid form rather than liquid or gaseous form. These materials originate from households, markets, commercial establishments, schools, industries, healthcare facilities and agricultural activities. Common examples include food remains, plastics, paper, glass, metal containers, textiles, wood materials and other discarded products.

Municipal solid waste is largely generated from residential and commercial activities within communities. The quantity and composition of solid waste produced differ according to population size, economic activities, consumption patterns, cultural practices and the availability of waste-management services. Organic materials such as food waste and plant residues may decompose naturally, while materials such as plastics, metals and glass persist in the environment for longer periods and require appropriate recovery, recycling or controlled disposal methods. Certain categories of waste require special attention because of their potential health and environmental hazards. These include electronic waste, batteries, chemical waste and healthcare-related waste. Such materials may contain toxic substances capable of contaminating soil, water sources and the surrounding environment when improperly handled.

Effective solid waste management therefore requires more than removing waste from residential areas. It involves coordinated activities throughout the waste chain, including waste reduction, safe storage, segregation, collection, transportation, treatment, recycling and final disposal (WHO, 2025).

1.2 Concept of Solid Waste Management Practices

Solid waste management practices refer to the activities and behaviours involved in handling waste from the point of generation to final disposal. These practices include household waste storage, waste segregation, collection, transportation, recycling, reuse, composting and disposal through approved facilities.

Proper waste management aims to minimise environmental pollution, conserve resources and protect human health. At household level, safe practices include storing waste in appropriate containers, separating recyclable materials and ensuring that waste is collected or disposed of through approved channels. Waste segregation at source is particularly important because it separates materials according to their characteristics and improves opportunities for recycling, composting and safe treatment. When biodegradable materials, plastics, metals and hazardous materials are mixed together, the possibility of recovery becomes more difficult and environmental risks may increase.

However, communities may adopt unsafe waste-management practices when formal systems are inadequate. Open dumping, burning of waste and disposal into drainage channels are often associated with limited access to collection services, inadequate disposal facilities, financial constraints and weak enforcement of environmental regulations.

The waste-management hierarchy provides a framework for improving sustainability. It prioritises waste prevention and reduction, followed by reuse, recycling, recovery and environmentally safe disposal. The success of this approach depends on both individual participation and the availability of supportive infrastructure.

1.3 Concept of Community Health

Community health refers to the overall health status and wellbeing of people living within a defined geographical area or social group. It includes physical, psychological, social and environmental aspects of health, as well as collective actions aimed at disease prevention and health promotion. The health of a community is influenced by several interconnected factors, including access to healthcare services, sanitation facilities, safe water, housing conditions, nutrition, education and environmental quality. Environmental conditions are particularly important because individuals interact continuously with their surroundings.

Within the context of solid waste management, community health reflects the health experiences and risks associated with exposure to waste-related environmental conditions. These may include exposure to foul odour, smoke from waste burning, contaminated surroundings, insects, rodents, blocked drainage systems and hazardous materials.

A clean environment can reduce exposure to harmful agents, while poor environmental conditions may increase vulnerability to illness and reduce quality of life. Therefore, solid waste management represents an important component of community health protection.

1.4 Effects of Poor Solid Waste Management on Community Health

Poor solid waste management can affect community health through several environmental exposure pathways. One major pathway is air pollution resulting from open burning of waste.

Burning mixed waste containing plastics, rubber, treated materials and household chemicals may release smoke, particulate matter and other harmful substances into the environment. Exposure to polluted air from waste burning may contribute to respiratory discomfort, coughing, eye irritation and worsening of existing respiratory conditions. Individuals living close to waste-burning locations, waste handlers and vulnerable groups such as children and older adults may face greater exposure.

Water and soil contamination represent additional concerns. Waste disposed of on open land, near streams or within drainage systems may release contaminants into surrounding soil and water sources. During rainfall, waste materials may produce contaminated runoff that affects nearby environments. Disposal of waste into drainage channels can also obstruct water flow and contribute to flooding. Accumulated waste may create stagnant water conditions that support mosquito breeding and increase exposure to disease vectors. Although diseases such as malaria are influenced by multiple factors, poor waste disposal can create environmental conditions that favour vector presence.

Poor waste management may also result in physical injuries. Residents, waste handlers and children may come into contact with broken glass, sharp metals and hazardous materials contained within mixed waste. Unsafe waste sites can attract flies, rodents and other pests that may contaminate food and living environments.

Beyond physical health effects, persistent waste accumulation, offensive odours and poor environmental appearance may negatively influence residents' comfort and overall quality of life.

2 Theoretical Framework

2.1 Theory of Planned Behaviour

The Theory of Planned Behaviour was developed by Ajzen (1991) to explain how individual intentions influence behaviour. The theory proposes that behaviour is shaped by three major factors: attitude, subjective norms and perceived behavioural control.

Attitude refers to an individual's evaluation of a behaviour as positive or negative. In relation to waste management, residents who believe that proper disposal, recycling and segregation protect health and the environment are more likely to support such practices. Subjective norms refer to the influence of social expectations and the opinions of significant groups, including family members, neighbours, community leaders and institutions. Community expectations can encourage or discourage practices such as open dumping and waste burning.

Perceived behavioural control refers to an individual's perception of whether they have the ability and resources required to perform a behaviour. A resident may support waste segregation but may be unable to practise it if waste bins, recycling facilities or collection services are unavailable. The

theory is relevant to this study because solid waste management involves both personal behaviour and environmental support systems. Improving waste practices requires not only awareness but also the availability of practical opportunities that enable residents to act responsibly.

3 Empirical Review

Previous studies have demonstrated relationships between waste-management practices, environmental conditions and community health outcomes.

Vinti et al. (2021), through a systematic review of municipal solid waste management and adverse health outcomes, reported that poor collection systems, uncontrolled disposal and unsafe treatment practices exposed communities and waste workers to biological, chemical and physical hazards. However, the authors noted that variations among studies indicate the need for more location-specific research.

Eshete et al. (2024) examined environmental and health impacts of poor solid waste management in Ethiopia. The study reported that inadequate waste sorting and disposal practices were associated with environmental contamination and self-reported health concerns, including respiratory problems and gastrointestinal illnesses. However, because the study was cross-sectional, the findings demonstrated associations rather than direct causation.

In Nigeria, Adebayo et al. (2024) investigated waste-management practices and community health in Ibadan North Local Government Area. The study found that inadequate collection services, poor disposal facilities and limited public education contributed to ineffective waste management. The researchers also reported relationships between poor waste practices and reported health concerns.

Ugbede et al. (2024) examined e-waste management and human health among individuals living near e-waste disposal and recycling locations in Enugu State. The study reported associations between hazardous waste exposure and health complaints, including respiratory problems and skin irritation. Although the study focused specifically on electronic waste, its findings demonstrate the importance of safe waste handling and environmental protection.

Teym et al. (2025) identified socioeconomic and behavioural factors influencing household waste-management practices. Their findings showed that education, income, attitudes and access to waste services affected households' ability to adopt safer practices.

Overall, existing evidence suggests that poor waste management contributes to environmental health risks. However, many studies focus on specific waste categories, particular vulnerable groups or locations outside the present study area. This study contributes by examining general solid waste-management practices and their reported effects on community health among residents of Enugu Metropolis.

Methods

1 Research Design

The study adopted a community-based descriptive cross-sectional research design to examine solid waste management practices and their effects on community health among residents of Enugu Metropolis, Enugu State, Nigeria. The design was considered appropriate because it allowed the researchers to assess existing waste-management behaviours, environmental conditions and reported health experiences of residents at a particular period.

The study focused on household solid waste-management practices, including waste storage, segregation, collection, disposal methods, open dumping, open burning, recycling and disposal of refuse into drainage channels. Community health effects were assessed based on respondents' reported experiences of environmental-health concerns associated with waste accumulation and unsafe disposal practices..

Because the study employed a cross-sectional approach, findings were interpreted as associations between waste-management practices and reported health conditions rather than direct evidence of cause and effect.

2 Study Area

The study was conducted in Enugu Metropolis, Enugu State, South-East Nigeria. The metropolis consists mainly of Enugu North, Enugu South and parts of Enugu East Local Government Areas. It is characterised by residential neighbourhoods, commercial centres, markets, schools, government institutions, religious organisations and small-scale businesses that generate different forms of municipal solid waste.

The major categories of waste generated within the metropolis include food waste, plastics, nylon materials, paper, bottles, cans, metal scraps, ash and other household refuse. Like many growing urban centres in Nigeria, Enugu Metropolis experiences challenges associated with increasing waste generation, irregular collection services, inadequate disposal facilities, open dumping and disposal of refuse into drainage systems.

These environmental conditions make the area suitable for assessing the relationship between solid waste-management practices and community health outcomes.

3 Study Population

The study population comprised adult residents of Enugu Metropolis who were 18 years and above and had lived within the study area for a minimum period of six months before the commencement of the research.

The inclusion of residents with at least six months of residence was to ensure that participants had sufficient exposure and familiarity with local waste-management conditions, sanitation practices and environmental challenges within their communities.

Household heads, adult household members and other adult residents who had knowledge of household waste-handling practices were eligible to participate.

Individuals below 18 years, temporary visitors, residents who had lived in the area for less than six months and persons who declined participation were excluded.

4 Sample Size Determination

The sample size was determined using Cochran's formula for estimating sample size in a large population:

$$n = Z^2pq / d^2$$

Where:

n = required sample size

Z = standard normal deviation at 95% confidence level (1.96)

p = estimated proportion of population possessing the characteristics of interest (0.50)

q = 1 – p (0.50)

d = margin of error (0.05)

Substituting the values:

$$n = (1.96)^2(0.50)(0.50) / (0.05)^2$$

$$n = (3.8416 \times 0.25) / 0.0025$$

$$n = 384.16$$

The minimum sample size was therefore approximated to **384 respondents**.

5 Sampling Technique

A multistage sampling technique was used for respondent selection.

At the first stage, Enugu Metropolis was divided into major residential areas across Enugu North, Enugu South and Enugu East Local Government Areas. Communities were selected through simple random sampling to ensure representation of different neighbourhood characteristics.

At the second stage, streets and residential clusters within selected communities were identified through balloting. The number of households selected from each location was proportionally allocated based on the estimated number of households.

At the final stage, systematic sampling was used to select households. The first household was selected randomly, after which a predetermined sampling interval was applied. Where more than one eligible adult was available in a household, one participant was selected through simple balloting.

This procedure ensured that respondents were drawn from different residential areas within the metropolis.

6 Instrument for Data Collection

Data were collected using a structured interviewer-administered questionnaire and an observational checklist.

The questionnaire was developed based on existing literature on solid waste management, environmental sanitation and community health. It consisted of four sections.

Section A collected information on respondents' socio-demographic characteristics, including age, sex, marital status, educational level, occupation and duration of residence.

Section B assessed solid waste-management practices. Items covered waste storage methods, availability of waste bins, waste segregation, frequency of collection, disposal methods, open dumping, open burning, recycling and participation in sanitation activities.

Section C assessed reported community-health effects associated with waste-related environmental conditions. These included mosquito infestation, offensive odour, flies, rodents, respiratory discomfort, gastrointestinal symptoms, skin irritation, injuries from sharp materials and perceived effects on quality of life.

Section D examined factors influencing waste-management practices, including access to collection services, availability of disposal facilities, awareness, cost of waste services and enforcement of sanitation regulations.

An observational checklist was also used to assess environmental conditions around selected households and streets. Observed conditions included uncovered waste containers, open dumpsites, blocked drains, stagnant water, waste accumulation, smoke from burning waste, flies, rodents and general environmental cleanliness.

7 Validity and Reliability of Instrument

The questionnaire and observational checklist were subjected to expert review to establish validity. Three experts, comprising a public health specialist, an environmental health practitioner and a measurement and evaluation specialist, reviewed the instruments.

Their comments focused on clarity, relevance, adequacy of items and alignment with the study objectives. Necessary modifications were made before final administration.

A pilot study was conducted among 38 adult residents of Nsukka Urban, Enugu State. The pilot location was selected because it shared similar residential and waste-management characteristics with the study area but was not included in the main research.

Reliability testing was conducted using Cronbach's alpha coefficient. A reliability value of 0.78 was obtained, indicating acceptable internal consistency of the instrument.

8 Procedure for Data Collection

Data collection was conducted by the researcher and trained research assistants. Prior to questionnaire administration, permission was obtained from relevant community representatives and local authorities.

The purpose of the study was explained to respondents, and informed consent was obtained before participation. Research assistants administered the questionnaires and provided clarification where necessary without influencing responses. The observational checklist was completed during visits to selected residential areas. Completed questionnaires were reviewed daily to ensure completeness and consistency before coding and analysis.

9 Measurement of Variables

The independent variable was solid waste-management practice. It was measured through indicators including waste storage, segregation, collection frequency, disposal methods, recycling, open dumping, burning of waste and disposal into drainage channels.

Respondents reporting safer practices, such as use of covered waste containers, regular collection services, waste segregation and approved disposal methods, were classified as having good waste-management practices.

Those reporting unsafe practices, including open dumping, open burning, disposal into drainage channels and indiscriminate waste disposal, were classified as having poor waste-management practices.

The dependent variable was community-health effect. This was measured through reported experiences of waste-related environmental-health concerns, including respiratory discomfort, eye irritation, skin irritation, gastrointestinal symptoms, mosquito infestation, rodent infestation, injuries and discomfort caused by offensive odour.

Composite scores were developed to classify overall waste-management practices and reported community-health effects.

10 Data Analysis

Data collected were coded and analysed using IBM Statistical Package for Social Sciences (SPSS) version 26.

Descriptive statistics, including frequencies, percentages, means and standard deviations, were used to summarise respondents' socio-demographic characteristics, waste-management practices and reported health effects.

Chi-square analysis was used to determine the association between solid waste-management practices and reported community-health effects.

Binary logistic regression analysis was conducted to identify waste-management practices that predicted the likelihood of respondents reporting waste-related health concerns.

All statistical analyses were conducted at a 5% level of significance. A p-value less than 0.05 was considered statistically significant.

11 Ethical Considerations

Ethical approval was obtained from the appropriate institutional ethics committee before commencement of the study.

Permission was obtained from community leaders and relevant authorities within the selected areas. Participation was voluntary, and respondents were informed about the purpose of the study, procedures involved and their right to withdraw without penalty.

Written informed consent was obtained from all participants before questionnaire administration.

No personal identifiers were collected, and all information obtained was treated confidentially and used strictly for academic purposes.

Results

1 Response Rate

A total of 400 questionnaires were administered to adult residents of Enugu Metropolis. Out of the questionnaires distributed, 389 were retrieved. Five questionnaires were excluded due to substantial missing information. Therefore, 384 questionnaires were found suitable for analysis, producing a valid response rate of 96.0%.

2 Socio-Demographic Characteristics of Respondents

Table 1 presents the socio-demographic characteristics of respondents. The findings showed that 117 respondents (30.5%) were between 18 and 29 years, 104 (27.1%) were between 30 and 39 years, 79 (20.6%) were between 40 and 49 years, while 84 (21.9%) were aged 50 years and above.

Regarding sex distribution, females constituted 214 (55.7%) respondents, while males accounted for 170 (44.3%). More than half of the respondents were married (54.9%), while 36.2% were single.

In terms of educational level, 158 respondents (41.1%) had secondary education, 130 (33.9%) possessed tertiary education, 66 (17.2%) had primary education, while 30 (7.8%) had no formal education.

Table 1: Socio-Demographic Characteristics of Respondents (n = 384)

Variable	Frequency	Percentage (%)
Age group		
18–29 years	117	30.5
30–39 years	104	27.1
40–49 years	79	20.6
50 years and above	84	21.9
Sex		
Male	170	44.3
Female	214	55.7
Marital status		
Single	139	36.2
Married	211	54.9
Divorced/Separated/Widowed	34	8.9
Educational level		
No formal education	30	7.8
Primary education	66	17.2

Secondary education	158	41.1
Tertiary education	130	33.9
Occupation		
Civil servant	74	19.3
Trader	120	31.3
Artisan	68	17.7
Student	50	13.0
Unemployed	72	18.8
Duration of residence		
Five years or less	130	33.9
6–10 years	119	31.0
More than 10 years	135	35.2

Source: Field Survey, 2026

3 Solid Waste Management Practices among Respondents

The findings revealed several challenges associated with household solid waste management practices. A considerable proportion of respondents stored waste in unsafe containers. Specifically, 152 respondents (39.6%) used uncovered containers, while 146 (38.0%) used covered waste bins.

Waste segregation was not commonly practised. Only 113 respondents (29.4%) reported separating waste before disposal, while 271 (70.6%) did not separate waste materials.

Regarding waste collection services, 152 respondents (39.6%) reported irregular collection, 118 (30.7%) experienced regular collection, while 114 (29.7%) reported having no formal collection service.

Open dumping was the most reported disposal method (29.2%), followed by the use of formal waste collectors (26.6%) and communal collection points (21.9%). Some respondents reported disposal into drainage channels (10.2%) and open burning of waste (12.2%).

Table 2: Solid Waste Management Practices among Respondents (n = 384)

Waste Management Practice	Frequency	Percentage (%)
Main waste storage method		
Covered waste bin	146	38.0
Uncovered container	152	39.6
Sack, nylon bag or open basket	86	22.4
Waste segregation before disposal		
Yes	113	29.4
No	271	70.6
Frequency of waste collection		
Regular collection	118	30.7
Irregular collection	152	39.6
No formal collection service	114	29.7
Main waste disposal method		
Formal waste collector	102	26.6
Communal collection point	84	21.9
Open dumping	112	29.2
Disposal into drainage channels	39	10.2
Open burning	47	12.2
Recycling or reuse		
Yes	95	24.7
No	289	75.3
Participation in sanitation activities		
Regular participation	149	38.8
Rarely or never participate	235	61.2

Source: Field Survey, 2026

4 Overall Level of Solid Waste Management Practice

A composite score was calculated to determine the overall level of waste-management practices among respondents.

Respondents who demonstrated safe storage, proper disposal through approved channels, waste segregation, recycling and participation in sanitation activities were classified as having good waste-management practices.

Those who reported open dumping, open burning, disposal into drainage channels and unsafe waste storage were classified as having poor waste-management practices.

Table 3: Overall Level of Solid Waste Management Practice (n = 384)

Level of Practice	Frequency	Percentage (%)
Good solid waste-management practice	138	35.9
Poor solid waste-management practice	246	64.1
Total	384	100.0

Source: Field Survey, 2026

The findings showed that 246 respondents (64.1%) had poor solid waste-management practices, while only 138 respondents (35.9%) demonstrated good waste-management practices.

5 Reported Community Health Effects Associated with Poor Waste Management

Table 4 presents waste-related environmental health concerns reported by respondents.

Mosquito infestation was the most frequently reported concern, with 264 respondents (68.8%) indicating increased mosquito presence around their residences. Offensive odour was reported by 252 respondents (65.6%), while 222 respondents (57.8%) reported increased presence of flies and rodents.

Respiratory discomfort, including coughing, breathing difficulties and eye irritation associated with smoke, dust or offensive odour, was reported by 149 respondents (38.8%).

Table 4: Reported Waste-Related Community Health Effects (n = 384)

Reported Health or Environmental Health Effect	Frequency	Percentage (%)
Mosquito infestation around residence	264	68.8
Offensive odour-related discomfort	252	65.6
Flies or rodent infestation	222	57.8
Cough, breathing discomfort or eye irritation	149	38.8
Diarrhoea, stomach upset or gastrointestinal symptoms	121	31.5
Skin irritation, itching or rashes	93	24.2
Injury or cuts from sharp waste materials	42	10.9

Multiple responses were allowed; therefore, percentages do not add up to 100%.

Source: Field Survey, 2026

6 Overall Reported Waste-Related Community Health Effects

Table 5: Overall Reported Waste-Related Community Health Effects (n = 384)

Reported Community Health Effect	Frequency	Percentage (%)
Reported one or more waste-related health effects	224	58.3
Reported no major waste-related health effects	160	41.7
Total	384	100.0

Source: Field Survey, 2026

The result showed that 224 respondents (58.3%) experienced at least one waste-related health or environmental health concern, while 160 respondents (41.7%) did not report major waste-related health effects.

7 Association between Solid Waste Management Practices and Community Health Effects

A Chi-square test was conducted to determine whether there was an association between waste-management practices and reported community-health effects.

Table 6: Association between Solid Waste Management Practice and Reported Community Health Effects

Waste Management Practice	Reported Health Effects n (%)	No Major Health Effects n (%)	Total χ^2	df	p-value
Good practice	50 (36.2)	88 (63.8)	138		
Poor practice	174 (70.7)	72 (29.3)	246	43.29	1 <0.001

Source: Field Survey, 2026

The analysis showed a statistically significant association between solid waste-management practices and reported community-health effects ($\chi^2 = 43.29$, $p < 0.001$).

Respondents with poor waste-management practices were more likely to report waste-related health concerns compared with those who demonstrated good practices.

8 Predictors of Reported Waste-Related Community Health Effects

Binary logistic regression analysis was conducted to determine waste-management practices that predicted reported health effects.

Table 7: Logistic Regression Analysis of Waste-Management Practices Predicting Community Health Effects

Predictor Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Poor overall waste-management practice	3.21	1.98–5.19	<0.001
Irregular/no formal waste collection	1.96	1.23–3.11	0.005
Open burning of household waste	1.83	1.05–3.18	0.032
Disposal of waste into drainage channels	2.11	1.01–4.39	0.047
Use of uncovered waste container	1.57	1.00–2.46	0.049

Predictor Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
No household waste segregation	1.28	0.78–2.09	0.329

Source: Field Survey, 2026

The regression model showed that poor overall waste-management practices were the strongest predictor of reported health concerns. Respondents with poor waste-management practices were more than three times more likely to report waste-related health effects compared with respondents practising safer waste management.

Discussion of Findings

This study examined solid waste management practices and their effects on community health among residents of Enugu Metropolis, Enugu State. The findings demonstrated that unsafe waste-management practices remain common within the study area and are associated with several reported environmental health concerns. The results further showed that poor waste management was not only a sanitation issue but also a community-health concern because residents were exposed to conditions that may affect their physical wellbeing and quality of life.

1 Solid Waste Management Practices among Respondents

The study found that a considerable proportion of respondents practised poor solid waste management. Specifically, many residents did not separate waste before disposal, used uncovered containers for waste storage, experienced irregular collection services and relied on unsafe disposal methods such as open dumping, open burning and disposal into drainage channels.

The low level of waste segregation observed in this study suggests that household waste was commonly mixed before disposal. When different waste materials are combined, opportunities for recycling, reuse and composting become limited. This increases the quantity of waste requiring final disposal and may create additional environmental challenges.

The finding is consistent with global waste-management recommendations that emphasise waste reduction, reuse, recycling and recovery before final disposal. UNEP (2024) notes that sustainable waste management requires improved systems that reduce waste generation and promote resource recovery rather than relying mainly on disposal.

The study also revealed that irregular waste collection was a major challenge among respondents. This finding suggests that poor waste management cannot be attributed only to individual attitudes

or lack of awareness. In communities where waste collection services are unavailable, irregular or unaffordable, residents may adopt unsafe disposal practices as immediate alternatives.

This observation agrees with Adebayo et al. (2024), who reported that inadequate collection services, poor disposal facilities and limited environmental education were major barriers affecting waste-management practices among residents of Ibadan North Local Government Area. The similarity between both studies indicates that inadequate waste infrastructure remains a continuing challenge within Nigerian urban communities.

The practice of open burning and disposal of waste into drainage channels observed in this study also raises environmental health concerns. Open burning may release smoke and particulate matter into surrounding areas, while disposal of refuse into drainage channels may obstruct water flow and contribute to stagnant water accumulation. These conditions may increase environmental discomfort and create favourable conditions for disease vectors.

2 Reported Community Health Effects Associated with Poor Waste Management

The study revealed that more than half of the respondents reported one or more waste-related environmental health concerns. Mosquito infestation, offensive odour, flies, rodents, respiratory discomfort, gastrointestinal symptoms, skin irritation and injuries from sharp waste materials were among the concerns reported.

The high proportion of respondents reporting mosquito infestation may be linked to the accumulation of waste materials around residential environments. Blocked drainage channels caused by plastics, nylon materials and other refuse may prevent proper water flow and create stagnant water conditions. Although mosquito-related diseases are influenced by several factors, poor waste disposal may contribute to environmental conditions that support mosquito breeding.

Offensive odour and increased presence of flies and rodents reported by respondents indicate the effect of accumulated waste on environmental quality. Organic waste materials, particularly food remains, can attract pests and create unpleasant living conditions when waste collection is delayed.

The respiratory complaints reported by some respondents may be associated with exposure to smoke from waste burning, dust from waste accumulation or unpleasant environmental conditions. However, because the present study relied on self-reported health experiences rather than medical examination, air-quality measurement or laboratory assessment, the findings should be interpreted as reported associations rather than confirmed clinical outcomes.

This interpretation is consistent with the evidence presented by Ugbede et al. (2024), who examined e-waste exposure and human health in Enugu State. Their study reported respiratory complaints, skin irritation and neurological symptoms among individuals exposed to e-waste environments. However, their research focused specifically on hazardous electronic waste and

included exposure assessment and health measurements. Therefore, their findings support the broader concern that unsafe waste handling can create health risks but should not be directly generalised to all forms of household waste.

3 Association between Solid Waste Management Practices and Community Health Effects

The study found a statistically significant association between solid waste-management practices and reported community-health effects. Respondents with poor waste-management practices were more likely to report health and environmental concerns compared with those who demonstrated safer practices.

This finding indicates that waste storage methods, collection systems, disposal behaviours and environmental sanitation conditions may influence residents' exposure to waste-related hazards. Poorly managed waste can create multiple exposure pathways, including contact with contaminated materials, exposure to smoke, attraction of disease vectors and degradation of environmental quality.

The finding supports the position of the World Health Organization that solid waste management should be considered a public health issue because unsafe waste practices can affect communities through biological, chemical and physical hazards (WHO, 2025). The result also aligns with the Theory of Planned Behaviour, which suggests that waste-related behaviour is influenced by attitudes, social expectations and perceived ability to perform the behaviour. Residents may understand the importance of proper waste disposal but may be unable to practise it when appropriate facilities and collection services are unavailable.

Similarly, the Health Belief Model provides an explanation for why awareness alone may not result in improved waste practices. Individuals may recognise the health risks associated with poor disposal but continue unsafe practices when barriers such as cost, distance to disposal points or inadequate collection systems exist.

4 Predictors of Waste-Related Community Health Effects

The regression analysis showed that poor overall waste-management practices, irregular waste collection, open burning, disposal of waste into drainage channels and use of uncovered containers significantly predicted reported community-health effects.

Poor overall waste management was the strongest predictor, suggesting that health risks are likely influenced by combinations of unsafe practices rather than one isolated behaviour. A household that stores waste unsafely, lacks regular collection and relies on open dumping may experience greater environmental exposure than a household with safer waste practices.

The influence of irregular waste collection highlights the importance of institutional responsibility in environmental sanitation. Effective waste management requires collaboration between households, government agencies, private waste operators and community organisations.

Interventions that focus only on changing individual behaviour may have limited success if residents do not have access to reliable waste services. Therefore, environmental education should be accompanied by practical measures such as regular collection schedules, accessible disposal facilities, provision of waste containers and enforcement of sanitation regulations.

Conclusion

This study demonstrated that poor solid waste management practices are common among residents of Enugu Metropolis and are associated with reported community-health concerns. Unsafe practices, including inadequate waste storage, poor segregation, irregular collection, open dumping, open burning and disposal into drainage channels, contribute to unhealthy environmental conditions.

The findings highlight that solid waste management is not only an environmental sanitation responsibility but also an important component of community health protection. Improving waste-management systems requires a combination of behavioural change, effective public education, reliable collection services, appropriate infrastructure and stronger implementation of environmental regulations.

A healthier urban environment will require shared responsibility among residents, environmental agencies, community leaders and policymakers.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. Improvement of waste collection services:
Environmental authorities and waste-management providers should ensure regular and reliable waste collection services across residential communities.
2. Promotion of household waste segregation:
Public education programmes should encourage residents to separate biodegradable, recyclable and hazardous waste materials at the household level.
3. Provision of appropriate waste storage facilities:
Households should be encouraged to use covered waste containers to reduce exposure to flies, rodents, offensive odour and other environmental hazards.

4. Strengthening environmental sanitation enforcement:
Relevant agencies should improve monitoring and enforcement against open dumping, disposal into drainage channels and unsafe waste-burning practices.
5. Community-based environmental education:
Community leaders, schools, religious organisations and local associations should participate in sanitation campaigns to promote safer waste-management behaviours.
6. Support for recycling initiatives:
Government and private organisations should encourage recycling and waste-recovery programmes to reduce dependence on open dumping and uncontrolled disposal.

Conflict of Interest Statement

The authors declare that there is no conflict of interest associated with this study.

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Ethical Approval

Ethical approval was obtained from the appropriate institutional ethics committee before commencement of the study. Permission was obtained from relevant community authorities before data collection.

Participation was voluntary, and informed consent was obtained from all respondents. The confidentiality and privacy of participants were maintained throughout the research process.

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