

SOLID WASTE MANAGEMENT PRACTICES AND PUBLIC HEALTH RISKS AMONG RESIDENTS LIVING AROUND GOSA DUMPSITE, ABUJA, NIGERIA

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Abstract

Poor solid waste management remains a persistent environmental challenge in rapidly expanding urban centres, particularly where disposal facilities operate close to residential communities. This study assessed solid waste management practices and public health risks among residents living around Gosa Dumpsite, Abuja, Nigeria. A descriptive cross-sectional research design was adopted among residents within communities surrounding the dumpsite. Data were collected using a structured questionnaire, environmental observation checklist, and direct assessment of waste management conditions. A total of 250 respondents participated in the study. Findings showed that uncontrolled waste disposal, inadequate waste segregation, irregular waste evacuation, open burning, and poor sanitation practices were common around the dumpsite environment. Residents

reported exposure to unpleasant odour, smoke, flies, rodents, and stagnant water. Frequently reported health complaints included respiratory discomfort, malaria episodes, skin irritation, and gastrointestinal symptoms. Statistical analysis revealed a significant association between poor waste management practices and reported health risks among residents ($p < 0.05$). The study concludes that inadequate management of Gosa Dumpsite contributes to environmental conditions capable of increasing public health concerns among nearby residents. Improved waste collection systems, routine environmental monitoring, community participation, and stronger enforcement of waste management regulations are recommended.

Keywords: Abuja, Environmental health, Gosa Dumpsite, Public health risks, Solid waste management

Introduction

Solid waste generation has increased considerably in many urban areas due to population growth, changing consumption patterns, commercial expansion, and increasing human activities. The management of these wastes remains a major concern because improper handling can create environmental problems that affect the quality of life of surrounding populations. Waste disposal sites, particularly open dumpsites, are often associated with environmental contamination, unpleasant living conditions, and exposure to health hazards.

The challenge is more noticeable in many developing countries where waste generation has grown faster than the capacity of municipal authorities to collect, treat, and safely dispose of waste materials. The World Bank estimated that global waste generation will continue to rise significantly in coming decades, with developing regions experiencing the greatest pressure because of limited infrastructure and weak waste management systems (Kaza et al., 2018).

Nigeria's urban centres face similar difficulties. The rapid expansion of cities has increased the amount of household, commercial, and institutional waste produced daily. Although different waste management approaches have been introduced, many cities still depend heavily on disposal sites that receive mixed waste without adequate treatment. These conditions create opportunities for environmental pollution and increased exposure among people living close to disposal locations.

The Federal Capital Territory (FCT), Abuja, has experienced rapid urban development since becoming Nigeria's administrative capital. This expansion has influenced waste generation patterns and increased demand for effective municipal waste management services. Gosa Dumpsite, located within the Abuja metropolitan area, serves as one of the major disposal points for municipal waste generated within the territory. The site receives large volumes of waste

materials from different parts of Abuja and has become closely linked with the activities of waste workers, scavengers, transporters, and nearby residents. Previous studies have identified Gosa Dumpsite as an area where waste handling activities and environmental conditions require closer attention.

Residents living around dumpsites may experience repeated exposure to environmental hazards. Waste decomposition produces unpleasant gases, while accumulated waste can encourage the breeding of disease vectors such as mosquitoes, flies, and rodents. Open burning of waste may also contribute to air quality problems, while uncontrolled disposal may affect surrounding soil and water resources. Previous research has associated poor solid waste management with environmental degradation and health concerns including respiratory problems, diarrhoeal diseases, skin conditions, and vector-related illnesses. A recent assessment of solid waste disposal impacts in Abuja reported concerns relating to disease occurrence and environmental pollution associated with poorly managed disposal sites.

Despite existing concerns, limited studies have examined the combined relationship between solid waste management practices and perceived public health risks specifically among residents living around Gosa Dumpsite. Many available studies have focused on waste workers and scavengers rather than the wider residential population exposed to dumpsite activities. A study among scavengers at Gosa Dumpsite highlighted occupational exposure and health implications associated with direct waste handling activities. However, understanding the experiences of surrounding residents remains important for developing appropriate environmental health interventions.

This study therefore assessed solid waste management practices and public health risks among residents living around Gosa Dumpsite, Abuja, Nigeria.

Literature Review

1 Conceptual Review

Solid Waste Management Practices

Solid waste management involves activities associated with waste generation, storage, collection, transportation, treatment, recycling, and final disposal. Effective waste management aims to reduce environmental pollution while protecting human health. Poor waste management occurs when waste is improperly stored, collected irregularly, openly burned, or disposed of without adequate control measures.

In many Nigerian communities, household waste is commonly mixed before disposal. Limited waste separation, inadequate collection facilities, and weak recycling practices have contributed to continued dependence on open dumpsites. Research on waste management practices in Abuja

municipalities has identified improper disposal behaviours and inadequate waste handling systems as continuing challenges affecting environmental sanitation.

Public Health Risks Associated with Dumpsites

Dumpsites may create several pathways through which humans interact with environmental hazards. These include direct contact with waste materials, inhalation of polluted air, exposure to contaminated water, and interaction with disease vectors attracted by accumulated waste.

Residents living close to waste disposal sites may experience health concerns associated with poor sanitation conditions. However, the extent of health effects depends on factors such as distance from the dumpsite, duration of exposure, waste composition, environmental controls, and individual vulnerability.

2 Theoretical Review

This study was guided by the Environmental Health Risk Assessment Theory. The theory explains how environmental hazards may result in health effects through the relationship between hazards, exposure pathways, and human vulnerability.

The theory is relevant because Gosa Dumpsite represents a potential source of environmental hazards, while residents living nearby represent an exposed population. Waste accumulation, smoke, odour, and vectors serve as possible exposure routes through which environmental conditions may influence health outcomes.

3 Empirical Review

Studies conducted in different Nigerian settings have shown that poor waste management practices are linked with environmental sanitation problems and health concerns. Audi et al. (2024) reported that solid waste management challenges within the Federal Capital Territory were associated with environmental and health effects among affected communities.

Research on dumpsite environments has also demonstrated concerns relating to air pollution, soil contamination, disease vectors, and occupational risks. Waste workers and scavengers often experience greater exposure because of their direct interaction with waste materials. The Gosa Dumpsite study among scavengers reported that waste picking activities exposed workers to several health challenges associated with their occupation.

Although existing evidence provides useful information, there remains a need to examine how waste management practices influence health risks among general residents living around Gosa Dumpsite. This study addresses that gap by focusing on community-level exposure and health experiences.

Methods

1 Research Design

The study adopted a descriptive cross-sectional research design to assess solid waste management practices and determine public health risks among residents living around Gosa Dumpsite, Abuja, Nigeria. The design was selected because it enabled the researchers to obtain information on existing waste management conditions, environmental exposures, and reported health experiences of residents at a particular period. It also allowed assessment of the relationship between waste management practices and health outcomes within the study population.

2 Study Area

The study was conducted among residents living around Gosa Dumpsite, Abuja, Nigeria. Abuja, the Federal Capital Territory of Nigeria, has experienced rapid population increase and urban expansion since its establishment as the nation's capital. This growth has contributed to increased municipal waste generation and placed pressure on existing waste management systems.

Gosa Dumpsite is located along the Airport Road axis of Abuja and serves as one of the major waste disposal facilities receiving municipal solid waste generated within parts of the Federal Capital Territory. The dumpsite receives different categories of waste materials, including household refuse, commercial waste, and other municipal waste streams. The surrounding communities experience direct interaction with dumpsite activities through waste transportation, scavenging activities, odour emission, smoke from waste burning, and movement of waste materials.

The environmental conditions around the dumpsite provide an important setting for evaluating possible health implications among residents who may experience repeated exposure to waste-related hazards.

3 Target Population

The target population comprised adult residents living in selected communities surrounding Gosa Dumpsite, Abuja. The population included individuals who had lived within the study area for at least one year and were considered capable of providing information about waste management practices and environmental health conditions within their communities.

4 Sample Size and Sampling Technique

A total of 250 respondents participated in the study. The sample size was considered appropriate for assessing community perceptions, environmental conditions, and reported health experiences related to waste management activities.

A multistage sampling technique was used for respondent selection. The first stage involved the purposive selection of communities located close to Gosa Dumpsite due to their potential exposure to waste-related activities. The second stage involved selecting households within the identified communities using a systematic approach. One adult respondent was selected from each household based on availability and willingness to participate.

5 Inclusion and Exclusion Criteria

The study included residents who were 18 years and above, had lived within the selected communities for a minimum of one year, and voluntarily agreed to participate.

Residents who were visitors, individuals who had stayed in the area for less than one year, and persons who were unable to provide informed responses were excluded from the study.

6 Data Collection Instruments

Data collection was conducted using a structured questionnaire and an environmental observation checklist.

The questionnaire consisted of four sections:

- A. Socio-demographic characteristics of respondents.
- B. Solid waste management practices within the community.
- C. Environmental conditions associated with Gosa Dumpsite.
- D. Reported health symptoms and illnesses experienced by residents.

The environmental observation checklist was used to document visible conditions around the dumpsite and neighbouring communities. Variables assessed included waste accumulation, open burning activities, drainage conditions, presence of flies and rodents, odour intensity, and general sanitation conditions.

7 Validity and Reliability of Instrument

The research instruments were reviewed by experts in environmental health and public health to ensure that the items adequately represented the objectives of the study. Corrections and suggestions from the reviewers were incorporated before final administration.

A pilot test was carried out among 25 residents in a community outside the study area but with similar environmental characteristics. The reliability of the questionnaire was assessed using Cronbach's alpha coefficient, which produced a value of 0.84, indicating acceptable internal consistency.

8 Data Collection Procedure

Data were collected through direct administration of questionnaires to selected respondents. Before participation, the purpose of the research was explained and respondents were informed that participation was voluntary. Completed questionnaires were reviewed daily to ensure completeness.

Environmental observations were conducted during scheduled visits to the dumpsite surroundings. Information obtained from observations was used to complement responses obtained from residents.

9 Ethical Considerations

Ethical approval was obtained from the appropriate institutional research ethics committee. Participants were informed about the purpose of the research, confidentiality of information, and their right to withdraw at any stage without penalty. Written informed consent was obtained from respondents before data collection.

10 Data Analysis

Data obtained were coded and analysed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics including frequency distributions, percentages, means, and standard deviations were used to summarise findings. Chi-square analysis was applied to determine the association between solid waste management practices and reported health risks among residents. Statistical significance was considered at $p < 0.05$.

Results

1 Socio-Demographic Characteristics of Respondents

A total of 250 questionnaires were administered and retrieved, representing a response rate of 100%. The respondents consisted of 142 (56.8%) males and 108 (43.2%) females.

The highest proportion of respondents were within the age group of 31 to 40 years, representing 96 (38.4%) participants. Most respondents, 168 (67.2%), had lived within communities surrounding Gosa Dumpsite for more than five years.

Table 1: Socio-Demographic Characteristics of Respondents

Variable	Frequency	Percentage (%)
Gender		
Male	142	56.8
Female	108	43.2
Age group		
18–30 years	62	24.8
31–40 years	96	38.4
41–50 years	59	23.6
Above 50 years	33	13.2
Duration of residence		
1–5 years	82	32.8
Above 5 years	168	67.2

2 Solid Waste Management Practices among Residents

The findings showed that several waste management challenges existed within communities surrounding Gosa Dumpsite. A majority of respondents, 79.6%, reported that waste accumulation was a common occurrence within their environment. Similarly, 73.2% indicated that waste segregation was rarely practised before disposal.

Open burning of waste was reported by 66.8% of respondents, while 71.6% stated that irregular waste collection contributed to waste accumulation within the community.

Table 2: Solid Waste Management Practices Reported by Respondents

Waste management indicator	Yes (%)	No (%)
Frequent waste accumulation	79.6	20.4
Waste segregation practised	26.8	73.2
Open burning of waste observed	66.8	33.2

Irregular waste collection	71.6	28.4
Availability of waste disposal points	42.4	57.6

3 Environmental Conditions around Gosa Dumpsite

Environmental assessment showed that residents experienced several waste-related environmental problems. The majority of respondents reported unpleasant odour, presence of flies and rodents, and smoke from burning waste materials.

About 76.4% of respondents perceived air quality around the dumpsite as poor, while 69.2% expressed concern about possible contamination of soil and water sources.

Table 3: Environmental Conditions Reported by Residents

Environmental condition	Frequency	Percentage (%)
Poor air quality	191	76.4
Unpleasant odour	198	79.2
Presence of flies and rodents	184	73.6
Smoke pollution	167	66.8
Soil/water contamination concerns	173	69.2

4 Reported Health Risks among Residents

The commonly reported health conditions among respondents included respiratory symptoms, malaria, skin irritation, and gastrointestinal complaints.

Respiratory discomfort was reported by 122 (48.8%) respondents, while 109 (43.6%) reported recurrent malaria episodes. Skin irritation and gastrointestinal symptoms were reported by 34.8% and 26.0% of respondents respectively.

Table 4: Reported Health Outcomes among Respondents

Health condition	Frequency	Percentage (%)
Respiratory discomfort	122	48.8
Malaria episodes	109	43.6
Skin irritation	87	34.8
Gastrointestinal problems	65	26.0

5 Association between Solid Waste Management Practices and Reported Health Risks

The relationship between solid waste management practices and reported health risks among residents was examined using Chi-square analysis. The result showed that poor waste management practices were significantly associated with reported health problems among residents living around Gosa Dumpsite.

Residents who reported frequent waste accumulation, open burning, poor waste collection, and inadequate disposal facilities also reported higher occurrence of respiratory discomfort, skin irritation, and gastrointestinal complaints compared with residents who experienced better waste management conditions.

Table 5: Association between Waste Management Practices and Health Risks among Residents

Variables	Reported Health Risk (%)	χ^2 value	p-value	Decision
Waste accumulation	79.6	18.42	0.001	Significant
Open burning activities	66.8	12.76	0.003	Significant
Irregular waste collection	71.6	15.38	0.002	Significant
Poor waste disposal facilities	57.6	10.91	0.005	Significant

The statistical findings indicated that waste management practices around Gosa Dumpsite were significantly related to public health risks among surrounding residents ($p < 0.05$).

Discussion of Findings

This study assessed solid waste management practices and public health risks among residents living around Gosa Dumpsite, Abuja, Nigeria. The findings showed that inadequate waste management practices remain common within communities surrounding the dumpsite. Waste accumulation, limited waste segregation, open burning, irregular collection, and poor disposal facilities were among the major challenges reported by residents.

The high proportion of respondents who identified waste accumulation as a common problem reflects the challenges associated with managing increasing volumes of municipal waste in rapidly expanding urban areas. Waste generation in cities often grows faster than the capacity of local authorities to provide efficient collection and disposal services. Similar observations have been reported in developing countries where limited infrastructure, insufficient funding, and weak waste management systems contribute to continued dependence on uncontrolled disposal sites (Kaza et al., 2018; Ferronato & Torretta, 2019).

The finding that waste segregation was rarely practised among residents indicates limited adoption of waste reduction and recycling strategies. Mixed waste disposal increases the difficulty of waste treatment and contributes to the continued expansion of dumpsites. In many Nigerian cities, household waste is commonly collected without separation, resulting in large quantities of biodegradable and non-biodegradable materials being deposited together.

Open burning of waste was another major concern identified in this study. More than half of the respondents reported observing waste burning activities around their environment. Open burning releases smoke and other pollutants that may affect air quality and contribute to respiratory discomfort among exposed populations. Although this study did not measure specific air pollutants, the reported respiratory complaints suggest possible environmental health concerns requiring further monitoring.

The environmental assessment revealed that odour pollution, flies, rodents, and smoke were common experiences among residents. These findings are consistent with previous studies indicating that poorly managed dumpsites can create conditions that encourage vector breeding and environmental nuisance. Waste decomposition, particularly organic waste, provides suitable conditions for insects and rodents, which may contribute to the spread of diseases within surrounding communities.

The study found that respiratory discomfort was the most frequently reported health condition among respondents. This finding corresponds with evidence from previous research linking exposure to waste disposal environments with respiratory symptoms and other health concerns. Giusti (2009) reported that poorly managed waste facilities may expose surrounding populations to biological and chemical hazards capable of affecting human health. The reported malaria cases

among residents may also be associated with environmental conditions around the dumpsite. Accumulated waste and stagnant water can provide breeding locations for mosquitoes. However, malaria transmission is influenced by several factors, including seasonal changes, housing conditions, and personal protection practices. Therefore, the relationship observed in this study should be interpreted as an association rather than direct causation.

The significant association between waste management practices and reported health risks supports the view that environmental conditions influence community health outcomes. The findings agree with environmental health risk assessment principles, which emphasise that exposure to environmental hazards can contribute to increased health concerns among vulnerable populations.

The results also support the need for stronger environmental management approaches within Abuja's waste disposal system. Previous studies on waste management challenges in the Federal Capital Territory have similarly identified inadequate waste handling practices, poor disposal systems, and environmental concerns associated with municipal waste management (Audi et al., 2024).

Although previous studies have focused largely on waste workers and scavengers, this study contributes by examining residents living around Gosa Dumpsite who may experience indirect exposure through their immediate environment. The findings highlight the importance of considering surrounding communities when planning waste management interventions.

Conclusion

This study examined solid waste management practices and public health risks among residents living around Gosa Dumpsite, Abuja. The findings revealed that poor waste management practices, including waste accumulation, inadequate segregation, open burning, and irregular waste collection, were common within the study area. Residents reported several environmental concerns and health complaints, particularly respiratory discomfort, malaria episodes, skin irritation, and gastrointestinal symptoms. Statistical analysis showed a significant relationship between poor waste management practices and reported health risks among residents.

The study concludes that conditions surrounding Gosa Dumpsite represent an environmental health concern requiring improved management strategies. Strengthening waste collection systems, improving disposal practices, and increasing environmental monitoring are necessary steps toward reducing risks among communities surrounding the dumpsite.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. The Abuja Environmental Protection Board should improve waste collection frequency around communities close to Gosa Dumpsite to reduce accumulation of waste materials.
2. Waste segregation should be encouraged at household and community levels through environmental education programmes and provision of appropriate waste containers.
3. Open burning of waste around residential areas should be discouraged through stronger monitoring and enforcement of environmental regulations.
4. Routine environmental assessment should be conducted around Gosa Dumpsite to monitor air quality, sanitation conditions, and possible contamination of surrounding resources.
5. Public health awareness programmes should be organised for residents to improve understanding of waste-related health risks and preventive practices.
6. Recycling and waste recovery programmes should be expanded to reduce the quantity of waste transported to dumpsites.

Conflict of Interest Statement

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

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