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ASSESSMENT OF LANDFILL MANAGEMENT PRACTICES AND THEIR EFFECTS ON ENVIRONMENTAL QUALITY AND HEALTH OUTCOMES AMONG COMMUNITIES AROUND OLUSOSUN LANDFILL, LAGOS STATE, NIGERIA

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Abstract

Improper municipal solid waste management remains a persistent environmental and public health concern in rapidly expanding urban centres. This study assessed landfill management practices and their effects on environmental quality and health outcomes among communities surrounding Olusosun Landfill, Lagos State, Nigeria. A descriptive cross-sectional study design was adopted among 250 residents living within communities surrounding the landfill. Data were collected using a structured questionnaire and environmental observation checklist. Selected environmental indicators, including waste handling practices, drainage conditions, odour perception, air pollution experiences, and water quality concerns, were assessed. Health outcomes associated

with landfill exposure were also documented among respondents. Findings showed that open waste accumulation (72.4%), irregular waste covering (64.8%), uncontrolled waste burning (58.0%), and inadequate leachate management (61.6%) were commonly reported landfill management challenges. Respiratory discomfort (46.8%), persistent cough (31.6%), skin irritation (24.4%), and gastrointestinal complaints (22.8%) were among the frequently reported health conditions. Significant associations were observed between proximity to the landfill and reported respiratory symptoms among residents ($p < 0.05$). The study concludes that existing landfill practices around Olusosun continue to influence environmental conditions and community health. Strengthening waste treatment systems, improving environmental monitoring, and promoting community-based waste management interventions are necessary to reduce exposure risks.

Keywords: Environmental health; landfill management; municipal waste; Olusosun landfill; public health

Introduction

Municipal solid waste generation has increased substantially in many developing cities due to rapid population growth, urban expansion, changing consumption patterns, and increasing commercial activities. In many African cities, waste collection and disposal systems have not developed at the same pace as waste generation, resulting in continued dependence on open dumping and poorly controlled landfill operations. These practices create pathways through which pollutants may enter the air, soil, surface water, and groundwater, thereby affecting communities living around disposal facilities.

Landfills remain an important component of urban waste management because they provide a location for final waste disposal. However, their environmental performance depends largely on the methods used for waste handling, compaction, covering, leachate control, gas management, and routine monitoring. Poorly managed landfill sites may generate unpleasant odours, particulate emissions, contaminated runoff, and toxic substances capable of affecting human health. Previous studies have linked waste disposal sites with groundwater contamination, particularly where leachate collection systems are inadequate (Aboyeji & Eigbokhan, 2016). Research around Olusosun landfill has identified concerns regarding groundwater quality due to possible movement of contaminants from decomposing waste materials into nearby water sources.

Olusosun landfill, located in Ojota, Lagos State, represents one of the major municipal waste disposal facilities serving the Lagos metropolitan area. The landfill receives large volumes of mixed municipal waste and is surrounded by residential and commercial activities. The expansion of urban settlements around the landfill has increased interactions between waste disposal activities and human populations. Studies investigating groundwater around the landfill have

reported variations in physicochemical parameters and possible contamination concerns associated with landfill activities.

Although landfill sites contribute to managing urban waste, inadequate operational practices may expose nearby populations to environmental hazards. Waste burning, direct contact with decomposing materials, poor drainage, and uncontrolled waste accumulation may contribute to respiratory irritation, skin conditions, gastrointestinal problems, and other health complaints among residents. Individuals living closer to disposal sites may experience higher exposure because of increased contact with landfill-related emissions and contaminated environmental resources.

Existing studies on Olusosun have mainly focused on specific environmental components, particularly groundwater contamination and heavy metal assessment. For instance, Aboyeji et al. (2016) evaluated groundwater contamination around the landfill using water quality assessment approaches, while later studies examined groundwater characteristics and pollution indicators around the site. However, fewer studies have combined assessment of landfill management practices, perceived environmental changes, and associated health outcomes among surrounding communities. Understanding this relationship is important because environmental conditions around landfill sites are shaped not only by waste composition but also by operational practices and community exposure patterns.

This study was therefore conducted to assess landfill management practices and determine their effects on environmental quality and health outcomes among communities around Olusosun Landfill, Lagos State, Nigeria. The study specifically examined waste handling practices, environmental concerns associated with landfill activities, and health complaints reported by residents living within the landfill vicinity.

Methods

1. Study Design and Study Area

A descriptive cross-sectional study design was adopted to assess landfill management practices and their relationship with environmental quality and health outcomes among residents living around Olusosun Landfill, Lagos State, Nigeria. The study was conducted between March and June 2026 in communities located within the immediate vicinity of the landfill. Olusosun Landfill is situated in the Ojota area of Lagos State and serves as one of the major municipal waste disposal sites within the Lagos metropolitan region. The surrounding communities experience frequent interaction with landfill-related activities due to residential proximity, commercial activities, traffic movement, and waste transportation operations.

The study area experiences characteristics of a densely populated urban environment, where increasing demand for land has resulted in the development of residential settlements close to

waste disposal facilities. The continuous movement of waste trucks, occasional burning of waste materials, odour emission, and concerns about leachate migration have contributed to environmental concerns among residents.

2. Study Population and Sample Selection

The study population consisted of adult residents living in communities surrounding Olusosun Landfill. Participants who had lived in the area for at least one year were considered eligible because prolonged residence was considered necessary for assessing possible exposure experiences associated with landfill activities.

A total of 250 respondents were selected for the study. A multistage sampling procedure was used. In the first stage, communities located around the landfill were identified based on their proximity to the waste disposal site. In the second stage, residential areas within the selected communities were identified, and households were selected through systematic sampling. One eligible adult resident was recruited from each selected household.

Participants were informed about the purpose of the study, and voluntary participation was obtained before questionnaire administration. Individuals who declined participation and those who had stayed within the study area for less than one year were excluded.

3. Data Collection Instrument and Procedure

Data were collected using a structured questionnaire developed based on previous studies on landfill exposure, waste management practices, and environmental health assessment. The questionnaire consisted of four sections. Section A collected information on respondents' demographic characteristics, including age, sex, educational level, occupation, and duration of residence. Section B assessed residents' perception of landfill management practices, including waste accumulation, waste burning, odour problems, waste covering practices, and leachate control. Section C focused on environmental quality indicators such as air quality concerns, water quality perception, drainage conditions, and surrounding environmental changes. Section D assessed self-reported health outcomes associated with landfill exposure, including respiratory complaints, skin irritation, gastrointestinal symptoms, and other health concerns.

An observational checklist was also used to assess visible landfill management conditions. The checklist evaluated waste disposal patterns, evidence of open burning, drainage conditions, waste covering practices, and general environmental sanitation around the landfill.

4. Data Analysis

Collected data were coded and analysed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics, including frequencies, percentages, means, and standard

deviations, were used to summarise respondents' characteristics, landfill management practices, environmental concerns, and reported health outcomes.

Chi-square tests were performed to determine associations between landfill exposure-related factors and reported health conditions. Logistic regression analysis was conducted to identify factors associated with selected health outcomes among residents. Statistical significance was determined at a p-value of less than 0.05.

5. Ethical Consideration

Ethical approval for the study was obtained from the relevant institutional research ethics committee before commencement of data collection. Permission was also obtained from community representatives within the study locations. Participants were informed about the objectives of the study, confidentiality of responses, and their right to withdraw at any stage without penalty. Written informed consent was obtained from all participants before participation.

Results

1. Socio-demographic Characteristics of Respondents

A total of 250 questionnaires were administered to residents living around Olusosun Landfill, and all questionnaires were adequately completed and included in the analysis, giving a response rate of 100%. The demographic characteristics of respondents showed that 138 (55.2%) were females, while 112 (44.8%) were males. The majority of participants were within the age group of 31–40 years (34.0%), followed by those aged 21–30 years (28.8%). Respondents aged above 50 years represented the smallest proportion (12.0%).

Regarding duration of residence, 104 (41.6%) participants had lived within the study area for more than 10 years, while 86 (34.4%) had stayed between 5 and 10 years. Only 60 (24.0%) respondents had lived in the area for less than five years. The educational background of respondents varied, with 98 (39.2%) having secondary education, 84 (33.6%) possessing tertiary education, and 68 (27.2%) having primary education or no formal education.

Table 1: Socio-demographic Characteristics of Respondents

Variables	Frequency (n=250)	Percentage (%)
Sex		
Male	112	44.8
Female	138	55.2
Age group (years)		

18–30	72	28.8
31–40	85	34.0
41–50	63	25.2
Above 50	30	12.0
Duration of residence		
Less than 5 years	60	24.0
5–10 years	86	34.4
Above 10 years	104	41.6

2. Assessment of Landfill Management Practices

Assessment of landfill management practices revealed several operational challenges around Olusosun Landfill. A majority of respondents (72.4%) reported frequent observation of accumulated waste without adequate covering, while 64.8% indicated that waste covering practices were irregular. Uncontrolled burning of waste materials was reported by 58.0% of participants, particularly during periods when waste volume increased.

Poor drainage and concerns about possible movement of contaminated runoff were reported by 61.6% of respondents. Similarly, 56.4% of residents reported persistent odour from landfill activities, especially during periods of high temperature and rainfall. Only 23.2% of respondents considered the current landfill management practices satisfactory.

The observational assessment supported residents' responses, showing visible mixed waste accumulation, inadequate separation of waste materials, limited evidence of routine waste covering, and areas where drainage systems required improvement.

Table 2: Reported Landfill Management Practices Around Olusosun Landfill

Landfill management indicators	**Frequency**	**Percentage (%)**
Uncovered waste accumulation	181	72.4
Irregular waste covering	162	64.8
Poor leachate management	154	61.6
Open waste burning	145	58.0

Persistent odour emission	141	56.4
Effective waste management observed	58	23.2

3. Environmental Quality Concerns Reported by Residents

Residents reported several environmental changes associated with landfill activities. Air quality concerns were the most frequently reported environmental issue, with 168 (67.2%) respondents indicating that unpleasant odour and smoke affected their daily activities. A total of 146 (58.4%) respondents reported concerns about water quality, particularly changes in colour, taste, and confidence in groundwater safety.

Poor environmental sanitation around drainage channels was reported by 139 (55.6%) participants, while 128 (51.2%) respondents observed increased presence of flies, rodents, and other nuisance organisms around residential areas close to the landfill.

Respondents living closer to the landfill reported greater environmental concerns compared with those living farther away. Residents within approximately one kilometre of the landfill frequently described stronger odour intensity and more noticeable changes in environmental conditions.

4. Reported Health Outcomes Among Residents

The assessment of health outcomes showed that residents experienced several health complaints that they associated with landfill activities. Respiratory-related symptoms were the most frequently reported conditions, with 117 (46.8%) respondents indicating episodes of cough, difficulty breathing, or irritation associated with exposure to landfill odour and smoke.

Skin irritation was reported by 61 (24.4%) respondents, while gastrointestinal symptoms such as stomach discomfort and diarrhoea were reported by 57 (22.8%) participants. Eye irritation was reported by 54 (21.6%) respondents.

A significant association was observed between proximity to the landfill and respiratory symptoms among residents ($\chi^2 = 8.63$, $p = 0.013$). Respondents living closer to the landfill had higher reports of respiratory complaints compared with those living farther away.

Table 3: Reported Health Outcomes Among Respondents

Health outcomes	Frequency	Percentage (%)
Respiratory symptoms	117	46.8
Persistent cough	79	31.6
Skin irritation	61	24.4
Gastrointestinal complaints	57	22.8
Eye irritation	54	21.6

5. Relationship Between Landfill Exposure Factors and Health Outcomes

Logistic regression analysis showed that duration of residence, proximity to the landfill, and exposure to waste burning were significant predictors of reported respiratory symptoms. Residents living within one kilometre of the landfill had higher odds of reporting respiratory complaints compared with those living farther away (OR = 2.14; 95% CI: 1.21–3.78).

Exposure to smoke from waste burning was also associated with increased likelihood of respiratory symptoms (OR = 1.89; 95% CI: 1.08–3.31). Longer duration of residence above 10 years showed a moderate association with reported health complaints, suggesting that prolonged exposure may contribute to increased environmental health concerns among residents.

Discussion

The present study assessed landfill management practices and their influence on environmental quality and health outcomes among communities surrounding Olusosun Landfill, Lagos State, Nigeria. The findings demonstrated that residents experienced several challenges associated with landfill operations, including uncovered waste accumulation, inadequate waste covering, uncontrolled waste burning, poor leachate management, persistent odour, and concerns about environmental sanitation. These findings suggest that the condition of landfill operations plays an important role in shaping environmental conditions and potential exposure risks among nearby populations.

The observation of inadequate waste covering and poor leachate management reflects common challenges associated with municipal solid waste disposal systems in many developing urban centres. Landfills require proper engineering controls, including controlled waste placement, compaction, covering, drainage management, and leachate containment, to minimise environmental contamination. Where these measures are insufficient, decomposing waste materials can release pollutants into surrounding environmental media. Ferronato and Torretta

(2019) noted that ineffective waste management practices remain a major environmental challenge in developing countries because limited infrastructure and weak operational systems often increase the likelihood of pollution and human exposure.

The concerns identified regarding leachate management in this study are consistent with previous investigations conducted around Olusosun Landfill. Aboyeji and Eigbokhan (2016) evaluated groundwater contamination around Olusosun open dumpsite using water quality assessment and geospatial techniques. The authors reported that groundwater quality around the dumpsite showed evidence of contamination associated with landfill leachate migration, with variations observed among sampling locations. Their findings highlighted the importance of continuous groundwater monitoring around waste disposal facilities, particularly in densely populated areas where communities depend on groundwater resources.

Similarly, Ameloko and Ayolabi (2018) reported that landfill activities around Olusosun influenced subsurface conditions and demonstrated the need for geophysical investigation of contaminant movement. The migration of leachate from waste disposal sites depends on several factors, including rainfall intensity, waste composition, soil characteristics, and landfill design. Inadequate containment systems may allow pollutants to move through soil layers and potentially affect groundwater sources.

The present study also identified waste burning as an important concern among residents. Open burning of municipal waste remains common in many urban environments where waste recovery and treatment facilities are limited. Burning mixed waste can generate smoke, particulate matter, and other harmful substances capable of affecting air quality. Ferronato and Torretta (2019) reported that poor waste management practices, including uncontrolled disposal and burning, contribute significantly to environmental pollution and public health concerns in developing countries. Respiratory symptoms were the most frequently reported health outcome among respondents in this study. Similar observations have been reported in communities exposed to poorly managed waste disposal facilities. Giusti (2009) explained that populations living near waste disposal sites may experience health concerns associated with exposure to landfill gases, dust particles, bioaerosols, and contaminated environmental resources. However, the author also emphasised that establishing direct causal relationships remains difficult because landfill environments contain multiple interacting exposure pathways.

The significant relationship observed between landfill proximity and respiratory complaints suggests that residents living closer to Olusosun Landfill may experience greater exposure to landfill-related environmental disturbances. Similar patterns have been reported in studies assessing communities located near waste disposal sites, where residents closer to disposal facilities often report stronger odour problems, air quality concerns, and environmental discomfort compared with those living farther away (Ncube et al., 2017). Although this study relied on self-

reported health information, the findings provide useful evidence regarding community experiences around landfill environments.

Water quality concerns reported by respondents are also important considering the dependence of many urban households on groundwater sources. Previous studies have demonstrated that landfill activities can influence groundwater characteristics through the movement of leachate containing dissolved organic materials, heavy metals, and other contaminants. Aboyeji and Eigbokhan (2016) identified groundwater contamination concerns around Olusosun, while Ferreira et al. (2023) further investigated groundwater quality around the dumpsite and reported variations in physicochemical characteristics of groundwater samples collected from surrounding wells and boreholes. Their findings reinforced the need for continuous assessment of groundwater resources around major waste disposal facilities.

Recent investigations have also continued to highlight concerns regarding groundwater safety around Olusosun. Oyebode et al. (2023) assessed groundwater quality around the landfill and recommended strategic monitoring of water resources to support pollution reduction and environmental sustainability. Similarly, Yahaya et al. (2022) reported concerns regarding heavy metals and microbial contamination in borehole water around Olusosun, indicating the importance of routine assessment of groundwater sources used by surrounding communities.

This study contributes to existing knowledge by combining assessment of landfill management practices, environmental quality concerns, and reported health outcomes within the same research framework. Previous studies around Olusosun have largely focused on environmental contamination, particularly groundwater quality and leachate movement. While these studies provide important scientific evidence, understanding residents' experiences provides additional information about how landfill conditions influence daily life within surrounding communities.

The findings also emphasise the need for improved waste management strategies around Olusosun Landfill. Effective interventions should include improved waste segregation, reduction of uncontrolled burning, better leachate collection systems, regular environmental monitoring, and stronger collaboration between waste management authorities and host communities. Community participation is particularly important because residents living around landfill sites often experience environmental changes before they are detected through formal monitoring systems.

Despite the contributions of this study, some limitations should be acknowledged. The cross-sectional design limits the ability to establish direct cause-and-effect relationships between landfill exposure and health outcomes. The use of self-reported symptoms may also introduce recall bias because health information was based on respondents' experiences rather than clinical diagnosis. In addition, environmental assessments were based mainly on observed conditions and reported perceptions. Future research should incorporate laboratory-based analysis of air, soil, and water

samples alongside clinical health assessments to provide stronger evidence on landfill-related health effects.

Overall, the study demonstrates that landfill management practices around Olusosun remain an important environmental health concern. Improving landfill operations, strengthening pollution monitoring systems, and implementing community-focused environmental interventions are necessary steps toward reducing potential exposure risks among populations living around major municipal waste disposal facilities.

Conclusion

This study assessed landfill management practices and their effects on environmental quality and health outcomes among communities surrounding Olusosun Landfill, Lagos State, Nigeria. The findings showed that residents experienced several challenges associated with landfill operations, including inadequate waste covering, poor leachate management, uncontrolled waste burning, persistent odour, and environmental sanitation concerns. These management challenges were reflected in residents' perceptions of declining environmental conditions and increased exposure to landfill-related disturbances.

The study further revealed that respiratory symptoms, skin irritation, gastrointestinal complaints, and eye irritation were among the commonly reported health concerns among residents. Proximity to the landfill and exposure to waste burning were significantly associated with respiratory complaints, suggesting that landfill-related activities may contribute to increased environmental health concerns among nearby populations. Although the cross-sectional design limits the establishment of direct causal relationships, the findings provide evidence of the need for improved landfill management practices.

Strengthening waste management at Olusosun Landfill requires improved operational monitoring, effective leachate control, reduction of open waste burning, routine environmental assessment, and greater community involvement. Relevant environmental and public health authorities should develop sustainable strategies that reduce exposure risks among residents living around major waste disposal facilities. Future studies should incorporate long-term environmental monitoring, laboratory assessment of air, soil, and water quality, and clinical evaluation of health conditions to provide more detailed evidence on landfill-related health impacts.

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