

Perceived Health Impacts of Improper Solid Waste Disposal Among Residents Living Near Dumpsites in Yola North Local Government Area, Adamawa State, Nigeria

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Abstract

Improper solid waste disposal remains an important environmental and public health concern, particularly in communities located close to unmanaged dumpsites. This study assessed the perceived health impacts associated with solid waste disposal among residents living near selected dumpsites in Yola North Local Government Area, Adamawa State, Nigeria. A descriptive survey design was adopted, involving 200 residents living in proximity to four selected dumpsites: Doubeli, Jambutu, Bachure, and State Low-Cost. Data were collected using the Solid Waste Impact Questionnaire (SWIQ), comprising eight items assessing perceived health-related consequences of solid waste disposal. Responses were measured on a five-point Likert scale and analysed using descriptive statistics, including mean and standard deviation, alongside chi-square analysis at a 0.05 significance level. The findings indicated an overall moderate perceived health impact (grand mean = 3.18). Vector-borne diseases recorded the highest mean score ($M = 3.77$, $SD = 0.79$), followed by hospital visits ($M = 3.48$, $SD = 0.82$) and injuries from sharp objects ($M = 3.28$, $SD = 0.76$). Other reported concerns included waterborne diseases ($M = 3.05$, $SD = 0.68$), gastrointestinal problems ($M = 3.02$, $SD = 0.71$), children's skin infections ($M = 3.01$, $SD = 0.69$), respiratory problems ($M = 2.96$, $SD = 0.73$), and rodent infestation ($M = 2.96$, $SD = 0.67$). The study indicates that residents living near the selected dumpsites perceive improper solid waste disposal as an important source of recurring health risks. The findings underscore the need for improved waste collection and disposal systems, vector-control measures, safer management of hazardous waste, enforcement against open burning, and community health education.

Keywords: *solid waste disposal; perceived health impacts; dumpsites; public health; environmental health; Yola North; Nigeria*

1.0 Introduction

Improper solid waste disposal is a persistent environmental and public health challenge in many rapidly growing urban communities. Inadequate waste collection, uncontrolled dumping, open burning, and poor handling of hazardous materials can create multiple pathways through which communities are exposed to environmental and health risks. Unmanaged waste can provide breeding and feeding sites for disease vectors, contribute to air pollution through decomposition

and open burning, and facilitate the contamination of soil and water resources. These concerns are particularly important in communities where residential areas are located close to informal or poorly managed dumpsites. The health implications of poorly managed solid waste are associated with several exposure pathways. Accumulated waste may support the proliferation of mosquitoes, flies, rodents and other vectors, thereby increasing community exposure to vector-borne diseases. Leachate from waste deposits can also contaminate surrounding water and soil, creating potential risks of gastrointestinal and waterborne illnesses. In addition, direct contact with waste materials can expose residents, waste handlers and scavengers to sharp objects and other hazardous materials. Open burning of waste may further expose nearby populations to smoke and other air pollutants, potentially contributing to respiratory problems. These risks demonstrate that solid waste management is not solely an environmental issue but also an important component of community health protection. The challenge is particularly relevant in developing countries, where rapid urbanisation, population growth and increasing waste generation may occur alongside inadequate waste-management infrastructure. In many urban communities, the capacity of formal waste-management systems to provide regular collection, transportation, treatment and safe disposal does not adequately match the volume and composition of waste generated. Consequently, open dumping and uncontrolled disposal remain common practices in some communities. Residents living close to such disposal sites may therefore experience prolonged exposure to environmental conditions associated with poorly managed waste. Nigeria faces similar challenges. The growth of urban settlements and increasing consumption have contributed to rising municipal solid-waste generation, while weaknesses in collection, segregation, transportation and final disposal continue to present environmental-management challenges. Recent Nigerian evidence has highlighted the need to integrate waste reduction, recycling, resource recovery and improved disposal practices with public-health protection. However, the health implications of waste management are not necessarily uniform across locations because they are influenced by local waste practices, environmental conditions, population characteristics and proximity to disposal sites. In Adamawa State, particularly in the Yola urban area, the presence of open and informal waste-disposal locations raises concerns regarding environmental quality and the wellbeing of surrounding communities. Yola North Local Government Area contains residential communities located in proximity to areas where solid waste is deposited. Four sites—Doubeli, Jambutu, Bachure and State Low-Cost—were selected for the present study because residents living around these locations may experience direct or indirect exposure to poorly managed solid waste. The presence of children and other individuals who may come into direct contact with discarded materials further highlights the need for community-level assessment. Although previous studies have documented environmental and health concerns associated with poor solid waste management, evidence remains geographically uneven. In particular, there is limited empirical evidence focusing specifically on the perceived health impacts of solid waste disposal among residents living near selected dumpsites in Yola North Local Government Area. Local evidence is important because waste-management practices and exposure conditions vary between communities, and findings from other cities cannot automatically be assumed to represent the experiences of residents in Yola North. Therefore, this study assessed the perceived health impacts associated with solid waste disposal among residents living near selected dumpsites in Yola North Local Government Area, Adamawa State, Nigeria. Specifically, the study examined residents' perceptions of vector-borne diseases, hospital visits, injuries from sharp objects, waterborne diseases, gastrointestinal problems, children's skin infections, respiratory problems and rodent infestation as health concerns associated with solid waste disposal.

2.0 Literature Review

Solid Waste Management and Public Health

Solid waste management encompasses the generation, storage, collection, transportation, treatment, recovery and final disposal of discarded materials. Effective management of solid waste is essential for protecting environmental quality and reducing exposure to health hazards. Conversely, inadequate collection and uncontrolled disposal can create environmental conditions that increase risks to populations living and working around waste-disposal sites. The World Health Organization identifies improperly managed solid waste as a potential source of exposure through contaminated water, soil and air, while accumulated waste can create conditions favorable for vectors and standing water. Vulnerable populations, including children and people who work directly with waste, may face increased exposure to these hazards.

The relationship between waste management and health is influenced by the characteristics of the waste, the disposal method, environmental conditions and the degree of human exposure. Uncontrolled dumping may result in the accumulation of decomposing organic materials, plastics, metals, discarded household items and potentially hazardous materials. These materials can generate odours, attract insects and rodents, obstruct drainage channels and contribute to environmental contamination. Where waste is openly burned, nearby residents may additionally be exposed to smoke and particulate pollutants. The WHO's recent assessment of solid waste and human health emphasizes that the health consequences of waste mismanagement are linked to multiple exposure pathways and that evidence remains uneven across populations and geographical settings.

Solid Waste Disposal and Vector-Related Health Risks

One of the important pathways linking unmanaged waste with community health is vector proliferation. Accumulated refuse can provide food, shelter and breeding environments for mosquitoes, flies and rodents. Where waste materials retain water or obstruct drainage, standing water may provide additional breeding opportunities for mosquitoes. WHO guidance identifies poor waste collection and resulting standing water as environmental conditions that can favour vector-borne diseases. For communities located close to unmanaged dumpsites, prolonged exposure to such conditions may therefore contribute to perceptions of increased risks of vector-related illnesses. However, the presence of vectors or waste around a community does not by itself establish that a particular disease was caused by the dumpsite. Health outcomes can also be influenced by sanitation, water supply, housing conditions, socioeconomic circumstances and individual behaviour. Consequently, community-level studies should distinguish between perceived or reported health risks and clinically established disease outcomes.

Solid Waste, Water Contamination and Gastrointestinal Health

Improper disposal can also affect water and soil quality. Waste deposited without appropriate containment may generate leachate that can migrate into surrounding soil and potentially contaminate surface or groundwater. Such contamination represents a potential exposure pathway where residents depend on affected water sources for domestic purposes.

The potential relationship between waste disposal and gastrointestinal or waterborne health problems is therefore relevant in communities surrounding unmanaged dumpsites. Nevertheless, establishing a direct association requires appropriate environmental and epidemiological measurements. A questionnaire-based study can provide valuable evidence regarding residents'

perceptions and experiences of health risks, but it should not be interpreted as demonstrating a direct causal relationship without supporting clinical or environmental data.

Respiratory and Physical Health Risks

Open burning is another important concern associated with poor waste management. Burning mixed waste may release smoke and particulate pollutants into the surrounding environment. Residents living close to disposal sites may consequently experience exposure to smoke, unpleasant odours and other air pollutants. WHO guidance identifies waste-management practices, including open burning and other inadequate treatment methods, as potential sources of harmful environmental exposure. Physical injuries constitute another potential health concern, particularly where waste contains broken glass, metal objects, needles, syringes or other sharp materials. This risk may be especially important for waste handlers and individuals who manually sort or scavenge waste. WHO notes that unsafe management of health-care waste can result in sharps injuries and exposure to infectious or toxic materials.

These pathways provide a basis for examining respiratory problems, injuries from sharp objects and other health concerns among populations living near waste-disposal sites. However, the nature and severity of exposure depend on the composition of the waste, disposal practices, proximity to the site and the behaviour of residents and waste handlers.

Evidence from Nigeria

Nigeria continues to face substantial challenges in the management of municipal solid waste. Recent research has identified inadequate infrastructure, weak institutional arrangements, limited enforcement and behavioural factors as important contributors to poor waste-management outcomes. A 2025 Nigerian study examining municipal solid-waste recycling and resource recovery in Enugu reported that infrastructure deficits and weaknesses in waste-management systems can worsen environmental and public-health conditions.

Similarly, a 2023 study examining illegal solid-waste dumping in Lagos identified inadequate disposal infrastructure, insufficient waste-management education, urbanisation and poor disposal practices among factors contributing to illegal dumping and associated public-health concerns. These findings demonstrate that waste-management challenges in Nigeria are not restricted to a single locality and that public-health considerations should be integrated into waste-management planning. Recent Nigerian research has also examined broader relationships between solid waste, urbanisation, pollution and health outcomes. For example, Onicha et al. (2024) examined the relationship between solid waste, urbanisation, pollution and under-five mortality in Nigeria, highlighting the broader public-health significance of environmental conditions associated with urban development. Evidence from other Nigerian locations is useful for understanding the national context, but differences in environmental conditions, waste-management practices, infrastructure and settlement characteristics mean that findings cannot automatically be generalized to every community. Location-specific studies are therefore necessary to document the particular health concerns experienced or perceived by residents in individual communities.

Empirical Gap

Existing evidence establishes a broad relationship between inadequate solid waste management and potential environmental and health risks. However, three important gaps remain.

First, much of the available evidence focuses on large metropolitan areas or national-level waste-management challenges, while comparatively less attention has been given to smaller urban communities and specific dumpsite-adjacent populations.

Second, existing studies frequently examine waste-management practices, environmental contamination or general public-health outcomes, whereas fewer community-level studies focus specifically on the range of health concerns perceived by residents living close to selected dumpsites. Third, there is limited location-specific evidence concerning residents living near major waste-disposal sites in Yola North Local Government Area of Adamawa State. The four dumpsites considered in this study—Doubeli, Jambutu, Bachure and State Low-Cost—provide a specific local context in which residents may experience recurring exposure to unmanaged waste.

The present study addresses this gap by examining the perceived health impacts associated with solid waste disposal among residents living near selected dumpsites in Yola North. Rather than claiming clinical causation, the study provides community-level evidence concerning residents' perceptions of eight health-related concerns: vector-borne diseases, hospital visits, injuries from sharp objects, waterborne diseases, gastrointestinal problems, children's skin infections, respiratory problems and rodent infestation.

Contribution of the Present Study

The study contributes location-specific empirical evidence to the literature on solid waste and community health in Nigeria. Its focus on residents living near selected dumpsites in Yola North provides evidence that can complement broader national and international research. The findings may assist local environmental-health authorities and other stakeholders in identifying community-perceived health priorities and in designing interventions involving waste collection, vector control, hazardous-waste management, prevention of open burning and public-health education.

Conceptual Framework

The conceptual framework for this study is based on the assumption that inadequate solid waste disposal creates environmental conditions through which residents may be exposed to different health hazards. The framework does not assume direct causality between waste disposal and specific diseases; rather, it provides an analytical structure for examining residents' perceptions of health concerns associated with living near selected dumpsites.

Improper Solid Waste Disposal

The independent/contextual condition in the framework is improper solid waste disposal. This includes the accumulation and uncontrolled disposal of solid waste around residential and community environments. Poorly managed waste may create conditions that facilitate human exposure to environmental hazards.

Environmental Exposure Pathways

Improperly disposed waste can generate several potential exposure pathways. These include the proliferation of mosquitoes, flies and rodents; contamination of surrounding soil and water through decomposing waste and leachate; exposure to smoke and particulate matter from open burning; and direct physical contact with hazardous materials such as broken glass, metal objects and other sharp materials.

Perceived Health Concerns

The exposure pathways provide the basis for the health concerns examined in this study. Eight indicators were assessed through the Solid Waste Impact Questionnaire: vector-borne diseases, hospital visits, injuries from sharp objects, waterborne diseases, gastrointestinal problems, children's skin infections, respiratory problems and rodent infestation. These indicators represent residents' perceptions of health-related consequences associated with solid waste disposal in their communities.

Community Public-Health Implications

The combined presence of these perceived health concerns indicates potential public-health implications for communities located close to unmanaged dumpsites. The framework therefore provides a basis for interpreting the level of perceived health impact reported by residents and for identifying areas requiring environmental-health intervention.



Figure 1: Framework for Health Implication of Improper Solid Waste Disposal

3.0 Methodology

Study Area

The area of the study will be Yola North Local Government Area of Adamawa State. Yola North is one of the 21 Local Government Areas of Adamawa State. Yola North approximately lies between latitude 09° 13'N and 9° 20'N and longitude 12° 20'E and 12° 30'E (Sahabo & Mohammed, 2016). Yola North LGA has 11 Wards namely: Alkalawa, Ajiya, Doubeli, Gwadabawa, Jambutu, Karewa, Limawa, Luggere, Nassarawo, Rumde, and Yelwa Wards (Sahabo & Mohammed, 2016; Olaitan, 2022). Yola North LGA is served by the port of Jimeta (5.5 miles [9 km] north-northwest) on the Benue River, about 500 miles (800 km) above its confluence with the Niger, and by an airfield. Yola also has road connections with Numan, Jalingo, Ganye, Fufore, and Jimeta (McKenna, 2019). Yola North has an area of 714.8km², a population density of 393.7/km², and an estimated population of 281,435 (European Commission's Joint Research Centre, 2019). Yola lies within the Sub-Saharan Savannah and the Guinea Savannah belts. The major occupation of the people is farming and few others engaged in business and formal employment with the public and private sectors. Cash crops grown in the in the LGA is groundnuts while food

crops include maize, yam, cassava, guinea corn, millet and rice. The village communities living on the banks of the rivers engage in fishing while the Fulanis rear cattle. A study like this therefore, is timely to address the problems faced by the vast majority of its inhabitants living in, and around the open dumpsite.

Research Design

The study adopted a descriptive cross-sectional survey design to assess residents' perceptions of the health impacts associated with solid waste disposal in Yola North Local Government Area (LGA), Adamawa State, Nigeria. The design was considered appropriate because the study sought to obtain information from residents living in communities surrounding selected solid waste disposal sites at a particular period. The study focused on perceived health impacts associated with solid waste disposal rather than clinically diagnosed diseases or the establishment of causal relationships between exposure to solid waste and specific health conditions. Consequently, the findings are interpreted in terms of residents' perceptions and reported experiences and should not be regarded as evidence of clinically confirmed disease prevalence or direct causal effects.

Study Area

The study was conducted in Yola North Local Government Area of Adamawa State, Nigeria. Yola North is one of the 21 Local Government Areas in the state and comprises 11 wards: Alkalawa, Ajiya, Doubeli, Gwadabawa, Jambutu, Karewa, Limawa, Luggere, Nassarawo, Rumde and Yelwa. The LGA forms part of the Yola urban environment and contains residential communities located around areas where municipal solid waste is disposed. Four dumpsites were selected as study locations based on their relevance to surrounding residential communities. These were Doubeli dumpsite along the River Benue Bridge, Jambutu dumpsite along the Geriyo axis, Bachure dumpsite near Bachure Central Mosque, and the State Low-Cost dumpsite opposite the Urban Planning Area. The selection of these locations provided the geographical basis for assessing residents' perceptions of health concerns associated with solid waste disposal in communities surrounding the selected waste-disposal sites.

Study Population

The study population comprised residents living in communities surrounding the four selected solid waste disposal sites in Yola North LGA. The population of interest consisted of residents who lived within the selected communities and were therefore considered appropriate for assessing perceived health impacts associated with nearby solid waste disposal activities.

Eligible respondents were residents of the selected communities who were available during the data-collection period and voluntarily agreed to participate. Individuals who were not residents of the selected communities or who declined participation were excluded from the survey.

Sample Size and Sampling Procedure

The study initially targeted 434 respondents across the four selected study locations. The target represented the number of respondents the researchers intended to reach during the field data-collection exercise. However, owing to practical field constraints, including respondent availability and willingness to participate, the researchers were unable to obtain responses from the entire targeted sample.

A total of 208 completed and usable questionnaires were successfully obtained and constituted the final sample used for statistical analysis. Thus, the achieved sample represented approximately 47.9% of the initial target:

Sample attainment rate

$$\frac{208}{434} \times 100 = 47.93\%$$

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The final sample of 208 respondents was distributed equally among the four selected study locations, with **52 respondents selected from each location**.

Study location	Number of respondents	Percentage (%)
Doubeli	52	25.0
Jambutu	52	25.0
Bachure	52	25.0
State Low-Cost	52	25.0
Total	208	100.0

The equal allocation ensured that each selected study location was adequately represented in the final dataset. The respondents were selected from eligible residents within the respective communities using the sampling procedure adopted during the fieldwork. Importantly, 434 represents the initial target and not the final sample or the population of the study. All subsequent statistical analyses, descriptive summaries and inferential tests were based exclusively on the 208 respondents who provided usable responses.

Research Instrument

Data were collected using a structured questionnaire referred to as the Solid Waste Impact Questionnaire (SWIQ). The instrument comprised eight items designed to assess residents' perceptions of health concerns associated with solid waste disposal.

The health-impact indicators assessed were:

1. vector-borne diseases;
2. hospital visits;
3. injuries from sharp objects;
4. waterborne diseases;
5. gastrointestinal problems;
6. children's skin infections;
7. respiratory problems; and
8. rodent infestation.

Responses to the items were measured using a five-point Likert-type scale ranging from Very Low (1) to Very High (5). Higher scores indicated higher perceived health impacts associated with solid waste disposal. The questionnaire was administered directly to residents within the selected study communities. The researchers explained the purpose of the study and provided clarification concerning the completion of the instrument where necessary, while taking care not to influence respondents' answers.

Validity of the Instrument

The validity of the Solid Waste Impact Questionnaire was considered in relation to its ability to capture residents' perceptions of health impacts associated with solid waste disposal. Where expert review was undertaken during the original development of the instrument, the final manuscript

should report the number and relevant expertise of the validators and describe how their observations informed the final questionnaire. No unsupported validation procedure should be introduced retrospectively. If formal expert validation was not documented during the original study, the manuscript should transparently report the actual procedures used in developing and reviewing the instrument.

Reliability of the Instrument

The reliability of the SWIQ should be reported based on empirical evidence obtained from the questionnaire data. Given that the instrument employed multiple Likert-type items, internal consistency may appropriately be assessed using Cronbach's alpha. Where a reliability test was conducted during the original study, the resulting coefficient and the procedure used should be reported. If reliability analysis was not previously undertaken but the raw questionnaire responses are available, an appropriate reliability analysis should be conducted before final journal submission. No reliability coefficient should be reported unless it is supported by the study data.

Data Collection Procedure

Data collection was conducted through direct administration of the SWIQ to residents in the four selected study communities. The field data-collection exercise lasted for two weeks. Before administration, the researchers explained the purpose and objectives of the study to prospective respondents. Participation was voluntary, and respondents were informed that they could decline participation. During administration, respondents were allowed to complete the questionnaire independently. Where clarification was required, the researchers explained the questionnaire items without directing respondents toward particular responses. At the conclusion of the field exercise, the completed questionnaires were retrieved and examined for completeness. A total of 208 adequately completed questionnaires were retained for analysis.

Ethical Considerations

Participation in the study was voluntary. Respondents were informed about the purpose of the research before completing the questionnaire, and consent was obtained in accordance with the procedure followed during the original fieldwork. Measures were taken to maintain respondents' privacy and confidentiality. The information obtained from respondents was treated as research data and used solely for the purposes of the study. Where formal institutional ethical approval was obtained, the approving institution and relevant approval or reference number should be stated in the final manuscript. Where formal ethical approval was not obtained, the manuscript should accurately report the ethical procedures that were actually followed rather than introducing an approval retrospectively.

Data Analysis

The data obtained from the 208 respondents were coded and analyzed using descriptive and inferential statistical techniques. All statistical analyses were based on the final achieved sample of 208 respondents. Descriptive statistics, particularly mean and standard deviation, were used to summarize respondents' ratings of the eight perceived health-impact indicators.

For interpretation of the five-point Likert-scale responses, a criterion mean of 3.50 was adopted. Mean scores of 3.50 and above were interpreted as indicating a relatively high perceived health impact, whereas scores below 3.50 were interpreted as indicating a comparatively lower perceived health impact. In addition to descriptive statistics, the chi-square test was employed at the 0.05

level of significance where applicable to determine whether the observed distribution of responses differed significantly from the distribution specified by the relevant null hypothesis.

For transparent reporting, the final results should specify the variables subjected to each chi-square analysis, observed and expected frequencies, degrees of freedom, chi-square statistic and corresponding p-value. This information is necessary to demonstrate the appropriateness and reproducibility of the inferential analysis. The statistical findings were interpreted in accordance with the cross-sectional and descriptive nature of the study. Thus, the results describe residents' perceived health impacts and reported experiences associated with solid waste disposal and do not establish direct causal relationships between waste disposal and clinically diagnosed diseases.

Sampling and Generalizability Considerations

Although the study initially targeted 434 respondents, the final achieved sample consisted of 208 respondents, with equal representation across the four selected study locations. The reduction in the achieved sample was attributable to practical field constraints encountered during data collection. The final sample therefore represents the respondents from whom usable data were successfully obtained rather than the entire initially targeted group. This distinction is important when interpreting the findings and assessing their generalizability. Because the study was restricted to four selected waste-disposal locations and relied on residents' self-reported perceptions, the findings should be generalized cautiously beyond the sampled communities. In addition, the cross-sectional design does not permit temporal or causal conclusions concerning the relationship between solid waste disposal and health outcomes.

Summary of the Sampling

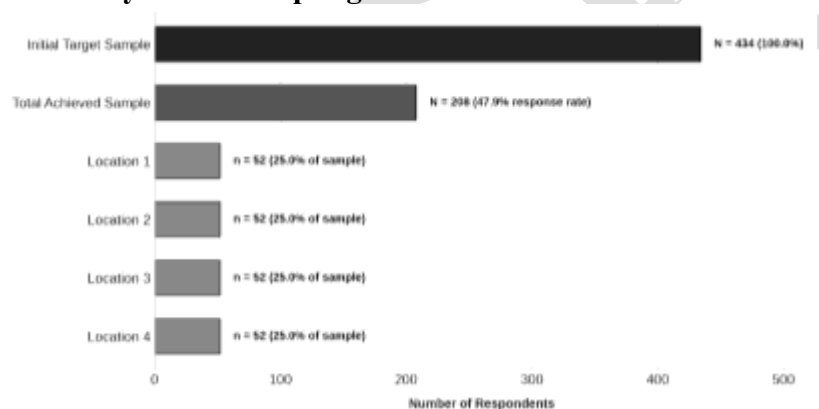


Figure 2: Summary of Sampling Chart

4.0 Results

Perceived Health Impacts of Solid Waste Disposal

The study assessed eight health-related concerns perceived by residents living near the four selected solid waste disposal sites in Yola North Local Government Area. The analysis was based on the 208 completed and usable questionnaires obtained from the four study locations.

4.1 Table 1

Perceived Health Impacts of Solid Waste Disposal Among Residents in Yola North (N = 208)

Health Impact	M	SD	Interpretation
Vector-borne diseases	3.77	0.79	High
Hospital visits	3.48	0.82	Moderate
Injuries from sharp objects	3.28	0.76	Moderate
Waterborne diseases	3.05	0.68	Moderate
Gastrointestinal problems	3.02	0.71	Moderate
Children's skin infections	3.01	0.69	Moderate
Respiratory problems	2.96	0.73	Moderate
Rodent infestation	2.96	0.67	Moderate
Grand Mean	3.18	—	Moderate

Note. M = Mean; SD = Standard Deviation. The criterion means adopted for interpretation was 3.50. Mean scores of 3.50 and above were interpreted as indicating a relatively high perceived health impact, while scores below 3.50 were interpreted as comparatively lower perceived health impact.

The results presented in Table 1 show variation in residents' perceptions of health concerns associated with solid waste disposal. Vector-borne diseases recorded the highest mean score (M = 3.77, SD = 0.79) and were therefore classified as a high perceived health impact based on the adopted criterion mean of 3.50.

Hospital visits recorded the second-highest mean score (M = 3.48, SD = 0.82), followed by injuries from sharp objects (M = 3.28, SD = 0.76). Both were below the criterion mean and were therefore classified as moderate perceived health impacts.

Waterborne diseases (M = 3.05, SD = 0.68) and gastrointestinal problems (M = 3.02, SD = 0.71) also recorded moderate mean scores. Similarly, children's skin infections recorded a mean of 3.01 (SD = 0.69), while respiratory problems and rodent infestation each recorded a mean of 2.96, with standard deviations of 0.73 and 0.67, respectively.

The overall grand mean of 3.18 indicates that the respondents' overall perception of the health impacts associated with solid waste disposal was moderate. Among the eight indicators assessed, vector-borne diseases were the only indicator whose mean exceeded the study's criterion mean of 3.50.

Chi-Square Analysis

The study also employed a chi-square test to examine the distribution of responses in accordance with the relevant null hypothesis. The original statistical analysis produced the result presented in Table 2.

4.2 Table 2

Chi-Square Test of the Distribution of Health-Impact Responses

Test Statistic	Value	df	p
χ^2	788.646	36	< .001

Note. Statistical significance was evaluated at $\alpha = .05$.

The reported chi-square statistic was statistically significant, $\chi^2(36) = 788.646$, $p < .001$. This indicates that the observed distribution of responses differed significantly from the expected distribution specified by the relevant null hypothesis.

However, the statistical significance of the chi-square test should be interpreted within the context of the study design. The test does not, by itself, establish that solid waste disposal directly caused any of the health conditions reported by respondents. Rather, it provides evidence concerning the statistical distribution of the responses under the specified chi-square hypothesis.

The descriptive results indicate that vector-borne diseases represented the most prominent perceived health concern, while the remaining seven indicators were rated below the criterion mean of 3.50.

Summary of Findings

Overall, the results demonstrate that residents living near the selected solid waste disposal sites reported moderate perceived health impacts, as reflected by the grand mean of 3.18. Vector-borne diseases represented the highest-rated concern and were the only indicator classified as high. Hospital visits, injuries from sharp objects, waterborne diseases, gastrointestinal problems, children's skin infections, respiratory problems and rodent infestation were all classified as moderate. The chi-square analysis was statistically significant at the 0.05 level. Nevertheless, the results are interpreted as evidence concerning residents' response patterns and perceptions rather than as evidence of clinically diagnosed diseases or direct causal relationships between solid waste disposal and health outcomes.

Discussion

The findings indicate that residents living near the selected solid waste disposal sites in Yola North perceived solid waste disposal as an important source of health-related concerns, although the overall perceived impact was moderate (grand mean = 3.18). The concerns covered vector-related, physical, water-related, gastrointestinal, dermatological and respiratory conditions, demonstrating the multidimensional nature of perceived health risks associated with poorly managed solid waste. Vector-borne diseases recorded the highest mean score ($M = 3.77$, $SD = 0.79$), making them the only indicator classified as high. This finding may be associated with the accumulation of waste and environmental conditions that provide food, shelter and potential breeding sites for mosquitoes, flies and rodents. However, because the study assessed residents' perceptions rather than clinical or entomological outcomes, the finding does not establish that the dumpsites directly caused specific vector-borne diseases. Hospital visits ($M = 3.48$, $SD = 0.82$) and injuries from sharp objects ($M = 3.28$, $SD = 0.76$) were also relatively prominent concerns. The finding regarding sharp-object injuries highlights the potential physical hazards of uncontrolled disposal of materials such as broken glass, metal and other sharp objects, particularly for waste handlers and scavengers. The reported level of hospital visits, however, represents respondents' perceptions and cannot be attributed exclusively to waste-related illness. Waterborne diseases ($M = 3.05$, $SD = 0.68$), gastrointestinal problems ($M = 3.02$, $SD = 0.71$), children's skin infections ($M = 3.01$, $SD = 0.69$), respiratory problems ($M = 2.96$, $SD = 0.73$), and rodent infestation ($M = 2.96$, $SD = 0.67$) were all perceived at moderate levels. These findings suggest concerns associated with potential environmental contamination, direct contact with waste, open burning and the presence of rodents around disposal sites. Nevertheless, the study did not include clinical diagnosis or environmental laboratory measurements; therefore, these findings should be interpreted as perceived health concerns rather than confirmed disease outcomes. Overall, the results demonstrate that poor solid

waste disposal represents a multidimensional environmental-health concern for communities surrounding the selected dumpsites. The findings underscore the need for improved waste collection and controlled disposal, integrated vector control, safer management of hazardous and sharp waste, prevention of open burning, and community environmental-health education.

The reported chi-square result, $\chi^2(36) = 788.646$, $p < .001$, indicates a statistically significant difference between the observed response distribution and the distribution specified under the relevant null hypothesis. However, this result should not be interpreted as evidence of a causal relationship between solid waste disposal and the reported health conditions. Given the descriptive cross-sectional design, the findings primarily provide evidence of residents' perceptions and reported experiences. The study contributes location-specific evidence from Yola North and provides a basis for environmental-health authorities and waste-management stakeholders to prioritize interventions around the selected disposal sites. Further research incorporating environmental measurements, clinical data and longitudinal designs would be useful for establishing the magnitude and causal pathways of waste-related health risks.

Limitations of the Study

This study has several limitations. First, its cross-sectional design captures residents' perceptions at a particular period and therefore does not establish temporal or causal relationships between solid waste disposal and health outcomes. Second, the study relied on self-reported perceptions rather than clinical diagnoses; consequently, the findings should not be interpreted as evidence of disease prevalence or clinically confirmed health effects. Third, the study was restricted to four selected dumpsites in Yola North Local Government Area, limiting generalizability beyond the sampled communities. Fourth, no environmental measurements, such as water-quality, air-quality, soil or vector assessments, were conducted to objectively establish exposure pathways. Finally, only 208 of the 434 initially targeted respondents provided usable responses, which may limit the representativeness of the findings. These limitations should be considered when interpreting and generalizing the results.

Conclusion

This study assessed perceived health impacts associated with solid waste disposal among residents living near four selected dumpsites in Yola North Local Government Area, Adamawa State, Nigeria. The findings indicate an overall moderate perceived health impact, with a grand mean of 3.18. Vector-borne diseases constituted the most prominent concern, while hospital visits, injuries from sharp objects, waterborne diseases, gastrointestinal problems, children's skin infections, respiratory problems and rodent infestation were perceived at moderate levels.

The findings suggest that poorly managed solid waste represents an important community environmental-health concern in the selected locations. The results particularly highlight the need to address vector proliferation, physical hazards from discarded materials, potential environmental contamination and exposure associated with waste accumulation and open burning.

However, the findings represent residents' perceptions and should not be interpreted as evidence that solid waste disposal directly caused the reported health conditions. Further research incorporating clinical assessments, environmental sampling, vector surveillance and longitudinal designs would provide stronger evidence concerning the magnitude and causal pathways of waste-related health risks. Overall, the study provides location-specific evidence that can support environmental-health planning in Yola North. Strengthening waste collection and controlled disposal, implementing vector-control measures, improving hazardous-waste management,

preventing open burning and expanding community environmental-health education are important measures for reducing potential health risks associated with poorly managed solid waste.

Recommendations

Based on the findings, the following recommendations are proposed:

1. Strengthen waste collection and controlled disposal around residential communities to reduce prolonged accumulation of solid waste.
2. Implement integrated vector-control programmes around dumpsites, particularly measures targeting mosquitoes, flies and rodents.
3. Improve segregation and safe handling of hazardous waste, especially sharp materials that may cause injuries to residents, waste workers and scavengers.
4. Discourage and regulate open burning of waste because of its potential contribution to air pollution and respiratory concerns.
5. Expand community environmental-health education on proper waste storage, segregation, disposal and avoidance of hazardous waste.

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