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ENVIRONMENTAL AND HEALTH IMPACT OF SOLID WASTE DUMPSITES IN MINNA, NIGER STATE, NIGERIA

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ABSTRACT
This study investigated the environmental and health implications of solid waste disposal in Minna metropolis, the objectives were to aassess the socio-economic characteristics of the residents of Minna metropolis. Examine the environmental and health impacts of improper waste disposal on the community, and Examine residents' perceptions of health risks associated with dumpsites in Minna. A descriptive survey design was employed, and data were collected from 384 households through structured questionnaires and random interviews. The results showed that malaria (42.2%), diarrhea (16.4%), and skin-irritation & dermatitis (15.4%) were the most prevalent diseases associated with solid waste dumpsites. The patterns of disease prevalence varied across communities, with FM-Maitumbi having the highest malaria prevalence (60%) and Albishiri having the highest diarrhea prevalence (31.3%). The result further shows that open burning of waste releases toxic gases, particulate matter, and greenhouse gases contributing to climate change and respiratory health issues. The study recommended the need for improved waste management infrastructure, public education, and community engagement to mitigate the risks associated with open dumpsites. The findings underscore the importance of integrated approaches to waste management and disease prevention, and have implications for policymakers, healthcare professionals, and communities.

Keywords: Dumpsites, Environmental Impact, Health Impact, Solid waste, Waste Management

Introduction

Minna, the capital of Niger State, is grappling with a growing waste management crisis. The city's rapid urbanization and population growth have led to increased municipal solid waste (MSW) generation, with inadequate waste disposal infrastructure exacerbating environmental and health concerns. Open dumpsites, often located near residential areas, are a major issue, attracting disease vectors and contaminating the environment. A study on Gidan Kwano, Minna, highlights the need for improved waste management practices, citing factors contributing to increased dumpsite impact on the environment (projectclue.com).

The rapid urbanization and population growth in developing countries have led to a significant increase in municipal solid waste (MSW) generation, posing a major environmental and health challenge (Mwanthi, 2019). The World Bank (2020) emphasizes that proper MSW management is crucial for protecting urban residents' health and wellbeing. This study focuses on the environmental and health implications of solid waste disposal in urban areas, with a specific emphasis on the risks associated with open dumpsites.

Solid waste refers to any discarded or unwanted material resulting from human activities (Federal Ministry of Environment, 2009). The composition of MSW varies, but commonly includes paper, vegetable matter, plastic, metal, textiles, rubber, and glass (USEPA, 2021). Effective waste management involves applying techniques such as recycling, composting, sewage treatment, incineration, and landfilling to minimize environmental impacts (Rushton, 2022). However, improper waste handling and disposal practices are prevalent in many developing countries, leading to environmental pollution, health hazards, and the spread of infectious diseases (Agbede & Ajagbe, 2020). Open dumpsites, often located near urban areas, are a major concern due to the proliferation of disease vectors and environmental contamination (Foday et al., 2013). Previous studies have established a link between waste dumps and adverse health effects, including gastrointestinal, dermatological, and respiratory diseases (Aatamila et al., 2010; Giusti, 2009; Nwanta & Ezenduka, 2010). Vulnerable populations, such as waste workers, rag pickers, and children, are disproportionately affected (Foday et al., 2013; Yongsi, 2008).

This study aims to investigate the environmental and health implications of solid waste disposal in urban areas, with a view to informing effective waste management strategies and mitigating the risks associated with open dumpsites.

This paper seeks to:

1. Assess the socio-economic characteristics of the residents of Minna metropolis.
2. Examine the environmental and health impacts of improper waste disposal on the community.
3. Examine residents' perceptions of health risks associated with dumpsites

Literature Review

Waste Management Challenges in Nigeria

Solid waste refers to any non-liquid, non-gaseous materials discarded as unwanted or useless by individuals or institutions. Solid waste management involves the collection, transportation, treatment, recycling, and disposal of such waste materials in ways that protect human health and the environment (UN-Habitat, 2010).

Solid waste types include:

- Domestic waste (household trash)
- Commercial waste (market, office refuse)
- Industrial waste
- Agricultural waste

- construction and demolition debris

Solid waste management involves a series of processes such as collection, storage, transportation, treatment, recycling, and recovery, followed by final disposal, all aimed at minimizing risks to human health, animals, and the environment (Fafioye and John-Dewole, 2013). This issue is especially problematic in developing African countries like Nigeria, where it threatens health, water, air, and land quality. In Nigeria, improper municipal waste management is widespread, with many urban areas lacking public disposal services. Residents often burn or bury their waste, leading to disorganized and unsafe disposal practices (Abila and Kantola, 2013).

The handling of SWM in Nigeria calls for immediate attention and the adoption of the best practicable environmental approach towards preserving the environment. In achieving a sustainable SWM strategy, all steps of the management process must be fully functional and effective. They include; solid waste generation and characterization, solid waste collection and transportation, and solid waste disposal/treatment (Federal Ministry of Environment, 2000). Researchers (Sha'Ato et al., 2007; Olanrewaju & Ilemobade, 2009; Uwadiegwu, 2013; Onuigbo & Bello, 2014) have reported a similar pattern of management at the different steps of solid waste management. This section will briefly examine the management strategies employed by various Solid Waste Authorities in Nigeria. They are; TSWMS, WMS, TcS and finally to disposal sites. This method often employed has presented some benefits as well as problems to the waste management process.

Health Implications of Poor Waste Management

Poor waste management is linked to various health issues, including diarrhea, respiratory problems, and other diseases (Kumar & Agrawal, 2020; Ziraba et al., 2016). In Nigeria, the lack of effective sanitation systems and waste management infrastructure exacerbates these health risks (Selin, 2013; UN Environment, 2017).

Scholars such as Omole et al. (2016) and Ezeah and Roberts (2014) have shown that the environmental, social, and health consequences of poor waste governance are substantial. Leachate from unmanaged dumpsites contaminates groundwater supplies, while open burning releases dioxins, furans, and particulate matter that exacerbate respiratory illnesses, particularly among children and the elderly. The economic implications are equally serious, including loss of land value, reduced tourism appeal, and increased healthcare burdens (Orisakwe et al., 2017; Odiana and Ikudayisi, 2021). Conceptually, Nigeria's waste management system is now situated at the intersection of climate resilience, public health, and sustainable urban development. As the country's urban population surges, there is a growing recognition that SWM must shift from short-term reactive interventions to strategic, data-driven, and community-anchored systems (Kodiya et al., 2023). Embedding educational outreach, technological innovation such as GIS mapping and smart bins, and collaborative governance across federal, state, and local levels is key to unlocking the country's circular economy potential (Benjamin and Benjamin, 2023; Fakunle, 2024). Furthermore, effective waste governance in Nigeria requires the harmonization of traditional practices with modern policy tools, underpinned by public participation and multi-sectoral coordination. Only then can the country break from the cycle of ecological neglect and unlock the economic and social dividends of sustainable waste management.

Solid Waste Management Strategies in Nigeria

Solid waste management involves a range of processes, including generation, sorting, transportation, treatment, and disposal (Fafioye & John-Dewole, 2013). However, in Nigeria, these processes are often inefficient, leading to environmental crises (Abel & Afolabi, 2007). Studies have highlighted the need for improved waste management practices, including waste segregation, recycling, and proper disposal (Babayemi & Dauda, 2009; Okeniyi & Anwan, 2012).

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Empirical Review

Urbanization and technological growth have intensified waste problems in developing nations. Cities undergoing rapid change face serious challenges in managing waste (Momoh and Oladebeye, 2010). In Nigeria, cities struggle to keep up with growing waste volumes, leading to environmental crises (Abel and Afolabi, 2007).

In Abeokuta, Babayemi and Dauda (2009) found high waste levels and low management efficiency. Only 35.8% of respondents used formal waste services. Okeniyi and Anwan (2012) observed that food waste and plastic bags made up the largest portions of daily waste at Covenant University. Ogu (2000) discovered that most households in Benin-City lacked formal collection services due to limited government resources. Onwughara et al. (2010) studied waste practices in Umuahia, where a population of 1.2 million produced hundreds of metric tons of waste daily. Most waste came from markets and included hazardous components. The authors emphasized the importance of separating, treating, and recycling waste before disposal.

Gap in Literature

Despite the growing body of research on solid waste management in Nigeria, there is a need for more recent studies focusing on the environmental and health impacts of poor waste management practices. Specifically, there is a lack of data on the presence of harmful substances like metals and plastics in the environment, and the health effects of exposure to these pollutants. Most studies on waste management in Nigeria have focused on southern cities, with limited research on the specific challenges and context of northern cities like Minna, while there is a growing body of research on the environmental impacts of poor waste management, there is a need for more studies that specifically examine the health impacts of waste management practices on local communities e.g community-level health data linked to specific dumpsite locations in Minna.

Methodology

This study employed a descriptive survey design to investigate the environmental and health impacts of solid waste disposal on human settlements around Minna metropolis dumpsites. The study was conducted in Minna metropolis, Nigeria, which has a population of 552,407 in 2026 projected from 285,000 0f the 2006 population census. A stratified sampling technique was used to select respondents from high, medium, and low social class strata in both traditional and modern townships of Minna, this was achieved by dividing the metropolis into distinct strata based on relevant characteristics such as location, waste composition, population density and socioeconomic factors, the dumpsites were selected randomly within each stratum. A total of 384 adult male and female household heads were selected as respondents, representing a sample of the population. Data were collected from primary and secondary sources:

Secondary Data: Relevant documents, records, books, journals, newspapers, and unpublished materials were reviewed to gather background information on the environmental and health effects of solid waste disposal.

Primary Data: Structured questionnaires (both close and open-ended) were administered to 384 households to gather information on: Socioeconomic characteristics (educational level, marital status, occupation; Type of solid wastes generated and disposal methods and Environmental and health impacts of solid waste disposal Random interviews were conducted with households residing near the dumpsites to gather additional information. Data were analyzed using descriptive statistics, and results were presented in tables, line graphs, and bar graphs. Photographs were also used to support the findings.

Results and Discussion

Table 1: Age distribution of respondents

Age	Frequency	Percentage (%)
19 – 25 years	5	1.3
26 – 45 years	242	63.0
46 years and above	137	35.7
Total	**384**	**100.0**

Source: Authors Field Work, 2026

The age distribution of respondents in this study is presented in Table 1. The majority of respondents (63.0%) fall within the 26-45 years' age range, followed by those aged 46 years and above (35.7%), and a small percentage (1.3%) are between 19-25 years old.

The age distribution of respondents has significant implications for understanding the health impact of solid waste dumpsites. The majority of respondents are within the working-age group (26-45 years), which is likely to be more exposed to environmental health risks associated with solid waste dumpsites. This age group may be more vulnerable to health problems such as respiratory diseases, skin infections, and other occupational health hazards.

The relatively small percentage of respondents in the 19-25 years' age range may indicate that younger individuals are less likely to be involved in waste management activities or are less aware of the health risks associated with solid waste dumpsites.

Table 2: Occupation of Respondents

Occupation	Frequency	Percent
Farming	130	33.8
Trading	70	18.2
Civil servant	120	31.3
Artisan	64	16.7
Total	**384**	**100.0**

Source: Authors Field Work, 2026

The occupation of respondents in this study is presented in Table 2. The majority of respondents are engaged in farming (33.8%), followed by civil servants (31.3%), trading (18.2%), and artisans (16.7%). The occupation of respondents has significant implications for understanding the health impact of solid waste dumpsites. Respondents engaged in farming and trading may be more likely to be exposed to health risks associated with solid waste dumpsites, as they may be involved in handling and disposing of waste as part of their daily activities. Civil servants, who are likely to be office-based, may be less exposed to direct health risks associated with solid waste dumpsites.

However, they may still be affected by environmental pollution and health risks associated with poor waste management practices. Artisans, who may be involved in activities such as metalwork, woodwork, or other crafts, may be exposed to hazardous materials and health risks associated with solid waste dumpsites.

Table 3: Educational levels of respondents

Educational Background	Frequency	Percentage %
Primary	80	20.8
Secondary	208	54.2
Tertiary	96	25
Total	384	100

Source: Authors Field Work, 2026

The educational levels of respondents in this study are presented in Table 3. The majority of respondents (54.2%) have a secondary education, followed by those with tertiary education (25%), and primary education (20.8%). The educational levels of respondents have significant implications for understanding the health impact of solid waste dumpsites. Respondents with lower levels of education (primary and secondary) may be more vulnerable to health risks associated with solid waste dumpsites due to limited awareness and understanding of proper waste management practices and health risks. The relatively high percentage of respondents with secondary education suggests that they may have some awareness of health risks associated with solid waste dumpsites, but may still require education and training on proper waste management practices.

Table 4: Types of Ailment Prevalent Among Respondents
IN KOROKPA

OPTION	**RESPONDENTS**	**PERCENTAGE**
CONVULSION	0	0.0
VOMITING	0	0.0
DIARRHEA	14	18.4
SKIN-IRRITATION AND DERMATITIS	20	26.3
MALARIA	25	32.9
CHOLERA	17	22.4
OTHERS	0	0.00
TOTAL	**76**	**100**

IN FM-MAITUMBI

OPTION	RESPONDENTS	PERCENTAGE
CONVULSION	0	0.0
VOMITING	0	0.0
DIARRHEA	6	8.6
SKIN-IRRITATION AND DERMATITIS	12	17.1
MALARIA	42	60.0
CHOLERA	10	14.3
OTHERS	0	0.00
TOTAL	**70**	**100**

IN KAMPALA

OPTION	RESPONDENTS	PERCENTAGE
CONVULSION	0	0.0
VOMITING	10	16.7
DIARRHEA	10	16.7
SKIN-IRRITATION AND DERMATITIS	5	8.3
MALARIA	30	50.0
CHOLERA	5	8.3
OTHERS	0	0.0
TOTAL	**60**	**100**

IN ALBISHIRI

OPTION	RESPONDENTS	PERCENTAGE
CONVULSION	20	25.0
VOMITING	0	0.0
DIARRHEA	25	31.25
SKIN-IRRITATION AND DERMATITIS	10	12.5
MALARIA	25	31.25
CHOLERA	0	0.00
OTHERS	0	0.00
TOTAL	**80**	**100**

IN GURARA

OPTION	RESPONDENTS	PERCENTAGE
CONVULSION	7	7.1
VOMITING	5	5.1
DIARRHEA	8	8.2
SKIN-IRRITATION AND DERMATITIS	12	12.2
MALARIA	40	40.9
CHOLERA	20	20.4
OTHERS	6	6.1
TOTAL	**98**	**100**

Source: Authors Field Work, 2026

The types of ailments prevalent among respondents in different locations are presented in Table 4 The results show that malaria is the most common ailment in Korokpa (32.9%), FM-Maitumbi (60%), Kampala (50%), and Gurara (40.9%). Diarrhea is the second most common ailment in Korokpa (18.4%) and Albishiri (31.25%). Skin-irradiation and dermatitis are also prevalent in Korokpa (26.3%) and FM-Maitumbi (17.1%).

The prevalence of malaria, diarrhea, and skin-irritation and dermatitis among respondents suggests that solid waste dumpsites may be contributing to the spread of these diseases. Malaria is often associated with stagnant water, which can be created by improper waste disposal. Diarrhea and skin-irritation and dermatitis can be caused by exposure to contaminated water and soil.

The results also suggest that the health impact of solid waste dumpsites may vary depending on the location. For example, malaria is more prevalent in FM-Maitumbi (60%) and Gurara (40.9%), while diarrhea is more prevalent in Albishiri (31.25%).

Table 5: Combined Summary of Ailments Prevalent in the Five Communities

Ailment	Korokpa (n=76)	FM-Maitumbi (n=70)	Kampala (n=60)	Albishiri (n=80)	Gurara (n=98)	Total (n=384)
Convulsion	0 (0.0%)	0 (0.0%)	0 (0.0%)	20 (25.0%)	7 (7.1%)	27 (7.0%)
Vomiting	0 (0.0%)	0 (0.0%)	10 (16.7%)	0 (0.0%)	5 (5.1%)	15 (3.9%)
Diarrhea	14 (18.4%)	6 (8.6%)	10 (16.7%)	25 (31.3%)	8 (8.2%)	63 (16.4%)
Skin-Irritation & Dermatitis	20 (26.3%)	12 (17.1%)	5 (8.3%)	10 (12.5%)	12 (12.2%)	59 (15.4%)
Malaria	25 (32.9%)	42 (60.0%)	30 (50.0%)	25 (31.3%)	40 (40.9%)	162 (42.2%)
Cholera	17 (22.4%)	10 (14.3%)	5 (8.3%)	0 (0.0%)	20 (20.4%)	52 (13.5%)
Others	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (6.1%)	6 (1.6%)

Discussion of Findings

The study reveals a significant burden of diseases associated with solid waste dumpsites in Minna metropolis. Malaria is the most prevalent disease (42.2%), followed by diarrhea (16.4%), and skin-irritation & dermatitis (15.4%). The patterns of disease prevalence vary across

communities, with FM-Maitumbi having the highest malaria prevalence (60%) and Albishiri having the highest diarrhea prevalence (31.3%).

FM-Maitumbi has the Highest malaria prevalence (60%), possibly due to proximity to breeding sites and poor waste management. While, Albishiri with Highest diarrhea prevalence (31.3%), potentially linked to contaminated water sources, Korokpa on the other hand with High skin-irritation & dermatitis prevalence (26.3%), possibly due to exposure to hazardous waste and Gurara with Relatively high prevalence of cholera (20.4%), indicating poor sanitation and hygiene.

Malaria thrive in Stagnant water in dumpsites thus creating breeding sites for mosquitoes, while Diarrhea as a result of Contaminated water and soil from dumpsites can spread pathogens. However, Skin-Irritation & Dermatitis owing to Exposure to hazardous waste and chemicals can cause skin reactions and Cholera can be transmitted through Poor sanitation and hygiene in dumpsites leading to Vibrio cholerae transmission.

Poor Waste Management owing to Inadequate disposal and lack of proper waste handling contribute to disease transmission. While, Environmental Factors such as Climate, topography, and water sources influence disease prevalence. Lastly, Socioeconomic Factors such as Education, occupation, and access to healthcare affect disease awareness and prevention.

Conclusion

This study highlights the significant environmental and health impacts of solid waste dumpsites in Minna metropolis, Nigeria. The prevalence of malaria, diarrhea, and skin-irritation & dermatitis among respondents suggests that poor waste management practices are contributing to the spread of these diseases. The findings underscore the need for improved waste management infrastructure, public education, and community engagement to mitigate the risks associated with open dumpsites.

The study contributes to the dual sector literature on waste and health, emphasizing the interconnectedness of environmental and health outcomes. The findings have implications for policymakers, healthcare professionals, and communities, highlighting the importance of integrated approaches to waste management and disease prevention.

However, the study has limitations. Firstly, the sample consisted only of males, which may not be representative of the broader population. Future studies should include female respondents to capture gender-specific perspectives and experiences. Secondly, the study relied on self-reported data, which may be subject to bias. Objective measures of disease prevalence and environmental contamination would provide more robust evidence.

Despite these limitations, the study provides valuable insights into the waste-health nexus in Minna metropolis, underscoring the need for urgent action to address the environmental and health impacts of solid waste dumpsites.

Recommendations

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

1. Implement proper waste disposal systems, including waste segregation and recycling and Provide alternative water sources to reduce reliance on contaminated water at Korokpa.
2. Prioritize malaria control measures, such as distribution of insecticide-treated bed nets and indoor residual spraying. Improve waste management infrastructure, including construction of proper waste disposal facilities and Conduct public education campaigns on malaria prevention and proper waste management at FM-Maitumbi
3. Improve waste collection and disposal services, including increasing frequency and coverage and Implement community-led total sanitation (CLTS) programs to improve sanitation and hygiene practices at Kampala.

4. Address diarrhea prevalence through improved water, sanitation, and hygiene (WASH) programs through Implementation of proper waste disposal systems, including waste segregation and recycling and Conduct public education campaigns on proper waste management, sanitation, and hygiene practices at Albishiri, and;
5. Improve waste management infrastructure, including construction of proper waste disposal facilities and Conduct public education campaigns on proper waste management, malaria prevention, and sanitation at Gurara.

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