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Review Article

The Nexus between Waste Management and Disease Prevalence in Offa Local Government Area, Kwara State

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Abstract

This study investigates the spatial distribution of solid waste dumpsites and their associated health and environmental impacts in Offa Local Government Area (LGA), Kwara State, Nigeria. Utilizing geospatial mapping, a total of 27 major dumpsites were identified and analyzed for their proximity to residential areas and sensitive ecological zones. Nearest neighbor analysis revealed a random but clustered distribution pattern, with higher concentrations in densely populated areas such as Owode, Rail Station, and Obada. Health data collected from residents showed a high prevalence of malaria (32.7%), typhoid (27.9%), and diarrheal diseases (24.8%), indicating a strong association between proximity to dumpsites and disease incidence. Laboratory analysis of water samples revealed total coliform counts (1.5×10^3 cfu/mL) exceeding permissible limits and confirming microbial contamination linked to reported illnesses. Soil analysis showed elevated phosphorus (368.01 ppm) and lead (0.82 mg/kg), surpassing safety thresholds and posing significant environmental and health risks, especially for children. Microbial isolates such as *Bacillus spp.*, *Candida spp.*, and *Aspergillus candidus* further underscored the potential for pathogenic exposure. Public perception surveys aligned with empirical findings, as most residents reported increased health risks due to nearby dumpsites. The study emphasizes the need to implement sustainable waste management strategies, stricter environmental regulations, improved public health infrastructure, and community education to mitigate environmental degradation and health hazards in Offa LGA.

Introduction

A central issue in contemporary waste management revolves around the precise definition of "waste." Broadly, waste can be understood as materials or by-products generated from human activities that are no longer useful for their original purpose, despite often containing the same substances as their functional counterparts. In this context, waste may be seen as any material considered redundant or of no value to its owner. Scholars such as Zaman, et al. [1] emphasize that waste encompasses items individuals plan to dispose of even when they must pay for disposal services. Although it is a natural outcome of various human processes, waste often arises from inefficiencies in production systems, leading to the needless depletion of resources [2]. Importantly, the perception of waste is subjective; what one party deems useless may still hold value for another. Thus, classification as waste is often dependent on the decision of the possessor [3].

Human activities universally generate waste, and this remains a growing concern globally. The volume and diversity of waste materials have escalated in recent decades, a trend closely tied to expanding populations and urban development [4]. Unlike in earlier centuries when waste was viewed mainly as a nuisance, today's waste management challenges are more complex, with significant environmental and public health implications. These complications are largely driven by rapid urbanization, demographic shifts, and evolving consumption patterns in modern societies [5]. Historically, the industrial revolution marked a turning point in waste generation trends, intensifying both the quantity and complexity of refuse. Materials such as plastics, metals, and electronic waste burden today's urban landscapes, requiring specialized handling [6].

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In the Nigerian context, improper waste disposal remains visibly evident in major cities, where refuse is often strewn across roads, open lands, drainage systems, and even water bodies. This unsanitary state frequently contributes to the spread of infectious diseases. The persistence of this issue is attributed to several interlinked factors, including unplanned urban expansion, demographic growth, shifts in consumer behavior, and inadequate funding for sanitation services [7]. Additional challenges hindering effective waste management in Nigeria include outdated technologies, poor segregation systems, weak regulatory enforcement, limited public sensitization, and income disparities [8].

Legally, the responsibility for waste management in Nigeria falls under the responsibility of local government councils, as mandated by the 1999 Constitution. Furthermore, national regulatory mechanisms such as the Federal Environmental Protection Agency (FEPA), established through Decree 58 of 1988 and revised by Decree 59 of 1992, form the basis of environmental governance and enforcement in the country [9].

In Offa, a town that represents many urban areas in Nigeria, managing solid waste remains a severe challenge, posing risks to both human health and environmental quality. Such challenges are common across developing nations. Solid waste, commonly termed "garbage" or "refuse," comprises a wide range of materials discarded in daily life. These vary by geography, socioeconomic conditions, and lifestyle. The waste stream includes both durable and non-durable goods, food remains, yard clippings, packaging, and other miscellaneous refuse. Classification of these materials typically falls into categories such as biodegradable (e.g., food scraps), recyclable (e.g., plastic, glass), electrical (e.g., electronics), hazardous (e.g., light bulbs, chemicals), and toxic (e.g., pesticides, herbicides) wastes [10].

Statement of the research problem

Improper solid waste disposal continues to pose a significant public health threat, particularly in developing countries where infrastructure and regulatory frameworks are weak. While associations between waste exposure and specific health outcomes such as gastrointestinal infections and vector-borne diseases are increasingly documented, causal pathways remain inadequately explored due to the complex interplay of environmental, biological, and social factors [11,12]. One persistent challenge in environmental epidemiology is accurately characterizing the type, dose, and duration of exposure to waste, along with isolating these effects from other coexisting environmental hazards [13]. In Nigeria, the consequences of weak waste management systems are particularly evident. Offa, a fast-urbanizing town in Kwara State, illustrates this problem vividly. Despite the existence of government agencies like the Kwara State Environmental Protection Agency (KWEPA) and local initiatives such as Offa Clean, indiscriminate dumping of waste in residential areas, uncompleted buildings, open plots, and drainage systems remains rampant [14]. These sites not only degrade the urban environment but also create breeding grounds for disease vectors such as mosquitoes and rodents. As a result, there is an alarming prevalence of health conditions like malaria, cholera, typhoid, and dermatological infections among residents living in proximity to these dumpsites [15]. Existing literature has addressed the composition and volume of solid waste in urban centers, municipal inefficiencies, and public perceptions of waste-related health risks [16,17]. However, few studies have empirically examined the direct health implications of proximity to dumpsites in small urban settlements, especially through environmental sampling and clinical correlation. This gap is critical, given that informal waste disposal sites are often located near residential wells and agricultural plots, potentially exposing the population to contaminated water and soil [12]. This study seeks to fill that knowledge gap by assessing the health risks associated with solid waste dumpsites in Offa, Nigeria. It will investigate the presence of pathogenic microorganisms in nearby soil and well water and analyze the correlation between exposure to waste and reported health conditions among affected residents. This evidence-based approach aims to inform more targeted public health interventions and urban sanitation policies.

The study therefore addressed the following research questions:

I. Where are the dumpsites of the solid wastes in the Offa Local Government Area?

II. What diseases and public health concerns are linked to solid waste dumpsites?

III. What is the public health perception of the solid waste dumpsites in the study area?

Aim and objectives

This study aimed at assessing the relationship of solid waste dumpsites to common health diseases in Offa Local Government Area, Kwara State, Nigeria. However, the specific objectives of the study are to:

I. Analyze the location of solid waste dumpsites in Offa Local Government;

II. Examine common diseases associated with solid waste dumpsites and

III. Assess the public health perception of solid waste dumpsites in the study area.

Materials and method

Location and size

The study area lies within the geographical coordinates of 8°42' to 8°46' North latitude and 4°42' to 4°46' East longitude. It is situated in Nigeria's North Central region. The area shares boundaries with Ijagbo to the north, Erin Ile to the south, and towns such as Ojoku, Ilemona, Ira, and Ikotun to the west. On the eastern side, it is bordered by Ipee and Igosun, all of which fall under the jurisdiction of Oyun Local Government Area in Kwara State (Figure 1).

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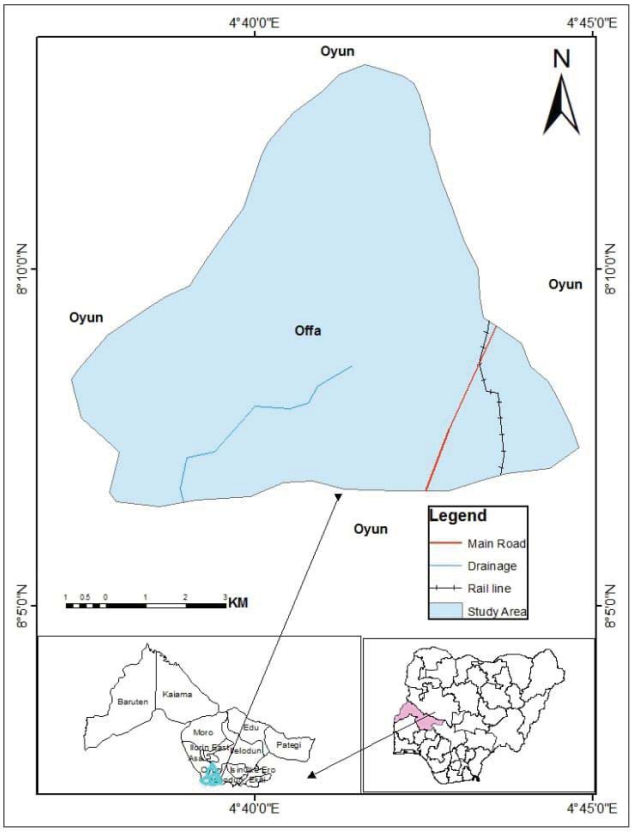

Figure 1: Offa Metropolis—the Study Area.

The study area has a population of 88,975 (NPC 2006). The population of the study area was projected to 2021 using Kwara State's annual growth rate of 3%. The study area has twelve wards, out of which eight wards will be purposively selected for the study. The wards are as follows. Balogun, Eesa A, Ojomu Central A, Ojomu North Northwest, Ojomu South East, Shawo Central, Shawo South East, and Shawo South West. The wards have more of the solid waste dump sites in the study. The study adopted simple arithmetic calculation to get the proportional sample size according to the population size of each ward (Figure 2).

This study employed a direct sampling approach for solid waste characterization, which involved a manual, labor-intensive process of sorting, classifying, and weighing waste materials from designated sources. Each sampling unit was carefully processed, and data were meticulously recorded in accordance with the methodology outlined by Ansah (2014). Sorting and weighing activities were conducted five times per week to ensure data accuracy and consistency. In addition to physical sampling, quantitative data on solid waste generation were collected from respondents using structured questionnaires. These data were analyzed using descriptive statistical tools, including frequency distribution, percentages, means, and graphical representations such as charts. Furthermore, the study examined prevalent health conditions linked to solid waste exposure by applying descriptive statistics to data obtained from respondents, alongside laboratory analyses of soil and water samples. These laboratory tests aimed to detect the presence of harmful microorganisms, including bacteria, viruses, and other pathogens capable of causing health-related issues.

Results and discussion

Mapping of solid waste dumpsites in offa local government area

The objective of the mapping exercise was to present a spatial overview of solid waste dumpsite locations within the study area, which includes the eight major wards in the central part of Offa, Kwara State. This spatial mapping serves as an essential aspect of the research, providing helpful details about the geographical distribution and characteristics of dumpsites across the area. By visualizing the locations of these sites, the study aims to enhance understanding of waste disposal patterns and potential environmental impacts. The geographic coordinates of the identified dumpsites are detailed in Table 1, Figure 3.

The researcher identified and mapped out a total of 27 major dumpsites in the study area. Consequently, nearest neighbor analysis with a z-score of 1.1511327 at a significant level (p - value: 0.130705) reveals that the dumpsites' pattern of distribution does not appear to be significantly different than random, with higher concentration in places like the Owode area, the Rail station area and the Obada area due to higher population density and available dumpsite space. Through mapping, the dumpsites show variation in sizes and content due to location, while most are located near sensitive areas such as residential areas, water bodies, and other points of interest (Figure 4).

Climate, socio-economic status, and living conditions play crucial roles in shaping the relationship between waste management and disease prevalence in the Offa Local Government Area (LGA). Climatic factors such as rainfall intensity, temperature, and humidity influence the rate at which waste decomposes and the proliferation of disease vectors such as mosquitoes, flies, and rodents. For instance, during the rainy season, poorly managed solid and liquid wastes can clog drainage systems, leading to flooding and the creation of breeding sites for waterborne pathogens [18]. Similarly, high temperatures accelerate the decomposition of organic waste, generating foul odors and encouraging vector

Figure 2: Dumpsite in the study area.

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activity, which increases the risk of communicable diseases such as cholera, malaria, and diarrheal infections [19]. Thus, any holistic assessment of waste management in Offa LGA must integrate climatic dynamics as a determinant of disease prevalence.

Table 1: Coordinates of solid waste dumpsites.

S/N	Locality	Latitude	Longitude
1	Owode	8.1635921	4.7253276
2	Lamodi	8.1714245	4.7253276
3	Isale Ago	8.1645798	4.7282378
4	Kere Aje	8.1722783	4.7104557
5	Hallelujah.	8.1579385	4.7136883
6	Navy area	8.1551763	4.6875091
7	Atari	8.1547688	4.6933256
8	Olorunkuse	8.1555354	4.4858935
9	Oba Bi	8.1379713	4.7033444
10	Olalomi	8.1506272	4.6981732
11	Omoluabi	8.1489062	4.6997892
12	Bintinlaye	8.1726151	4.7107789
13	Saint Mark	8.1534635	4.7178911
14	Popo	8.1483415	4.7191843
15	Ile Eesa	8.1435716	4.7195077
16	Osunte	8.1446752	4.7123953
17	Idi Ogun	8.1395165	4.7169212
18	Unique	8.1467814	4.7068999
19	Amuyo	8.1302251	4.7256509
20	Fed. Poly	8.1313696	4.7149815
21	Nawarudeen	8.1394267	4.7246809
22	Government Day school	8.1347098	4.7204776
23	Obada	8.1431825	4.7237109
24	Alubata	8.1495834	4.7295312
25	Adesoye	8.1464856	4.7324417
26	Tawakaltu	8.1383531	4.7292079
27	Railway station	8.1593417	4.7261510

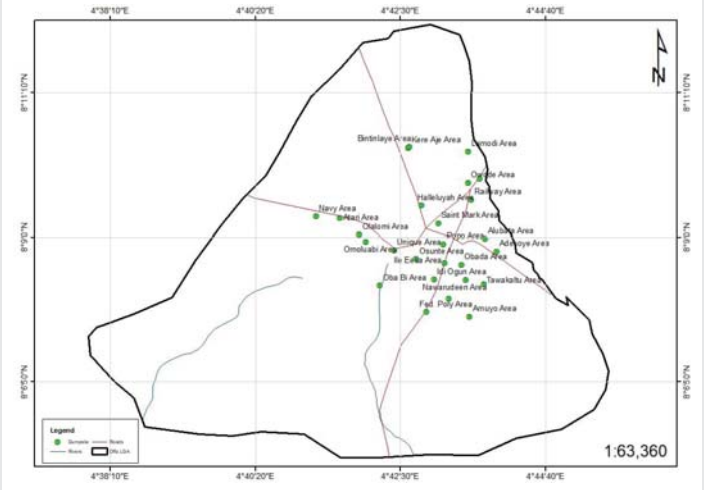

Figure 3: Location of Dumpsites in the study area.

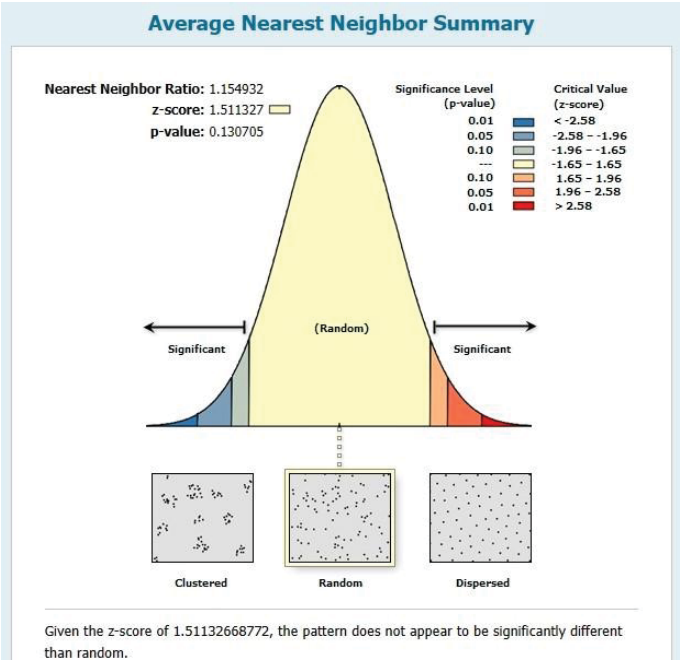

Figure 4: Average nearest Neighbor Summary.

Socioeconomic status and prevailing living and working conditions further determine how waste exposure translates into health outcomes. Households with limited income often reside in densely populated areas like Lamodi, Iwodi, and the populated wards with inadequate sanitation facilities, poor drainage, and insufficient access to formal waste collection services. These conditions heighten vulnerability to disease outbreaks since residents are more likely to dispose of waste indiscriminately, creating unsanitary environments [20]. Similarly, informal workers, especially those engaged in open dumping and scavenging, face direct occupational exposure to hazardous waste materials and pathogens [21]. In Offa LGA, where rapid urbanization is intersecting with poverty and inadequate infrastructure, such socio-economic realities amplify the transmission of infectious diseases. Therefore, addressing disease prevalence in relation to waste management requires interventions that not only improve technical waste management systems but also tackle underlying structural issues of poverty, housing quality, and occupational safety [22].

Health diseases associated with solid waste dumpsites

The study investigated common health diseases in the Offa Local Government Area, Kwara State; the result is presented in Table 2. It shows the frequency of common diseases caused by solid waste in the study area.

Respondent affected by common health diseases

The data in Table 3 provide a compelling insight into the public health challenges associated with proximity to dumpsites in the Offa Local Government Area. Malaria, with the highest frequency of 128 cases, accounting for 32.7% of the total disease burden, indicates a strong environmental linkage. Dumpsites are often breeding grounds for mosquitoes, especially when stagnant water accumulates in discarded containers and waste

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Table 2:	
Observed Mean Distance:	517.6150 Meters
Expected Mean Distance:	448.1780 Meters
Nearest Neighbor Ratio:	1.154932
z-score:	1.511327
p - value:	0.130705

Table 3: Respondent affected by common health diseases.

Diseases	Frequency	Percentage
Diarrheal Diseases	97	24.8%
Respiratory Infection	41	10.5%
Typhoid	109	27.9%
Malaria	128	32.7%
Lead Poisoning	2	0.5%
Skin Disease	14	3.6%

pits. The high prevalence of malaria suggests inadequate waste management and poor drainage systems, which enhance vector breeding and increase the risk of vector-borne diseases. This underscores the urgent need for integrated waste and vector control strategies in affected communities.

Typhoid fever follows closely with a prevalence of 27.9%, representing 109 respondents. Typhoid is typically caused by the ingestion of food or water contaminated with the Salmonella typhi bacterium, which often thrives in environments with poor sanitation. The significant occurrence of typhoid reflects the health risks posed by dumpsites contaminating surface and groundwater sources. Residents near open dumps may be exposed to leachate runoff that seeps into shallow wells or streams, which they use for domestic purposes. The situation reveals an alarming sanitation crisis in Offa, where the improper siting and management of dumpsites directly compromise water quality and food safety.

Diarrheal diseases also represent a substantial health burden, with 97 reported cases accounting for 24.8% of disease prevalence. This high rate is indicative of fecal contamination and poor hygiene practices, both of which are exacerbated by proximity to dumpsites. Children and the elderly are especially at risk because they are more vulnerable to dehydration caused by diarrhea. The presence of pathogens like *E. coli*, Shigella, and other enteric bacteria in the waste environment can easily contaminate food and water sources. This points to a failure in public health infrastructure, particularly in waste segregation, safe disposal, and community health education.

Respiratory infections, with 41 recorded cases (10.5%), suggest the harmful effects of air pollution caused by waste decomposition and open burning of refuse. Dumpsites release particulate matter, methane, and other noxious gases, especially when waste is incinerated without control. Inhalation of these pollutants, particularly among children, the elderly, and individuals with pre-existing conditions, can lead to chronic respiratory issues, including asthma and bronchitis. This statistic highlights a less-discussed but significant environmental hazard of airborne contamination from dumpsites and the lack of clean air in waste-adjacent communities.

Although less frequent, the 14 cases of skin disease (3.6%) also illustrate another dimension of the health risks associated with dumpsites. Direct contact with contaminated soil or water from waste sites can lead to skin infections, rashes, and other dermatological conditions. Waste scavengers and children playing near dumps are particularly vulnerable. This points to a need for public awareness, protective legislation, and enforcement regarding human exposure to hazardous waste environments. Proper fencing and restricted access to dumpsites could reduce such direct physical exposure. The least frequent disease reported is lead poisoning, with only 2 cases (0.5%). Despite its low occurrence, this result should not be overlooked. Lead, often found in batteries, paints, and electronic waste, is a potent neurotoxin, especially harmful to children. Even minimal exposure can result in cognitive and developmental deficits. The presence of lead poisoning cases near dumpsites suggests that hazardous waste materials are not being properly identified and handled. Emphasizing the need for stricter regulations on hazardous waste segregation and disposal, alongside public sensitization campaigns to prevent toxic exposures in the community.

Laboratory test on water from the solid waste dumpsites

Microbiological water test: The water sample was taken randomly from wells closer to dumpsites and taken to the laboratory for testing and the result is presented in Table 4.

T.C.U. - True colour unit; N.T.U. - Nephelometric turbidity unit; µS/cm - microsiemens per centimeter; mg/L - milligram per liter; cfu/mL - Colony forming unit per milliliter.

From Table 5, the microbiological analysis showed that the total coliform counts in the water sample were 1.5 x 10^3 cfu/mL, which exceeded the permitted level of 0 cfu/mL. The *E. coli* count was 0 cfu/mL, within the permitted level. The fecal coliform count was also 0 cfu/mL, within the permitted level. The unsatisfactory findings in the microbiological analysis of the water sample show that the total coliform counts exceed the permitted level set by the Nigerian Industrial Standard for drinking water. This indicates a potential risk of waterborne diseases such as cholera, typhoid fever, dysentery, and diarrhea which is also in line with Ogbonna (2020), who found a significant association between the presence of total coliforms and incidence of diarrheal disease in children and According to the WHO, the presence of total coliforms in drinking water can potentially lead to waterborne diseases (WHO, 2017). Such illnesses arise from pathogens flourishing in polluted water.

Table 4: Microbiological water test result.

S/No	Parameters	Analytical Results	Permitted Level [NIS]	Remarks
1.	Total coliform counts (cfu/mL)	1.5 x 10^3	0	Unsatisfactory*
2.	*E. coli* (cfu/mL)	0	0	Satisfactory
3.	Fecal coliform count (cfu/ml)	0	0	Satisfactory

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And can be transmitted to humans when they drink or come in contact with the contaminated water.

Soil sample test: The soil sample was taken to the laboratory for testing, and the result is presented in Table 6.

The soil analysis revealed unsatisfactory levels of phosphorus and lead. Elevated levels of phosphorus can lead to eutrophication of nearby water bodies, which can result in algal blooms and low dissolved oxygen levels, leading to fish kills and other aquatic life loss. Also, algal blooms caused by excess phosphorus can release toxins into the water. The toxins can cause symptoms such as skin rashes, gastrointestinal illness, and neurological effects [23]. Elevated levels of lead in soil can pose serious health risks, particularly for children who are more vulnerable to its toxic effects. The US Environmental Protection Agency (EPA) has set a soil lead level standard of 400 ppm (parts per million) for residential soil and 1200 ppm for

Total Bacterial Count and Total Fungal Count (cfu/g) of the soil

Table 5: Soil sample test result

S/No	Parameters	Sample
1.	Ph	7.15
2.	Organic carbon (%)	1.62
3.	Organic matter (%)	2.79
4.	Nitrogen (%)	0.72
5.	Phosphorus (ppm)	368.01
6.	Potassium (cmol/kg)	1.49
6.	Lead (mg/kg)	0.82
7.	Cadmium (mg/kg)	ND
8.	Mercury (mg/kg)	ND
9.	Calcium (cmol/kg)	11.50
10.	Magnesium (cmol/kg)	2.00
11.	Sodium (cmol/kg)	1.95
12.	Textural class	Sand
13.	Sand (%)	94
14.	Silt (%)	2
15.	Clay (%)	4

Table 6: Public perception on solid waste dumpsites.

Variable	SD	D	SA	A	SA	Σf	Mean	Rank
People living close to waste dump sites are prone to health hazards	22	48	72	151	89	1383	3.62	1st
Residents living around waste dumpsites usually experience diseases such as asthma, tuberculosis, bronchitis	17	42	115	169	39	1317	3.44	2nd
Diseases from waste dump sites usually result in untimely death	34	52	78	168	50	1294	3.38	3rd
Living near waste dumpsites has no health effects	185	146	18	16	17	680	1.78	4th

Note: SD: Strongly Disagree; D: Disagree; SA: Somehow Agree; A: Agree; SA: Strongly Agree

Total Bacterial Count (cfu/g)	Total Fungal Count (cfu/g)
1.76×10^5	2.2×10^6

Isolated Bacteria and Fungi from the soil

Bacteria isolated	Fungi Isolated
Bacillus spp.	*Candida spp.* *Aspergillus candidus*

Non-residential soil. Therefore, 0.82 mg/kg is equivalent to 820 ppm, which is above the residential soil lead level standard. Prolonged exposure to lead in soil can lead to adverse health effects, including neurological and developmental delays in children, lower IQ, attention deficits, behavior problems, impaired cognitive function, and increased blood pressure, which is in line with the findings of Miranda, et al. [24]: "Children living in urban areas with high soil lead levels had significantly lower cognitive scores than children living in areas with lower soil lead levels."

The total bacterial and fungal counts in the soil suggest that there is a significant amount of organic matter present, which can result in increased microbial activity. Some of these microbes may be pathogenic and can cause a range of health problems in humans and animals, including respiratory infections, skin irritations, and gastrointestinal illnesses.

Bacillus spp. represents a genus of bacteria known for its diverse interactions with human health, exhibiting both beneficial and harmful effects. Certain species, such as *Bacillus subtilis*, are considered probiotic and play a supportive role in digestive processes as part of the normal gut flora. In contrast, pathogenic members of this genus, like *Bacillus anthracis*, are associated with severe diseases such as anthrax, a life-threatening condition particularly dangerous when inhaled or transmitted through open wounds, especially in immunocompromised individuals. Candida spp., a genus of opportunistic yeast, is commonly implicated in fungal infections in humans. The most frequently isolated species, *Candida albicans*, is responsible for a range of mucosal and cutaneous infections, including oral thrush, vaginal candidiasis, and diaper rash. In more critical scenarios, *Candida* can enter the bloodstream, leading to invasive candidiasis or candidemia, which can result in systemic infections such as sepsis. *Aspergillus candidus*, a species within the *Aspergillus genus*, is a filamentous fungus that can become pathogenic, particularly among individuals with compromised immune systems or chronic respiratory conditions. Exposure to its spores may trigger allergic reactions, exacerbate asthma symptoms, or, in severe cases, cause invasive aspergillosis—a serious fungal infection capable of spreading beyond the lungs and affecting other organs.

Public health perception on solid wastes dumpsites in Offa local government area

The study assessed the perception of the respondents on the solid waste dumpsites in the study area and the result is presented in Table 5.

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Based on the decision rule provided, it is evident that the mean scores for the second, third, and fourth variables are all greater than or equal to 3 (3.62, 3.44, and 3.38, respectively), which suggests that these opinions are significant and represent the popular opinion of the respondents. The first statement has a mean score of 1.78, which is below the decision rule threshold of 3, indicating that it is not the popular opinion of the respondents; therefore, the statement is not significant.

Conclusively, based on the mean scores, the popular opinion of the respondents is that they disagree with the statements presented in Variable 1, and they either somewhat agree, agree, or strongly agree with the statements presented in Variables 2, 3, and 4.

Summary

The study critically examined the link between solid waste dumpsites and the prevalence of common health diseases in Offa Local Government Area (LGA), Kwara State, Nigeria. Data obtained from respondents revealed a high frequency of diseases such as malaria (32.7%), typhoid (27.9%), diarrheal diseases (24.8%), respiratory infections (10.5%), skin diseases (3.6%), and lead poisoning (0.5%). The distribution of these ailments is closely connected to environmental pollution stemming from indiscriminately managed dumpsites located near residential areas. The findings underscore the severe threat that poor waste disposal practices pose to public health, particularly in densely populated or under-resourced communities. The high incidence of malaria is primarily attributed to the presence of stagnant water in waste heaps, which serve as breeding grounds for mosquitoes. Poor drainage systems and unmanaged waste accumulation further exacerbate this vector-borne crisis. Similarly, the prevalence of typhoid and diarrheal diseases points to widespread contamination of food and water sources, most likely through leachates from dumpsites infiltrating shallow wells and surface water bodies. The contamination reflects gross sanitation failures and highlights the need for improved infrastructure, such as protected water sources, sewage systems, and community-wide waste education. These diseases are preventable, yet they persist due to systemic lapses in public health management and environmental governance. Beyond waterborne and vector-related diseases, the study reveals respiratory infections and skin diseases as significant health concerns linked to air and soil contamination. Open burning of refuse releases harmful gases and particulate matter into the atmosphere, affecting individuals, especially children and the elderly, with respiratory conditions like asthma and bronchitis. Similarly, skin conditions result from direct contact with toxic waste materials or leachate-contaminated soil. Scavengers, informal waste pickers, and children playing near dumpsites are most at risk. These findings point to a broader environmental justice issue, where vulnerable populations bear the brunt of pollution due to ineffective waste policy enforcement.

Laboratory analysis of water samples from waste-adjacent areas confirms the presence of total coliforms (1.5 x 10^3 cfu/mL), significantly surpassing the Nigerian Industrial Standards for safe drinking water. Although *E. coli* and fecal coliform levels were within permissible limits, the elevated total coliform count indicates unsafe water conditions that align with reported cases of typhoid and diarrhea. Additionally, soil tests reveal elevated phosphorus levels (368.01 ppm), which can lead to eutrophication of nearby water bodies and associated public health consequences such as toxic algal blooms. The lead content in soil (0.82 mg/kg or 820 ppm) is more than double the acceptable limit for residential areas, posing neurodevelopmental and cognitive risks to children. This confirms that communities living near these dumpsites are constantly exposed to hazardous environmental toxins.

Community perception, as reflected in the survey, strongly supports the evidence-based findings. Most residents agreed that living near dumpsites exposes them to life-threatening illnesses, including respiratory infections and premature deaths. The general consensus was that dumpsites significantly degrade environmental quality and increase disease vulnerability. In contrast, only a minority believed that waste dumpsites posed no health risks. This widespread awareness offers a critical opportunity for policy intervention, community mobilization, and advocacy for safer waste practices. In conclusion, the findings advocate for a multi-sectoral response involving environmental regulation, public health policy, community education, and investment in sustainable waste management systems. Without urgent action, the cycle of environmental degradation and disease in Offa LGA will likely persist and worsen.

Conclusion

This study established a clear link between ineffective solid waste management and the prevalence of diseases in Offa. The prevalence of diseases such as malaria, typhoid, and diarrheal illnesses reflects the adverse impact of poor waste management practices on environmental and human health. The laboratory analysis of water and soil samples further confirms high levels of microbial and heavy metal contamination, particularly total coliforms in water and excessive phosphorus and lead in soil. These pollutants are directly linked to the disease burden in the communities surveyed.

The presence of pathogenic microorganisms such as *Bacillus spp.*, *Candida spp.*, and *Aspergillus candidus* in the soil indicates the high risk of skin, respiratory, and gastrointestinal infections, especially among children and individuals with weakened immune systems. Respondents' perceptions validated the environmental health hazards of living close to dumpsites, as most agreed that such proximity significantly increases the risk of illness and untimely death. The study emphasizes the urgent need for a strategic, multi-faceted approach to address the environmental health challenges posed by solid waste dumpsites. The findings serve as a wake-up call for both local authorities and environmental health agencies to implement sustainable waste management systems, enforce public health regulations, and prioritize community health education. Without timely intervention, the health and environmental degradation associated with these dumpsites will continue to escalate, placing a greater burden on healthcare systems and reducing the quality of life for residents in the area.

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Recommendations

1. **Strengthening waste segregation and hazardous waste management:** Waste should be sorted at the source into organic, recyclable, and hazardous categories. Special attention should be given to the safe disposal of electronic waste, batteries, and medical waste to prevent contamination by heavy metals like lead and mercury.

2. **Provision of safe water and improved sanitation infrastructure:** Residents in high-risk zones should be provided with access to clean and treated drinking water. Protection of water sources from waste runoff and regular testing of water quality should be institutionalized to prevent outbreaks of waterborne diseases such as typhoid and diarrhea.

3. **Environmental monitoring and policy enforcement:** Regular environmental monitoring of soil, water, and air quality should be institutionalized around dumpsites. Environmental and health protection laws should be strictly enforced, with penalties for illegal dumping and poor waste management practices by private and public operators.

References

1. Zaman AU, Swapan MSH, Lehmann S. The zero-waste index: A performance measurement tool for waste management systems in a 'zero waste city' framework. J Clean Prod. 2016;122:284–92.
2. Nabavi-Pelesaraei A, Hosseinzadeh-Bandbafha H, Mohammadi A. Modeling of energy consumption and environmental life cycle assessment for incineration and landfill systems of municipal solid waste management. J Clean Prod. 2017;148:186–95.
3. Pires A, Martinho G, Chang NB. Waste management and critical issues in urban sustainability: Challenges and opportunities. Cities. 2019;89:136–45.
4. Al-Khatib IA, Al-Sari MI, Kontogianni S. Trends and challenges of municipal solid waste management in developing countries: A case study of Palestine. Waste Manag Res. 2020;38(6):617–26.
5. Ferronato N, Torretta V. Waste mismanagement in developing countries: A review of global issues. Int J Environ Res Public Health. 2019;16(6):1060. Available from: https://doi.org/10.3390/ijerph16061060
6. Hahladakis JN, Velis CA, Weber R, Iacovidou E, Purnell P. An overview of chemical additives present in plastics: Migration, release, fate, and environmental impact. J Hazard Mater. 2018;344:179–99.
7. Afon A, Abolade O. Urban waste management issues in Nigeria: Challenges and prospects. J Environ Manage Safety. 2017;8(2):101–11.
8. Ogunyemi TA, Ojo OJ, Hassan AT. Challenges and prospects of solid waste management in Nigeria: A review. Niger J Environ Sci Technol. 2020;4(1):1–14.
9. Adegoke JA, Babatunde OO, Olaniran HA. Environmental governance and regulatory framework in Nigeria: An overview. J Sustain Dev Afr. 2018;20(2):90–101.
10. Akinbile CO, Olatunji MF, Ajibade FO. Waste management and environmental health implications in Nigerian cities. Appl Environ Res. 2016;38(3):13–25.
11. World Health Organization. Managing health risks of waste in low-income countries (WHO Technical Report Series No. 1045). Geneva: WHO; 2022. Available from: https://www.who.int/publications/i/item/9789240060291
12. Obaid A, Murtaza M, Yusuf F. Health hazards of urban solid waste exposure: Evidence from a cross-sectional study in Pakistan. Int J Environ Res. 2020;14(1):45–52.
13. Afolabi MO, Dania PO. Environmental sanitation and public health nexus in Nigeria. J Environ Policy Plan. 2021;23(3):345–59.
14. Eze C, Ajayi SA. Community-level waste management and health risks: A case study of Kwara State. Niger J Public Health. 2023;19(1):67–79.
15. Adedoyin A, Musa T, Ojo K. Urban waste exposure and public health in southwestern Nigeria. Afr J Environ Health. 2022;14(2):101–15.
16. Khan R, Rahman A, Parveen F. Municipal solid waste and associated health risks in developing countries. Waste Manag Res. 2019;37(8):876–84.
17. Ogbonna DN, Amangabara GT, Anozie R. Solid waste management practices and challenges in Nigeria. Environ Manag Sustain Dev. 2018;7(2):23–33.
18. Adelekan IO, Asiyanbi AP. Flood risk perception in flood-affected communities in Lagos, Nigeria. Nat Hazards. 2016;80(1):445–69. Available from: https://doi.org/10.1007/s11069-015-1977-2
19. Nnaji CC, Utsev JT, Omole DO. Impact of climate change on waste decomposition and public health in developing countries. Environ Res Commun. 2019;1(7):075003.
20. Olayemi OA, Aluko O. Household solid waste management and health implications in Nigeria. Afr J Environ Sci Technol. 2020;14(6):142–50.
21. Abila B, Kantola J. Municipal solid waste management problems in Nigeria: Evolving knowledge management solution. Int J Environ Chem Ecol Geol Geophys Eng. 2017;11(5):396–402.
22. Ezeh PC, Obike UC. Environmental sanitation practices and disease prevalence in Nigeria: A sociological perspective. J Public Health Epidemiol. 2021;13(2):85–94.
23. Dodds WK, Gudder DA, Mollenhauer D. The ecology of Cladophora. J Phycol. 2009;45(1):18–33
24. Miranda ML, Kim D, Galeano MA, Paul CJ, Hull AP, Morgan SP. The relationship between early childhood blood lead levels and performance on end-of-grade tests. Environ Health Perspect. 2007;115(8):1242–7. Available from: https://doi.org/10.1289/ehp.9994
25. Giusti L. A review of waste management practices and their impact on human health. Waste Manag. 2009;29(8):2227–39. Available from: https://doi.org/10.1016/j.wasman.2009.03.028
26. Papageorgiou A, Barton JR, Karagiannidis A. Assessment of the greenhouse gas impact of technologies used for energy recovery from municipal waste: A case for England. J Environ Manag. 2009;90(10):2999–3012. Available from: https://doi.org/10.1016/j.jenvman.2009.04.012
27. Solomon U. Solid waste management in Nigeria: Problems and prospects. Environ Waste Manag J. 2016;2(1):45–58.
28. United Nations Environment Programme. Guidelines on best available techniques and provisional guidance on best environmental practices. United Nations Environment Programme; 2013.

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