



Environmental and Public Health Impact Assessment of Solid Waste Management Practices in Ovia North East, Edo State, Nigeria

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ABSTRACT: Improper solid waste management has become a growing environmental and public health concern in many developing communities due to population growth, urban expansion, and inadequate waste management systems. This study assessed the environmental and health impacts associated with solid waste management practices in Okada, Usen and Iguomon communities in Edo State. The research was conducted to examine the environmental conditions and public health effects linked to prevailing waste management practices and identify differences among the selected communities. Primary data were collected through the administration of questionnaires distributed randomly among households, schools, stores, etc. This study utilised Section C of the questionnaire, which focused on environmental and health impacts of solid waste management practices. The data collected were processed using descriptive statistical techniques. Results indicated that ineffective waste management practices had substantial adverse effects on environmental conditions within the communities. The environmental impacts identified included bad odour, air pollution, water pollution, flooding, soil contamination, and an increase in pests. Okada recorded higher environmental pressures due to greater waste generation and population concentration, while Usen and Iguomon experienced moderate environmental impacts. Health challenges associated with poor waste management included malaria, diarrhoea, cholera, and skin infections. Most respondents indicated that open dumping negatively affected environmental aesthetics. The study concluded that existing solid waste management practices within the study area pose considerable environmental and public health risks. It is recommended that improved waste management infrastructure, regular environmental monitoring, public awareness programmes, and strengthened sanitation policies be implemented to promote environmental sustainability and healthier communities.

KEYWORDS: Environmental sanitation, refuse handling, storage, pollution assessment

1. INTRODUCTION

Solid waste management has become a major environmental concern in many developing countries due to rapid urbanisation, population growth, industrialisation, and changing consumption patterns. In Nigeria, the increase in municipal solid waste generation has placed enormous pressure on the environment and public health systems (Aderemi et al, 2011; Ogwueleka, 2009; Imam et al, 2008; Nnaji, 2015; Adekunle et al, 2011; Taiwo, 2011, Nabegu 2010). Poor waste management practices such as indiscriminate dumping, open burning, and improper collection methods have contributed significantly to environmental degradation in both urban and rural communities (Olukanni & Adebayo, 2014; Ziraba et al, 2016; Sankoh et al., 2013; Egun & Aifuwa, 2013; Sridhar et al., 2011; Oyelola et al., 2009; Nwachukwu et al., 2010). According to the World Health Organisation (WHO), improper waste disposal can lead to air, water, and soil pollution, thereby exposing humans and ecosystems to serious health risks. Environmental Impact Assessment (EIA) is an important tool used to evaluate the likely environmental consequences of human activities before decisions are made. The assessment of solid waste management practices helps to identify the environmental, social, and economic impacts associated with waste generation, storage, collection, transportation, treatment, and disposal. Scholars such as Afon (2012), UNEP (2015), Ogbonna et al. (2007); Oyekan & Sulyman (2015); Abila & Kantola (2013), Akinbile & Yusoff, Adefemi and Awokunmi (2009) observed that inadequate waste management practices in Nigerian cities have resulted in blocked drainage systems, flooding, and outbreaks of diseases. Similarly, Ogwueleka (2009) noted that ineffective waste management systems contribute greatly to environmental pollution and deterioration of urban aesthetics.

Solid waste consists of refuse generated from households, markets, institutions, industries, and commercial activities. These wastes may include food remnants, plastics, paper, glass, metals, and organic materials. According to Medina (2010), the quantity and composition of solid waste generated in a community depend largely on lifestyle, income level, and consumption patterns. In many developing nations, waste collection systems are inefficient, leading to the accumulation of refuse in open spaces and waterways.



In Edo State, particularly in Ovia North East Local Government Area, communities such as Okada, Usen, and Iguomon are experiencing increasing waste generation due to population growth and socio-economic activities. The absence of effective waste management infrastructure has encouraged practices such as roadside dumping, burning of refuse, and disposal into drainage channels and water bodies. These practices pose serious environmental and health hazards to residents. According to Nwanta et al. (2010), indiscriminate waste disposal contributes to environmental contamination and the spread of communicable diseases. Several researchers have emphasised the relationship between poor waste management and environmental quality. Ziraba, Haregu, and Mberu (2016) explained that unmanaged waste contributes to greenhouse gas emissions, offensive odours, and breeding grounds for disease vectors such as flies, mosquitoes, and rodents. Similarly, Adekunle, Adebola, Aderonke, Pius, and Toyin (2011) stated that poor waste disposal practices negatively affect groundwater quality, especially in areas where wastes are dumped openly without proper engineering designs. The environmental impacts associated with poor solid waste management include soil contamination, water pollution, air pollution, flooding, and biodiversity loss. According to Taiwo (2011), open burning of waste releases harmful gases such as carbon monoxide and methane into the atmosphere, thereby contributing to climate change and respiratory illnesses. In addition, Hoornweg and Bhada-Tata (2012) reported that poorly managed waste systems increase environmental vulnerability and reduce the quality of life of residents.

Despite efforts by government agencies and environmental bodies, waste management challenges still persist in many Nigerian communities. Factors responsible include inadequate funding, poor public awareness, lack of waste collection facilities, insufficient manpower, weak environmental policies, and poor implementation of sanitation laws. Agunwamba (1998) argued that public participation and environmental education are essential for sustainable waste management practices. This study, therefore, seeks to assess the environmental impacts of solid waste management practices in Okada, Usen, and Iguomon communities in Ovia North East Local Government Area of Edo State. The study focuses on waste generation, storage, collection, transportation, and disposal methods as well as their effects on the environment and public health.

The increasing rate of solid waste generation in Ovia North East Local Government Area has become a serious environmental issue. Communities such as Okada, Usen, and Iguomon are experiencing rapid population growth and commercial expansion, which have resulted in increased waste production. However, the available waste management systems are inadequate to effectively handle the growing volume of waste generated daily. In many parts of these communities, waste is dumped indiscriminately along roadsides, drainage channels, open spaces, and streams. Residents also engage in open burning of refuse due to the absence of proper disposal facilities. These practices have caused environmental pollution, blocked drainage systems, offensive odours, and increased breeding of disease-causing organisms. According to Egun and Egun (2007), indiscriminate waste disposal significantly contributes to environmental degradation and public health risks in Nigerian communities. Poor waste collection and disposal practices have also affected the aesthetic quality of the environment and exposed residents to diseases such as malaria, cholera, typhoid fever, and respiratory infections. Furthermore, the lack of adequate waste bins, poor road accessibility, and irregular waste collection services worsen the problem. Ogbonna, Ekweozor, and Igwe (2007) emphasised that ineffective waste management systems are major contributors to urban environmental problems in Nigeria. Another major concern is the contamination of land and water resources resulting from improper waste disposal. Leachates from decomposing waste can infiltrate soil and groundwater, thereby affecting water quality and agricultural productivity. In addition, open dumping sites attract rodents and insects, which constitute health hazards to nearby residents. Although several environmental sanitation programmes have been introduced by government authorities, the problem of poor waste management persists in the study area. There is therefore a need to assess the environmental impacts associated with current solid waste management practices in Okada, Usen, and Iguomon in order to provide sustainable solutions for environmental protection and public health improvement. This study aims to assess the environmental impacts of solid waste management practices in Ovia North East Local Government Area of Edo State, with particular reference to Okada, Usen, and Iguomon communities with the objectives of the Study: to evaluate the environmental impacts associated with solid waste management practices in the study area, to examine the health implications of improper solid waste disposal on residents and to suggest possible measures for improving solid waste management practices in the study area. The novelty of this study lies in its integrated and comparative assessment of solid waste management practices, environmental quality and public health outcomes across the three communities with differing settlement characteristics in Ovia North East, Edo State. The findings provide location specific evidence that can guide policymakers in developing community-based waste management strategies in an area that has received limited attention in previous studies within southern Nigeria. The study will equally contribute to academic knowledge by

adding to existing literature on environmental impact assessment and solid waste management practices in Nigeria. In addition, the recommendations from this research may help local authorities in planning efficient waste collection systems and reducing environmental pollution within the study area.

2. DESCRIPTION OF STUDY AREA

This study was carried out in Ovia North East Local Government Area of Edo State, Nigeria, with a focus on three selected communities: Okada, Usen, and Iguomon. Figure 1 presents the map of the Study area and the sampling communities.



Figure 1: Okada (Nigeria) Map showing Usen and Iguomon Locations (Source: www.Nona. Net)

Okada is the administrative headquarters of Ovia North East Local Government Area and serves as an urban centre with relatively high population density and commercial activities. The town hosts several residential buildings, markets, educational institutions, churches, shopping complexes, and business centres. Due to rapid urbanisation and population growth, large quantities of solid waste are generated daily from households, markets, schools, institutions, and commercial establishments. Common waste disposal practices in the area include open dumping, burning, and irregular waste collection, which contribute to environmental pollution and health challenges (Wikipedia contributors, 2026; Edo State Government, 2020).

Usen is a semi-urban community located within the Ovia North East Local Government Area. The community is characterised by moderate commercial activities, educational institutions, local markets, churches, and residential settlements. Waste generation in the area mainly originates from households, schools, market activities, stores, and institutions. Waste management practices are relatively less organised, with self-disposal, open dumping, and burning being common methods of waste handling. The semi-urban nature of the community makes it suitable for comparative assessment of waste management practices (Wikipedia contributors, 2026).

Iguomon is predominantly a rural settlement with lower population density compared to Okada and Usen. The community is mainly characterised by agricultural activities, small-scale trading, churches, schools, and residential settlements. Solid waste generation is relatively low; however, waste disposal practices such as open dumping and burning remain common due to limited waste management infrastructure and inadequate government services. The inclusion of Iguomon in the study provided an opportunity to examine rural waste management practices and their environmental impacts (Wikipedia contributors, 2026).

3. METHODOLOGY

The study adopted a descriptive survey research design to assess the environmental impacts of solid waste management practices in Okada, Usen, and Iguomon. The design enabled the researcher to obtain information directly from respondents regarding waste generation, storage, collection, transportation, disposal practices, and associated environmental and health impacts.

The target population consisted of residents and waste generators within the selected communities in Ovia North East Local Government Area. Respondents were drawn from major waste generation sources, including households, schools, institutions, churches, stores, shopping complexes, and market traders. A random sampling technique was adopted in the distribution of questionnaires to ensure equal opportunity for participation among respondents within the study areas. Respondents were randomly selected from the major waste generation sources such as households, schools, institutions, churches, stores, shopping complexes, and market traders in Okada, Usen, and Iguomon. The random sampling method was chosen because it reduces bias and allows for fair representation of the population under study. The sample size comprised respondents selected from the three communities based on accessibility and availability during the field survey.

The study utilised primary data obtained through the administration of structured questionnaires developed for the Environmental Impact assessment of Solid Waste management practices in Ovia North East Local Government Area of Edo State. Although the questionnaire contained four sections, this study specifically utilised section C, which focused on Environmental and health impacts associated with solid waste management practices. Variables examined included air pollution, flooding, soil contamination, water pollution, pest infestation and waste-related health conditions among residents. Responses from respondents were grouped according to the study objectives and analysed comparatively among Okada, Usen, and Iguomon communities to determine the variations in environmental and health impacts associated with solid waste management practices within the study area.

4. RESULTS AND DISCUSSIONS

The number of respondents under environmental and health impact are summarized in Table 1., Table 2 and Table 3 for Okada town, Usen and Iguomon Town, respectively.

Table 1: Number of respondents under Environmental and Health Impact in Okada Town

Have you noticed environmental problems such as odour due to poor waste management in your area?					
Yes	NO				
28	11				
If yes, which of the following? (Tick all that apply)					
Bad odour	Flooding	Water pollution	Air pollution	Soil contamination	Increase in pests
25	5	4	17	4	12
Does poor waste disposal affect drainage systems?					
Strongly Agree	Agree	Disagree	Strongly Disagree		
15	12	8	4		
Has poor waste management affected your health?					
Yes	NO				
15	12				
If yes, specify	Stomach upset, Diarrhea, Injuries, Stomach upset & nausea, Bad odour, difficulty in breathing, Waterborne diseases, Nose irritation, Thyroid and infection, Sickness due to air pollution				
Does open dumping reduce environmental aesthetics?					
Strongly Agree	Agree	Disagree	Strongly Disagree		
10	21	7	1		
Do you think current waste management practices are environmentally sustainable					
Yes	No		Not sure		
12	8		21		
Have water sources been polluted due to waste?					
Yes	No				
21	19				

Are there health issues in your area linked to waste		
Yes		No
13		25
If yes, specify	Skin infections, Diarrhea, Waterborne disease, Cholera, Malaria by mosquito, Infection	
Rank the severity of environmental impacts from waste in your area		
High	Medium	Low
3	26	7

From Table 1, The responses obtained from Okada Town showed that many residents had observed environmental problems resulting from poor solid waste management practices in the community. The most common environmental problems identified were bad odour, air pollution, increase in pests, flooding, water pollution, and soil contamination. Bad odour and air pollution were the major environmental concerns frequently experienced by residents.

Most respondents also agreed that poor waste disposal practices negatively affect drainage systems, leading to blocked drainage channels and environmental sanitation problems. In addition, the majority of respondents believed that open dumping reduces environmental aesthetics, making the surroundings unattractive and unhealthy.

The findings further revealed that poor waste management had affected the health of several residents in the area. Reported health challenges included stomach upset, diarrhea, nausea, injuries, breathing difficulties, nose irritation, infections, waterborne diseases, and sickness caused by air pollution. Some respondents also linked poor waste management to cholera, malaria, and skin infections. The study also showed that many respondents were uncertain whether the current waste management practices in Okada Town were environmentally sustainable, while only a few respondents considered the practices sustainable. A significant number of respondents further confirmed that waste disposal activities had polluted water sources within the community.

Finally, most respondents ranked the environmental impacts of poor waste management in Okada Town as moderate, while a smaller number considered the impacts severe. Overall, the findings indicate that poor solid waste management practices in Okada Town contribute significantly to environmental pollution, public health problems, drainage blockage, and deterioration of environmental quality. Table 2 is for the Usen Community summary respondents under Environmental and Health Impact.

Table 2: Number of respondents under Environmental and Health Impact in Usen Town

Have you noticed environmental problems such as odour due to poor waste management in your area?					
Yes	NO				
16	7				
If yes, which of the following? (Tick all that apply)					
Bad odour	Flooding	Water pollution	Air pollution	Soil contamination	Increase in pests
14	2	3	12	2	3
Does poor waste disposal affect drainage systems?					
Strongly Agree	Agree	Disagree	Strongly Disagree		
4	9	4	4		
Has poor waste management affected your health?					
Yes	NO				
5	16				
If yes, specify	Malaria, Asthma, Fever, Pest				
Does open dumping reduce environmental aesthetics?					
Strongly Agree	Agree	Disagree	Strongly Disagree		
3	17	1	1		
Do you think current waste management practices are environmentally sustainable					
Yes	No		Not sure		

7	4	11
Have water sources been polluted due to waste?		
Yes	No	
10	13	
Are there health issues in your area linked to waste		
Yes	No	
3	20	
If yes, specify	Soil contamination, Asthma, Diarrhea	
Rank the severity of environmental impacts from waste in your area		
High	Medium	Low
3	11	5

From Table 2, the responses obtained from Usen Town showed that many residents had noticed environmental problems associated with poor solid waste management practices in the area. The major environmental problems identified included bad odour, air pollution, water pollution, flooding, soil contamination, and increase in pests. Among these, bad odour and air pollution were the most frequently experienced environmental issues by residents.

Most respondents agreed that poor waste disposal practices affect drainage systems, contributing to blockage of drains and environmental sanitation problems within the community. In addition, the majority of respondents agreed that open dumping reduces environmental aesthetics, making the environment less attractive and unhealthy.

The findings further revealed that some residents believed poor waste management had affected their health. The health problems identified included malaria, asthma, fever, and pest-related illnesses. Although more respondents stated that waste management had not seriously affected their health, the reported illnesses indicate that improper waste disposal still poses health risks to the residents. The study also showed that many respondents were uncertain whether the current waste management practices in Usen Town were environmentally sustainable, while only a few respondents considered the practices sustainable. Some respondents also confirmed that water sources within the community had been polluted due to improper waste disposal practices.

Furthermore, only a few respondents directly linked waste management to health issues in the area, with identified problems including soil contamination, asthma, and diarrhea. Most respondents ranked the severity of environmental impacts in the community as moderate, while only a few considered the impacts to be severe. Overall, the findings indicate that poor waste management practices in Usen Town contribute to environmental pollution, drainage blockage, and some public health concerns, although the impacts were generally perceived as moderate. Table 3 is for Iguomon Community summary respondents under the Environmental and Health Impact of Solid Waste Management Practices

Table 3: Number of respondents under Environmental and Health Impact in Iguomon Town

Have you noticed environmental problems such as odour due to poor waste management in your area?					
Yes	NO				
13	4				
If yes, which of the following? (Tick all that apply)					
Bad odour	Flooding	Water pollution	Air pollution	Soil contamination	Increase in pests
14	1	2	8	2	3
Does poor waste disposal affect drainage systems?					
Strongly Agree	Agree	Disagree	Strongly Disagree		
0	3	5	2		
Has poor waste management affected your health?					
Yes	NO				
2	10				

If yes, specify	Causes Malaria, Cause Sickness		
Does open dumping reduce environmental aesthetics?			
Strongly Agree	Agree	Disagree	Strongly Disagree
5	5	2	0
Do you think current waste management practices are environmentally sustainable			
Yes		No	Not sure
1		5	6
Have water sources been polluted due to waste?			
Yes		No	
4		8	
Are there health issues in your area linked to waste			
Yes		No	
2		10	
If yes, specify	1. Malaria		
Rank the severity of environmental impacts from waste in your area			
High	Medium	Low	
2	8	2	

From Table 3, the responses obtained from Iguomon Town revealed that many residents had noticed environmental problems associated with poor solid waste management practices in the area. The major environmental issues identified included bad odour, air pollution, an increase in pests, water pollution, flooding, and soil contamination. Among these problems, bad odour and air pollution were the most commonly reported by respondents.

The findings also showed that some respondents agreed that poor waste disposal practices affect drainage systems, although a greater number disagreed with the statement. This suggests that drainage blockage due to waste may not be as severe in rural areas compared to urban and semi-urban areas.

In addition, many respondents agreed that open dumping reduces environmental aesthetics, making the surroundings less attractive and unhealthy. However, only a few respondents stated that poor waste management had directly affected their health. The health issues identified included malaria and general sickness caused by poor environmental sanitation.

The study further revealed that most respondents were uncertain or believed that current waste management practices in Iguomon were not environmentally sustainable. Some respondents also confirmed that water sources in the community had been polluted due to poor waste disposal practices.

Furthermore, only a few respondents directly linked waste management to health issues in the area, with malaria being the major health problem identified. Most respondents ranked the severity of environmental impacts from waste as moderate, while only a few considered the impacts either high or low. Overall, the findings indicate that poor waste management practices in Iguomon Town contribute to environmental pollution and some health concerns, although the impacts were generally perceived to be moderate in severity.

4.1. Summary of Environmental Impact Assessment of Solid Waste Management Practices in Okada, Usen and Iguomon

Table 4 presents a comparative summary of the environmental impact assessment of solid waste management practices in Okada (urban area), Usen (semi-urban area), and Iguomon (rural area) based on questionnaire responses obtained from residents.

Table 4: Summary of Environmental Impact assessment Solid Waste Practices in Okada, Usen and Iguomon Community

Parameters	Okada Town (Urban Area)	Usen Town (Semi-Urban Area)	Iguomon Town (Rural Area)
Environmental Impacts	Major environmental problems included bad odour, air pollution, pests, flooding,	Environmental problems identified included bad odour, air pollution,	Environmental impacts identified included bad odour, air pollution, pests, flooding,

	water pollution, and soil contamination. Poor waste disposal affected drainage systems and environmental aesthetics.	flooding, soil contamination, and pests. Most respondents believed waste disposal affected drainage systems and environmental quality.	and soil contamination. However, drainage blockage was perceived to be less severe than in the urban and semi-urban areas.
Health Impacts	Residents reported health problems such as diarrhea, stomach upset, nausea, breathing difficulties, infections, cholera, malaria, and waterborne diseases linked to poor waste management.	Health impacts reported included malaria, asthma, fever, diarrhea, and pest-related illnesses, although the severity was generally considered moderate.	Few respondents reported direct health impacts, but malaria and sickness related to poor sanitation were identified as common health concerns.
Suggestions for Improvement	Respondents suggested environmental awareness campaigns, and improved drainage systems.	Recommendations included awareness campaigns, and stricter enforcement of sanitation laws.	Respondents recommended regular inspections, environmental sanitation exercises, and improved waste collection services.

The table summarizes respondents' views on environmental and health impacts responses to waste management issues. The findings revealed that environmental challenges such as bad odour, air pollution, flooding, pests, and drainage blockage were common in the study areas, although the severity varied among the communities. Health issues associated with poor waste management included malaria, diarrhea, respiratory problems, and waterborne diseases.

5. FINDINGS

This study assessed the environmental impact of solid waste management practices in Okada (urban area), Usen (semi-urban area), and Iguomon (rural area) in Ovia North East Local Government Area of Edo State. The findings obtained from the questionnaire responses revealed significant differences and similarities in environmental impacts, and health effects responses across the three communities.

- Environmental problems identified in the study included bad odour, air pollution, flooding, drainage blockage, soil contamination, water pollution, and increase in pests such as flies and mosquitoes.
- These environmental impacts were more severe in Okada due to higher waste generation and population density.
- Most respondents agreed that poor waste disposal negatively affects environmental aesthetics and drainage systems.
- The study also revealed that poor waste management practices contributed to several health challenges among residents. Common health problems reported included malaria, diarrhea, cholera, asthma, respiratory difficulties, stomach upset, skin infections, waterborne diseases, and other sanitation-related illnesses. However, the severity of health impacts was perceived to be moderate in most of the communities.

6. CONCLUSION

The study concluded that poor solid waste management practices in Okada, Usen, and Iguomon are generally inadequate and unsustainable. These practices have contributed significantly to environmental pollution, drainage blockage, unpleasant odour, air pollution, water contamination, and deterioration of environmental aesthetics. The study further concluded that improper solid waste management poses serious public health risks to residents through the spread of diseases such as malaria, diarrhea, cholera, respiratory infections, and other sanitation-related illnesses. Although the severity of impacts varied across the urban, semi-urban, and rural areas, the overall environmental and health implications of poor waste management were evident in all the communities studied.



7. RECOMMENDATIONS

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

- i. Environmental sanitation laws and regulations should be strictly enforced to discourage indiscriminate dumping, open burning, and other improper waste disposal practices.
- ii. Environmental health officers should conduct regular inspections and monitoring of communities to ensure compliance with waste management regulations.

8. FUNDING DECLARATION

All authors certify that they have no affiliations with or involvement in any organisation or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript. No funding was received.

9. HUMAN ETHICS AND CONSENT TO PARTICIPATE DECLARATION

The study complied with the ethical requirements for human participant research. Informed consent was obtained from all participants involved in this study before questionnaire administration. Participation was voluntary, and personal names were not required. Respondents were informed of the objectives of the study, confidentiality of responses, and their right to withdraw at any stage without consequences.

10. ETHICS APPROVAL

This study involved minimal risk survey procedures. Departmental permission was obtained before data collection.

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Cite this Article: Ogoamaka, E.M., Eseoghene, O.G., Ayomide, A.S., Osagie, O. (2026). Environmental and Public Health Impact Assessment of Solid Waste Management Practices in Ovia North East, Edo State, Nigeria. International Journal of Current Science Research and Review, 9(7), pp. 3902-3911. DOI: <https://doi.org/10.47191/ijcsrr/V9-i7-31>