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Assessment of Waste Disposal Methods, Hygiene Practices, and Awareness among Informal Internally Displaced Persons (IDPs) in Maiduguri Metropolitan Area, Nigeria

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Abstract

This study provides an in-depth assessment of waste disposal methods, hygiene practices, and awareness among IDP residents in selected informal Internally Displaced Persons (IDP) camps within Maiduguri Metropolitan, Borno State, Nigeria. The research was necessitated by the growing concerns surrounding public health and environmental safety in informal IDP settlements, which host thousands of individuals displaced by insurgency. A total of 400 respondents were sampled using structured questionnaires, while additional insights were gathered through interviews with key stakeholders and direct field observations. The data were analyzed using descriptive statistics and simple percentage distributions to present a clear understanding of prevailing sanitation challenges. Findings indicate severe inadequacies in sanitation infrastructure across the camps. Waste management practices were also found to be substandard. Open dumping (45%) and burning of waste (24%) remain the dominant disposal methods, contributing to environmental pollution and creating breeding grounds for disease vectors. Consequently, the prevalence of sanitation-related illnesses is alarmingly high. Diarrhea (44%), typhoid fever (26%), cholera (16%), and skin infections (14%) were commonly reported among camp residents, underscoring the direct link between poor sanitation and adverse health outcomes. The study concludes that informal IDP camps in Maiduguri Metropolitan face critical sanitation and public health challenges that demand urgent, targeted interventions. It recommends collaborative efforts by government agencies, non-governmental organizations, humanitarian actors, and community leaders to improve sanitation infrastructure, ensure access to safe drinking water, establish effective waste management systems, and strengthen health education campaigns. These measures are essential for safeguarding the well-being of displaced populations and mitigating the public health risks associated with poor sanitation.

Keywords: IDPs (Internally Displaced Persons), Waste disposal methods, Hygiene practices, Awareness among IDP residents, Maiduguri metropolitan.

Introduction

Internal displacement remains a major humanitarian and public health challenge in Nigeria, particularly in the North-East region where prolonged insecurity has resulted in large populations of

Internally Displaced Persons (IDPs). Maiduguri Metropolitan in Borno State hosts a significant number of IDPs living in both formal and informal camps. Informal IDP camps, which often emerge spontaneously within urban and peri-urban areas, are typically characterised by inadequate infrastructure, limited access to basic services, and weak environmental health support systems (Odedairo, 2025).

Waste disposal methods and hygiene practices are critical determinants of health in displacement settings. Inadequate wastewater disposal and poor hygiene behaviors contribute to environmental contamination and the proliferation of disease vectors and sanitation-related diseases such as diarrhea, cholera, typhoid, fever, and malaria. These risks are heightened in informal IDP camps due to overcrowding, insufficient sanitation facilities, and irregular access to clean water (Benny, 2025).

In Maiduguri Metropolitan, the rapid expansion of IDP camps has placed additional pressure on already strained water and sanitation systems. These camps are not integrated into municipal planning and therefore lack organized wastewater disposal systems, drainage infrastructure, and consistent hygiene promotion programmes (Okwute, Okwute & Ibrahim, 2020). As a result, residents often rely on improvised water disposal methods that may compromise environmental quality and public health, both within the camps and in surrounding host communities.

Beyond infrastructural challenges, awareness and knowledge of appropriate water disposal and hygiene practices play a crucial role in shaping health-related behaviors among IDP residents (Tahlil *et al.*, 2025). However, displacement disrupts social structures and access to health education, potentially limiting the adoption of safe practices. Understanding the level of awareness and prevailing hygiene behaviors in informal IDP camps is therefore essential for designing effective, context-specific interventions (Cantor *et al.*, 2021).

This study examines water disposal methods, hygiene practices, and awareness among IDP residents of informal internally displaced persons' camps in Maiduguri Metropolitan. The findings aim to provide evidence to inform public health interventions, urban environmental management, and humanitarian responses targeted at improving environmental hygiene and reducing disease risks among displaced populations.

The rapid increase in the population of IDPs in Maiduguri Metropolitan has led to the emerging expansion of numerous informal IDP camps that operate outside formal planning and service delivery frameworks (Nggada *et al.*, 2025). These informal settlements are often characterised by overcrowding, inadequate sanitation facilities, and the absence of organized waste management systems. As a result, waste is frequently disposed of through unsafe methods such as open dumping, indiscriminate burning, and disposal into open spaces and drainage channels, creating unsanitary living conditions (Nyathi, 2025).

Poor waste disposal practices, when combined with inadequate personal and domestic hygiene behaviors, pose serious environmental and public health risks, including the spread of water and sanitation-related diseases. Despite these risks, residents of informal IDP camps often have limited access to hygiene education and environmental health information, which may negatively affect their awareness and adoption of safe waste management practices. Furthermore, informal IDP camps are frequently excluded from municipal waste collection services and environmental health monitoring, leaving critical gaps in intervention and policy responses.

Although several studies have examined sanitation and hygiene conditions in formal displacement settings, there is limited empirical evidence on waste disposal methods, hygiene practices, and awareness among residents of informal IDP camps in Maiduguri Metropolitan. This lack of localized data constrains effective public health planning and the development of targeted interventions. Addressing this gap is essential for improving environmental hygiene, reducing disease vulnerability, and enhancing the overall well-being of the IDP population in informal settlements in Maiduguri Metropolitan, Borno State, Nigeria.

The primary aim of this study is to assess waste disposal methods, hygiene practices, and awareness among IDP residents in selected informal IDP camps within Maiduguri Metropolitan. Consequently, the specific objectives include assessment of existing waste disposal methods and their environmental impact; examination of the hygiene practices and awareness among IDP residents; and the investigation of health implications associated with poor sanitation in informal camps.

Materials and method

The study area for this research is Maiduguri Metropolitan, the capital city of Borno State, located in the northeastern part of Nigeria. Maiduguri serves as the political, economic, and administrative center of the state and has become a focal point for humanitarian response efforts due to the ongoing insurgency that has displaced millions of people within the region (Figure 1).

Maiduguri is located between latitudes 11°40'N and 11°55'N, and longitudes 13°00'E and 13°20'E. It lies within the Sudano-Saharan ecological zone of Nigeria. The city serves as the headquarters of the Maiduguri Metropolitan Council (MMC) and Jere Local Government Area (LGA) (Buba *et al.*, 2024). The metropolitan area covers an estimated 543 square kilometers and shares boundaries with Konduga LGA to the south, Mafa LGA to the east, and Nганzai LGA to the north. Its strategic position along major highways connecting Nigeria to Cameroon, Chad, and the Niger Republic enhances its regional importance (Buba *et al.*, 2024).

This study focuses specifically on selected informal IDP camps within the Maiduguri Metropolitan area. These camps emerged due to the prolonged conflict and population displacement caused by the Boko Haram insurgency. The research area was chosen because it contains a high concentration of displaced populations and varying sanitation conditions that have significant implications for public health and humanitarian response.

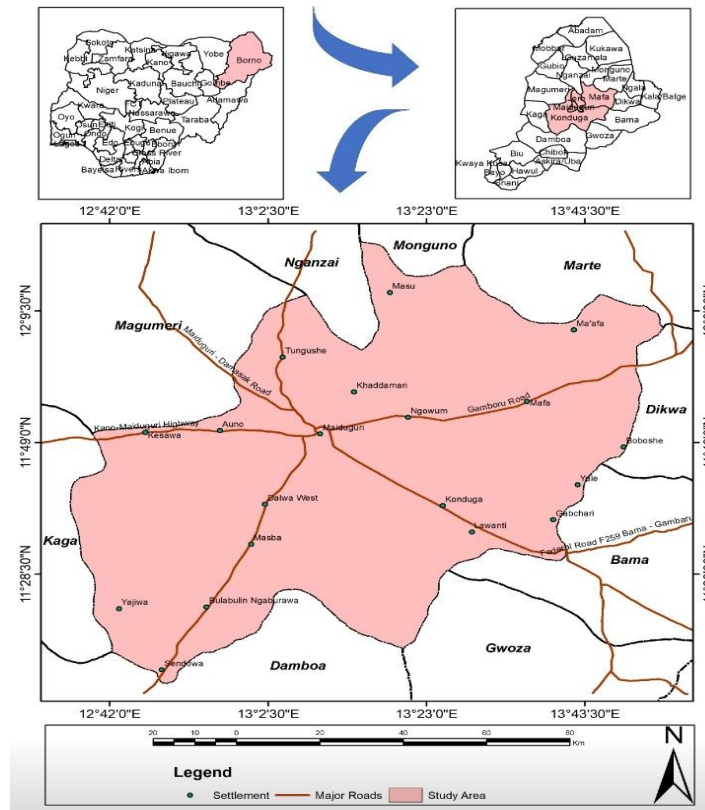


Figure 1: Locator Map showing Nigeria, Borno and the study area

Source: Adapted from the Administrative map of Borno state, Maiduguri, 2026
Adapted from the Administrative map of Borno State, Maiduguri, 2026

Data Collection

Data for the research were obtained from two major sources. These include primary and secondary sources. Primary data were collected directly from the field through structured questionnaires for IDP residents, Interviews with camp leaders, health and sanitation officers, and direct observation of sanitation facilities and waste management practices. The secondary data for this study were sourced from both published and unpublished materials, reports, and documents from BOSEMA, UNICEF, WHO, NGOs, and relevant academic research on sanitation and displacement in Borno State.

This section describes the methods and procedures adopted in carrying out the study. It covers the study population, sample size and sampling technique, sources of data, data collection instruments, and methods of data analysis. The population of this study comprises residents of selected informal IDP camps within Maiduguri Metropolitan, as well as key stakeholders such as camp leaders, sanitation workers, health officials, and local government representatives. These groups are directly involved in the management and experience of sanitation conditions in the camps.

Sample Size and Sampling Techniques

The sample size for this research consists of 400 respondents selected from four major informal IDP camps in Maiduguri. The respondents included both male and female camp residents, health officers, sanitation personnel, and camp leaders.

Sixty-one (61) IDP camps were identified in Maiduguri metropolis namely: Teachers village, Garba Buzu Quarters, Federal Low-Cost camp, Living Faith camp, Bullet Quarters camp, Sabon Gari 2, Shuwari 5 camp, Dogongida Camp, Dala standard, Beni Farin Gada, Karantina, Ansar camp, Real Form camp, Umarari Borehole camp, Doron Baga camp, Doro camp, Biafra camp, Kasuwa Shanu Gidan Kifi, Alamin Dagash garage, EYN camp, Dujima camp, DCC Shuwari camp, Grema Mohammed Company, Gidan Mandara, Old INEC camp, Marte camp, Railway Terminus camp, Pampas Street, Kangarmak A camp, NYSC camp, Borno, Bakasi camp, St. Hillary, Suleimanti, Kaduwa I, Kudawa II, Ali Dawari I, Bulabulin Gaura, Ajiri I, Awulan camp, Yajuwa camp Kushi, Kushi Bulamari, Abulam, Basugu camp, Musune, Kuru camp, Ajiri II, Goni Kyarimi, Kori camp, Umarari camp, Karshen Kwalta camp, Flatari Farin Ruwa, 40 House camp, V.I.O. camp, Abatchari camp, Yejiwa borehole camp, Borgozo camp, Mashidimam E camp, Stadium camp, Bulamari camp and Kuwar Maila.

Ten (10) camps were randomly sampled by writing all the sixty-one (61) IDPs on folded pieces of paper and inserting them in a lidded container, shaking it vigorously, and randomly picking ten (10) names. After this process was followed through, the IDP's picked were Bullet Quarters camp, Dala Standard, Umarari Borehole camp, Alamin Dagash garage, Gidan Mandara, Pampas Street, Bulabulin Gaura, Musune Kuru camp, Karshen Kwalta camp, and Stadium camp.

A stratified random sampling technique was used. Each camp served as a stratum, from which forty (40) respondents were randomly chosen to ensure fair representation across different camps and stakeholder categories.

Data analysis and interpretation

The main objective of this section is to assess waste disposal methods and hygiene practices, and awareness among IDP residents in selected informal Internally Displaced Persons (IDP) camps within Maiduguri Metropolitan, Borno State, Nigeria, identify prevalent challenges, and examine the implications of these conditions on the health and well-being of the IDP population. The responses have been analyzed using simple percentage tables and descriptive analysis.

The most common methods of waste disposal in the informal camps are dumping in open spaces, which accounts for 45% of respondents. This method leads to environmental pollution and provides breeding grounds for flies and other disease vectors, and this aligns with the study of [Babatunde et al. \(2025\)](#), which was conducted at selected dumpsites in Akure Metropolis. Only 18% reported any form of organized waste collection, which is insufficient for a population as dense as that in IDP camps (Table1).

Table 1: Method of Waste Disposal

Dumping in Open Spaces	180	45.0%
Burning	96	24.0%
Burying	52	13.0%
Organized Collection	72	18.0%
Total	400	100%

Source: Field Survey, 2025

In table 2, Diarrhea is the most frequently reported illness, affecting 44% of respondents. Typhoid and cholera also pose significant health threats due to unsafe water and inadequate sanitation practices. The presence of skin infections indicates poor personal hygiene and water scarcity. These health outcomes confirm the link between poor sanitation and increased vulnerability to disease and the agrees with a study by [Amicizia et al. \(2019\)](#) who investigated typhoid fever and cholera which are diseases that typically affect

Table 2: Common Sanitation-Related Illnesses Reported

Diarrhea	176	44.0%
Cholera	64	16.0%
Typhoid Fever	104	26.0%
Skin Infections	56	14.0%
Total	400	100%

Source: Field Survey, 2025

Low, and middle-income countries where housing is overcrowded and water and sanitation are poor, or where conflicts or natural disasters have led to the collapse of the water, sanitation and healthcare systems, like IDP camps in Maiduguri Metropolitan.

The Health Implications Associated with Poor Sanitation in Informal Camps

The investigation of health implications associated with poor sanitation in informal internally displaced persons (IDP) camps in Maiduguri Metropolitan focuses on understanding how inadequate environmental conditions affect the wellbeing of displaced populations. Informal IDP camps in the area are often established spontaneously in response to prolonged insecurity, without adequate planning for water supply, sanitation facilities, or waste management. As a result, residents are exposed to unhygienic living conditions that increase their vulnerability to disease, which agrees with a study by Tahlil et al. (2025), who assessed the knowledge, attitudes, and practices of Internally Displaced Persons, regarding water, sanitation, and hygiene.

Findings from the investigation indicate that limited access to safe drinking water, widespread open defecation, poorly constructed latrines, and indiscriminate solid waste disposal are common features of

these camps. These conditions contribute directly to the contamination of water resources and the proliferation of disease vectors such as flies and mosquitoes, and this tallies with the study by Mala, Gajerima, Usman and Bult (2025), who averred that poor and unsafe access to Water, Sanitation and Hygiene (WASH) plays a key role in the transmission of various diseases. Consequently, camp residents experience a high prevalence of sanitation-related illnesses, particularly diarrhea diseases, cholera-like symptoms, malaria, and skin infections. Children, pregnant women, and the elderly are especially at risk due to their weaker immune systems and greater exposure to contaminated environments, which is in line with the study by Yitageasu *et al.* (2025), whose systematic review and meta-analysis aimed to quantify the global prevalence of diarrhea in these vulnerable groups.

The investigation reveals that overcrowding within the camp exacerbates health burden by facilitating rapid disease transmission and placing additional pressure on already inadequate sanitation facilities, which agrees with the study by Abuzerr, Hamdan and Charafeddine (2025), who aimed to assess the prevalence of waterborne illness symptoms and evaluate water quality, sanitation conditions, and associated risk factors among internally displaced persons in Gaza. Poor drainage and stagnant wastewater further create breeding grounds for mosquitoes, intensifying the incidence of vector-borne diseases. In addition, low levels of hygiene awareness and limited access to hygiene materials such as soap and clean water hinder effective personal and household sanitation practices, which is in tandem with the study by Chowdhury, Raihan, Islam, and Abdullah (2025), whose study identified the most influential parameters related to drainage infrastructure, water quality, and environmental factors for preventing mosquito breeding in the urban drainage system.

Overall, the investigation demonstrates a strong link between poor sanitation conditions and adverse health outcomes in informal IDP camps in Maiduguri Metropolitan. Poor sanitation in informal IDP camps poses significant risks, including diarrheal diseases, parasitic infections, vector-borne diseases, and broader psychosocial impacts. A rigorous investigation, combining environmental assessment, health surveillance, and community engagement – is necessary to quantify these impacts and inform effective public health responses. Addressing sanitation challenges is not only a humanitarian imperative but also foundational for protecting health and dignity among displaced populations, which agrees with the study by Hamza, George-Opuda, Ukoha-Onuoha and Bealo (2025), with their systematic review examining the effectiveness, challenges, and innovations of emergency WASH interventions in internally displaced persons (IDP) camps across sub-Saharan Africa.

Conclusion

This study reveals that waste disposal methods and hygiene practices among residents of informal IDP camps in Maiduguri Metropolitan Area remain largely inadequate, with low levels of awareness and limited access to appropriate sanitation facilities. The predominance of improper waste disposal practices exposes residents to heightened environmental and public health risks, particularly communicable and water-related diseases.

Although some level of hygiene awareness exists, it is constrained by overcrowding, poverty, and insufficient institutional support. Strengthening hygiene education, improving access to safe and affordable waste management facilities, and fostering collaboration between government agencies, humanitarian organizations, and camp residents are essential for enhancing environmental health outcomes. Sustainable and context-specific interventions are therefore critical to improving living conditions and safeguarding the health of IDP populations in Maiduguri. Water is life. Without it, even the safest camp cannot offer real relief to displaced people, and so if IDPs in Maiduguri need to live with dignity and hope, supply and access to clean, reliable water is a top priority for them.

Recommendations

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

1. Government and humanitarian agencies should provide adequate waste disposal facilities, including communal bins and designated dumping points, within informal IDP camps.

2. Regular waste collection and environmentally safe disposal methods should be implemented to reduce indiscriminate dumping.
3. Targeted hygiene education and awareness programs should be strengthened, focusing on hand washing, safe water use, and household waste management.
4. Community-based sanitation committees should be established to promote resident participation, monitoring, and maintenance of hygiene standards.
5. Improved access to basic sanitation infrastructure, such as latrines and hand washing stations, should be prioritized to enhance public health outcomes.

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