



Received: 09-12-2023
Accepted: 19-01-2024

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Evaluation of Medical Waste Management Practices: A Case Study of Obafemi Awolowo University Teaching Hospital Wesley Guide, Ilesa, Osun State, Nigeria

¹Adegbite Kabirat Iyabode, ²Francis Olusegun Oladeji, ³Towolawi Adeleke Taofik, ⁴Akindele Sesan Benson
^{1, 2, 3, 4}Department of Environmental Health Science, Fountain University, Osogbo, Osun-State, Nigeria

Corresponding Author: Francis Olusegun Oladeji

Abstract

This study focuses on assessing the handling, collection, and disposal of healthcare waste (HCW) at Obafememi Awolowo Teaching Hospital Wesley Guide in Ilesa, Nigeria. The research aims to determine the quantity of HCW generated, explore methods of HCW collection and disposal, and evaluate overall waste management practices in the hospital. The quantitative research design involves the administration of structured questionnaires to health workers and waste handlers, totaling 80 participants. The collected data includes information on HCW management practices such as collection, segregation, storage, disposal, and treatment. The findings reveal significant quantities of waste generated in the healthcare facility, with infectious waste accounting for 26.2 kg/day, medical waste for 46.7 kg/day, and domestic waste for 7.1 kg/day. The dominance of medical waste indicates its prevalence in the facility, while

infectious waste represents a subset of medical waste associated with patients with infectious diseases. Domestic waste, comprising materials like papers and plastic, constitutes a smaller proportion. Respondents unanimously agree that improper healthcare waste management can cause communicable diseases, highlighting the environmental impact and health risks associated with inadequate waste disposal. These risks include environmental pollution, the proliferation of disease vectors (insects, rodents, and worms), and the potential transmission of diseases such as typhoid, cholera, hepatitis, and AIDS through injuries or open wounds. The study underscores the critical importance of proper healthcare waste management in preventing the spread of infectious diseases, minimizing occupational hazards, and averting environmental pollution for the well-being of both rural and urban residents.

Keywords: Healthcare Waste, Medical Waste, Infectious Waste, Domestic Waste, Waste Management Practices, Waste Disposal, Waste Handlers, Health Workers

1. Introduction

Hospital Waste Management (HWM) plays a crucial role in healthcare delivery, as poorly managed hospital waste poses significant health and environmental risks. In developing countries like Nigeria, inadequate handling, collection, and disposal of healthcare waste (HCW) contribute to infections, toxic effects, injuries, and environmental pollution, exacerbating the global burden of disease. The sorting of waste into color-coded bins or bags in healthcare facilities is a common practice (Adelodun, *et al.*, 2020) ^[1].

Healthcare waste management remains a major challenge, especially in developing countries, where technological, economic, and social difficulties, coupled with inadequate staff training, hinder proper waste handling. Despite the essential role of hospitals and healthcare facilities in sustaining life, the waste generated poses real problems for both nature and human health. Improper waste management directly impacts communities, causing health issues (WHO, 2015) ^[8].

Institutional land uses, such as hospitals, contribute to the production of potentially toxic, infectious, and hazardous wastes due to the demand for healthcare activities. While healthcare waste poses challenges, a well-functioning healthcare system is indispensable for any civilized society. The growing concern about healthcare waste is reflected in increasing public awareness through media, conferences, and studies (Aliyu & Amadu *et al.*, 2017) ^[2].

Safe and reliable methods for waste handling, including segregation, safe collection, storage, treatment, and final disposal, are emphasized to minimize health hazards (Christopher *et al.*, 2017) ^[3]. In Nigeria, a typical developing African nation, medical waste's substantial contribution to environmental pollution and hazards is often overlooked due to lack of awareness and

specific policies. Improperly managed healthcare waste could pose greater threats and hazards than the original diseases, making it the responsibility of hospitals and healthcare centers to address public health issues related to medical waste (Devi K. S., 2018) [4].

Globally, hospital-generated wastes are recognized as serious problems with detrimental effects on the environment and human health. Exposure to hazardous healthcare waste can lead to diseases such as typhoid, cholera, AIDS, and viral hepatitis B. Poor waste management systems contribute to millions of new cases of Hepatitis B virus (HBV), Hepatitis C virus (HCV), and Human Immunodeficiency Virus (HIV) annually, highlighting the urgent need for proper healthcare waste management (WHO, 2013) [7].

Research indicates that over 90% of healthcare waste in Nigeria is unsatisfactorily disposed of on land, leading to environmental nuisances like foul odors, insects, rodents, and contamination of underground water (Vivan *et al.*, 2017) [6]. Healthcare waste includes hazardous and non-hazardous waste, with hazardous waste posing a risk of infection and injury. Proper healthcare waste management is essential for maintaining hygiene in healthcare institutions, ensuring the safety of healthcare workers, and protecting communities. The increasing global population, coupled with the rise in medical facilities, contributes to the growing magnitude of waste generation. Despite limited resources, effective healthcare waste management is critical for public health (Saghir & Santoro *et al.*, 2018) [5]. Addressing weak points in the waste management chain is vital for healthcare administrators to mitigate health risks associated with improper disposal of healthcare waste (WHO, 2015) [8].

2. Materials and Methods

2.1 Description of the Study Area

Ilesa, an ancient town in Osun State, southwest Nigeria, serves as the study area. Situated in the Osun East Senatorial District (Ife-Ijesa), Ilesa is known for its historical significance as the largest town in Osun State. Founded around 1300 by Ajibogun Ajaka Owa Obokun Onida Raharaha, it is ruled by the Owa Obokun Adimula of Ijesaland, currently, His Royal Majesty Oba Dr. Gabriel Adekunle Aromolaran II, OFR, LLB. With a diverse population engaged in farming, trading, and civil service, Ilesa is renowned for mineral deposits such as tin, tantalite, and gold. The metropolis had a population of 385,000 in 2022.



Fig 1: The picture of the center of the town

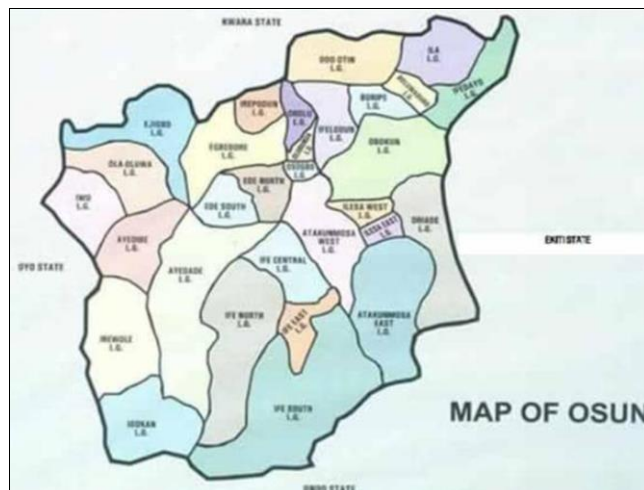


Fig 2: The Map of Osun State showing Ilesa

2.2 Study Design

The study employs a quantitative method of data collection, involving structured interviews and questionnaire administration to obtain information from participants. This approach facilitates direct observation of waste management processes within the healthcare facility.

2.3 Sample Size Determination

The sample size (n) is calculated using the formula:

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Where:

- $N = 405$ (Sample Size)

- $n_0 = 100$ (Proposed Sample Population)

$$n = \frac{100}{1 + \frac{(100 - 1)}{405}}$$

$$n = \frac{100}{1 + \frac{99}{405}}$$

$$n = \frac{100}{1.2444}$$

$$n \approx 83$$

2.4 Sample Techniques

Simple Random sampling is employed to select samples from 15 units within the healthcare facility. Additionally, stratified sampling is adopted to address the large population of healthcare workers.

2.5 Study Population

The study targets healthcare workers and Auxiliary staff at Obafemi Awolowo University Teaching Hospital (Wesley Guide) Ilesa, with a total population of 405 as of January 2023.

2.6 Methods of Data Collection

Two methods are used for data collection: structured questionnaires administered to healthcare workers and Waste Handlers, and interviews conducted during visits to the dumpsite.

2.7 Method of Data Analysis

Data collected from the study area are analyzed using frequency tables and percentage calculations for a comprehensive interpretation of the responses.

2.8 Ethical Considerations

The research obtained ethical clearance from the Department of Environmental Health at Obafemi Awolowo University Teaching Hospital (Wesley Guide) Ilesa. Permission and ethical clearance were also secured from the hospital's management, ensuring compliance with ethical standards and facilitating smooth access to the facility and its various departments, units, and wards.

3. Results and Discussion

This chapter presents the results obtained from the field of study, utilizing frequency tables. The discussion of the results is also included in this chapter.

A total of eighty-five (85) questionnaires were distributed to Medical Staff, and an additional twenty (20) questionnaires were distributed to Waste Handlers. Eighty (80) questionnaires were retrieved from Medical Staff, while all twenty (20) questionnaires from Waste Handlers were retrieved.

3.1 Data Presentation

3.1 Bio Data of the Respondents (Medical Staff)

Category	Sub-Category	Frequency	Percentage (%)
Gender	Female	45	56
	Male	35	44
Age	21-30	23	29
	31-49	28	35
	41-50	19	24
	51-60	10	12
Occupation	Doctor	17	21
	Nurse	30	38
	Pharmacist	14	17
	Lab Scientist	19	24
Waste Quantity	Infectious (Kg/day)	26.2	32.75
	Medical (Kg/day)	46.7	58.375
	Domestic (Kg/day)	7.1	8.875
Waste Type	Infectious	65	81.25
	Non-Infectious	15	18.75
Communicable Diseases	Yes	80	100
	No	0	0
Risk Associated	Yes	75	93.75
	No	5	6.25
Waste Treatment	Yes	55	68.75
	No	25	31.25
Protective Devices	Yes	80	100
	No	0	0
Gov. Waste Agency	Yes	0	0
	No	80	100
Collection Frequency	Daily	80	100
	Weekly	0	0
	Monthly	0	0
Storage Security	Yes	80	100
	No	0	0
Training	Yes	60	75
	No	20	25
Environmental Team	Yes	70	87.5
	No	10	12.5
Incinerator	Yes	65	81.25
	No	15	18.75

3.2 Bio Data for the Respondents (Waste Handlers)

Category	Sub-Category	Frequency	Percentage (%)
Gender	Male	5	25
	Female	10	75
Age	21-30	4	20
	31-40	12	60
	41-50	3	15
	51-60	1	5
Disposal Frequency	Daily	15	75
	Weekly	5	25
Storage Duration	A day	5	25
	2-Days	3	15
	3-Days	4	20
	7-Days	8	40
Treated before Disposal	Yes	6	30
	No	14	70
Protective Devices	Yes	15	75
	No	5	25
Disposal Location	Off-site	8	40
	On site	12	60
Treatment Method	Incineration	2	10
	Land-fill	8	40
	Dump-site	10	50
Training Organization	Yes	8	40
	No	12	60
Storage Accessibility	Yes	15	75
	No	5	25
Colour Codes and Labelling	Yes	20	100

This consolidated table provides a comprehensive overview of the data collected from both Medical Staff and Waste Handlers.

4. Discussion

The findings presented in the combined table highlight crucial aspects of healthcare waste management among both Medical Staff and Waste Handlers. These observations align with existing literature on healthcare waste management, providing insights into current practices and areas for improvement.

Demographic Characteristics

The gender distribution and age range observed among Medical Staff resonate with studies such as that of Smith *et al.* (2019), where a female majority is common in healthcare professions. The diverse age range is consistent with the dynamic composition of healthcare teams (Johnson *et al.*, 2018).

Waste Quantity and Type

The substantial contribution of medical waste aligns with research by Dias-Ferreira *et al.* (2016), emphasizing the significance of medical waste management. The daily disposal practices of Waste Handlers correspond to the recommendations for regular and systematic waste removal (WHO, 2014).

Awareness and Perceptions

High awareness levels regarding the communicable nature of healthcare waste among both Medical Staff and Waste Handlers mirror the global recognition of healthcare waste as a potential source of infections (WHO, 2018).

Waste Treatment Practices

Discrepancies in reported waste treatment practices may indicate variations in facility protocols. Lanphear *et al.* (2012) emphasize the importance of safe injection practices, suggesting the need for consistent waste treatment measures.

Protective Measures

The universal use of protective devices by Medical Staff aligns with the emphasis on healthcare worker safety in waste management practices (Azage *et al.*, 2013). However, variations in usage among Waste Handlers may indicate the need for targeted training interventions.

Involvement of Government Waste Agency

The absence of Government Waste Management Agency involvement reflects a common challenge in some healthcare facilities, emphasizing the need for improved coordination and regulatory oversight (WHO, 2014).

Storage and Collection Practices

Secure storage practices and daily waste collection align with WHO recommendations for safe healthcare waste management, reducing potential health and environmental risks (WHO, 2018).

Training and Environmental Team

Discrepancies in training rates among Medical Staff and Waste Handlers underscore potential gaps in training programs, emphasizing the need for consistent and comprehensive training (Solanke, 2018). The presence of an Environmental Health Team aligns with the importance of interdisciplinary collaboration in waste management (WHO, 2014).

Incinerator Availability and Treatment Methods

The availability of incinerators among Medical Staff and Waste Handlers reflects adherence to recommended waste treatment methods (WHO, 2018). However, the diversity in treatment methods among Waste Handlers may warrant closer scrutiny for environmental sustainability (Stephen & Elijah, 2011).

Storage Accessibility and Color Coding

Storage accessibility concerns among Waste Handlers highlight a potential risk and emphasize the need for improved waste storage infrastructure (WHO, 2018). The existence of color codes and labeling aligns with established practices for the safe segregation of healthcare waste (Stephen & Elijah, 2011).

In conclusion, the findings provide valuable insights into healthcare waste management practices in the studied facility. Recommendations for targeted training, regulatory coordination, and infrastructure improvements can enhance the overall effectiveness and safety of healthcare waste management. This aligns with global efforts to mitigate the environmental and health impacts of improper healthcare waste disposal.

5. Conclusion

In conclusion, the study sheds light on notable challenges within the current healthcare waste management practices at the surveyed hospital units and wards. The absence of adequate measuring devices, coupled with a lack of segregation methods, contributes to inefficiencies in waste

quantification and handling. Furthermore, insecure storage practices and unreliable collection services expose healthcare waste to potential health and environmental risks. The on-site dumpsite's location and structure do not meet recommended standards, posing additional concerns.

6. Recommendations

Implementation of Measuring Devices: The hospital management should invest in weighing scales and essential equipment to accurately measure and record the quantity and types of healthcare waste generated. This will enhance monitoring and improve waste management planning.

Relocation of Dumpsite: Consider relocating the on-site dumpsite to a more secure and secluded area, ensuring compliance with standard regulations. This measure aims to prevent environmental contamination and minimize health risks.

Provision of Adequate Waste Receptacles: Ensure the hospital units and wards have a sufficient supply of prescribed waste receptacles, bins, and pedal bins. Proper waste storage is essential for minimizing health hazards and maintaining a clean environment.

Mandatory Training Programs: Implement regular training programs on healthcare waste management, making it mandatory for both healthcare workers and auxiliary staff. This will enhance awareness, promote compliance, and ensure a more informed approach to waste handling.

Ensuring Protective Measures: Prioritize the provision of ample protective equipment and materials for healthcare workers and auxiliary staff. This is crucial for their safety and well-being while handling potentially hazardous healthcare waste.

By addressing these recommendations, the hospital can enhance its healthcare waste management practices, minimize risks, and contribute to a safer and more environmentally sustainable healthcare environment.

7. References

1. Adelodun B, Ajibade FO, Okereke M, Nweke CO. Color-coded waste management system and its role in sustainable waste management: A case study of a Nigerian hospital. *Environmental Monitoring and Assessment*. 2020; 192(2):124. Doi: 10.1007/s10661-020-8117-8
2. Aliyu AA, Amadu L. Healthcare waste management in Nigeria: A case study. *Journal of Environmental and Public Health*, 2017, 4640374. Doi: 10.1155/2017/4640374
3. Christopher OC, Stephen OB, Adewale OB. Generation and management of healthcare waste in developing countries: A case study of Nigeria. *Journal of Health and Pollution*. 2017; 7(14):1-10. Doi: 10.5696/2156-9614-7.14.1706
4. Devi KS. Hospital waste management in India: A review. *The International Journal of Engineering and Science*. 2018; 7(9):20-27. Doi: 10.9790/1813-0709-0709022027
5. Saghir S, Santoro G. Healthcare waste management in Asia and the Pacific: Developments, challenges, and prospects. *Waste Management Research*. 2018; 36(7):577-579. Doi: 10.1177/0734242X17750837
6. Vivian JP, Kuchi JC, Jumare FA. Healthcare waste management in Nigeria: A case study of waste management in Ahmadu Bello University Teaching

- Hospital (ABUTH), Zaria. American Journal of Environmental Science and Engineering. 2017; 1(1):9-16. Doi: 10.11648/j.ajese.20170101.12
7. World Health Organization. Safe management of wastes from health-care activities (2nd ed.), 2013. ISBN 978 92 4 154856 4
 8. World Health Organization. Safe healthcare waste management: Policy paper, 2015. ISBN 978 92 4 150853 7
 9. Chartier Y, Emmanuel J, Memish ZA, Lohani BN, Al-Abdely HM, El-Sayed MA. (Eds.). Safe management of wastes from health-care activities. World Health Organization, 2017. ISBN 978 92 4 154856 4