



doi 10.5281/zenodo.11523487

Vol. 07 Issue 05 May - 2024

Manuscript ID: #01408

SEGREGATION AND TREATMENT METHODS OF HEALTH CARE WASTE PRACTICED IN NEMBE: THE BAYELSA HEALTH ENVIRONMENT, NIGERIA

¹DR. SOLOMON M UVOH, ²LOKOBO J ABRAHAM, ³AZIBAYAM B ORUAMA, ⁴ODIKEME E DAVID

¹Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences University of port Harcourt, Rivers State Nigeria.

^{2,3}Department of Environmental Health Sciences, College of Health Technology, Bayelsa State Nigeria.

⁴Department of Community Health Sciences, College of Health Sciences Bayelsa State, Nigeria

*Corresponding Author: solomonu31@gmail.com

Abstract:

Aim: This study determine various treatment and segregation methods practiced in disposing HCW in Nembe LGA. A census sampling technique was adopted to select the participants for this study.

Results: The study consist of 27 males and 23 female staff subjects randomly interviewed in one hospital and 24 health centres. Findings from this study indicate that >40yrs make up the highest proportion of respondents while those between the ages of 20-29yrs are the least among the recruited respondents. The level of education among staff with ND and HND was far higher compared to staff with Msc degree and school cert. The study also reveal that the hospital visited has waste disposal containers around its premises. However containers were not observed in some health centres during the study period. The autoclave and microwave was effectively used in the hospital as a means of disinfecting health care instrument after use (44%) as against health centres of none but 12% of chemical use as means of disinfection. Also, revelation from this study indicate that *health care wastes generated at the Nembe General Hospital are moderately managed*. The study further reveal that both staff in the various facilities do regularly transfer sharp objects that have been used to the LGA headquarter for proper incineration.

Conclusion: Most health care centres dispose their HCW into the river, with bushy surrounding without regular fumigation of its environment. This has created an avenue for mosquitoes forming breeding sites leading to their increase in number with the possibilities of spreading malaria rapidly to both staff, patients and other subjects..

Keywords:

Incineration, health care, Waste, Segregation, Facilities



This work is licensed under Creative Commons Attribution 4.0 License.

INTRODUCTION

These are waste generated from health care activities such as used needles/syringes to soiled dressings, body parts, diagnostic samples, blood, chemicals, expired drugs, medical devices, radioactive materials etc. The activities of health care are responsible for production of unavoidable waste and when not properly managed can affect the environment and its inhabitants. It is an issue of increasing concern as health care facilities increases in number population growth reduces space for waste disposal. Waste generated by human activities and changes associated with lifestyles is a threat to humans and natural resources (Kwikiriza *et al.*, 2019; Lokoboet *et al.*, 2024).

Segregation or sorting is an essential practice in the management of HCW since considerable percentage of generated waste is often not hazardous, and can be handled as solid waste while the hazardous making lesser percentage requires specialized handling techniques that are often not cost-effective (Idowu, *et al.*, 2013; Uddin *et al.*, 2014). Poor segregation of waste cause increased quantity of infectious fragments due to contact with infectious parts (De Titto, *et al.*, 2013) Waste segregation is therefore a critical determinant of effective healthcare waste management (Etim, 2021). Deligent segregation of waste will result sufficient quantities of safer stream that would be cost-effective to manage through recycling, landfilling, and composting (Oli *et al.*, 2015). The standard practice is to use a color-coded bag or containers for segregation (Marinkovic *et al.*, 2008).

The simplest and safest waste segregation method is the use of the “three-bin system” where the collected waste is first separated into hazardous and nonhazardous general (which is usually larger in quantity) waste at the point of generation (WHO, 2016,2018; Ali *et al.*, 2017). Although earlier studies on health care management in Nigeria reported an absence of sorting/segregation in HCW management. However studies have shown that waste are segregated at facilities in Nigeria but with inconsistencies in the segregation methods (Afolabi *et al.*, 2017). Waste segregation is more commonly practiced in Lagos than other states in the country due to effective government health monitoring units and policies in the state (Nwankwo, 2018; Ezeokeet *et al.*, 2017). The absence or improper segregation of HCW have been reported in Iran, Pakistan, and Yemen (Bazrafstan&Mostafapoor, 2011; Ali, 2015, 2017). The treatment of medical waste involve the processing and disposal of the waste after treatment and subsequent disinfection of health workers that may have come in contact with the materials may not be a threat to others (Chisholm *et al.*, 2021; Oyekaleet *et al.*, 2017; Megan, 2019).

Types of Health Care Waste

Infectious Waste: These are blood waste contaminant from infected patients, cultures, body fluids, laboratory animals, materials, discarded medical devices/diagnostic samples with sufficient concentration of pathogens to transfer diseases to a potential host (Anozieet *et al.*, 2017; Nwachukwu *et al.*, 2013).

Pathological Waste: This include anatomical waste from either human or animal tissues or organs containing cells, blood and fluids are considered potential infectious waste (Umegboluet *et al.*, 2017).

Pharmaceutical Wastes: This include pharmaceutical products that are expired or unused such as bottles, tubes, discarded items, drugs, equipment etc (Aduseiet *et al.*, 2022; Abahet *et al.*, 2011).

Genotoxic Waste/Radioactive Waste: These waste are derives from drugs generally used in oncology or radiotherapy units with high hazardous mutagenic /cytotoxic effect. Radioactive waste includes

liquids, gas and solids contaminated with radionuclides whose ionizing radiations have genotoxic effects (Awodele *et al.*, 2016; Nwankwo *et al.*, 2018)).

Laboratory Waste

This includes chemicals used in the pathological laboratory, microbial cultures and clinical specimens, slides, culture dish, needles, syringes, Iodine-125, iodine -131 etc

RESEARCH METHODOLOGY

A descriptive research design was employed for this study.

Study Area

This study was conducted at the Nembe General government owned hospital in Ogbolomabiri and 24 health care facilities constructed by the government in Nembe LGA..

Study Population: The population for the study consists of registered and licensed health/medical practitioners and others present in the general Hospital and PHC centres during the study period.

Sample Size /Methods

Census sampling technique was adopted to select a total of 26 health care staff that were present in the hospital and a random sampling method for the 24 PHC respondents at the time of sample collection.

Data Collection

Data were collected through the use of questionnaire structured into 3 sections: (A) contained the demographic data, (B) and (C) contained questions under different subheadings of the research questions.

Ethical Consideration

Permission to carry out this research was duly obtained from the Ethical Research Committee of Bayelsa State College of Health Sciences.

Data Analysis: Data were analyzed using (SPSS Version 23) and results are expressed in frequency and percentage in tables.

RESULTS

Table 1: Response Distribution According to Gender, Age, Position, and Education

Parameters	Categories	Frequency (n = 50)	Percent (%=100.0)
Gender	Male	27	54
	Female	23	46
Total		50	100
Age	20-29	6	12
	30-39	19	38
	>40	25	50
Total		50	100
Position	Nurse	7	14
	Doctor	1	2

	Pharmacist	4	8
	Med Lab Scientist	4	8
	Record Staff	9	18
	Cleaners	6	12
	Environmental Health Officers	8	16
	CHEW	11	22
Total		50	100
Level of education	ND/Technician	19	38
	HND/Tertiary	19	38
	MSc	2	4
	Others (Secondary)	10	20
Total		50	100

Table 2: Primary Health Care Centres and Hospital with no Waste Collection Containers.

Variables	n	%
Presence of containers		
Hospital (Yes)	26	52
PHC (Yes)	10	20
PHC (No)	14	28
Hospital (No)	0	0
Total	50	100

Table 3: Adopted HCW Segregation and Disinfection Methods

Categories	Yes n(%)	No n(%)	Total
(PHC) Autoclave	0(0.0)	10(20)	10
(Hosp)	16(32)	-	16
(PHC) Incineration	-	-	-
(Hosp.)	-	-	-
PHC) Chemical disinfection	6(12)	-	6
(Hosp.)	-	4(8)	4
(PHC) Irradiation	0(0.0)	4(8)	4
(Hosp.)			
(PHC) Microwave	0(0.0)	4(8)	4
(Hosp.)	6(12)	-	6

Table 4: Health Care Waste Disposal Methods in Various Facilities

Categories	Yes n (%)	No n(%)	Total %
(Hosp.)Sanitary landfills	3(6)	23(46)	26(52)
PHC	2(4)	22(44)	24(48)
Aggregate	5	45	50(100)
(Hosp.) Incineration of sharp objects at LGA	26(52)	0(0.0)	26(52)
PHC	24(48)	-	24(48)
Aggregate	50	-	50(100)
(Hosp.) Pulverization	0(0.0)	26(52)	26(52)
PHC	-	24(48)	24(48)
Aggregate	-	50	50(100)
(Hosp.) Recycling	0(0.0)	26(100.0)	26(100.0)
PHC	10(20)	14(28)	24(48)
Aggregate	10	40	50(100)
(Hosp.) Dispose in the river	0(0.0)	26(100.0)	26(100.0)
PHC	24(48)	-	24(48)
Aggregate	24	26	50(100)

Table 5: Environmental Status of the Facilities

Variables	Yes (but not regular)	No	Once dly (General floors)	Twice dly (General floors)	Monthly	Twice Monthly	Total(%)
Grass clearing (No/%)	11(44)	-	-	-	12(48)	2(8)	25(100)
Cleaning per day(No/%)	-	-	22(88)	3(1)	-	-	25(100)
Presence of mosquitoes	25(100) yes						25(100)
Moping with disinfectant (No/%)	4(6)	21(84)	-	-	-	-	25(100)
Labor room Moping with	25	-	-	-	-	-	25(100)

disinfectant (No/%)							
Environ. Sanitation(No/%)	5(20)	-	-	-	18(72)	2(8)	
Fumigation (No/%)	5(20)	20(80)	-	-	-	-	25(100)
Regular Light supply (No/%)	7(28)	18(72)					25(100)

DISCUSSION

This study reveal 54% and 46% as males and females within the age range of 20-29 (12%), 30-39(38%) and above 40yrs (50%) as the highest percentage among the participants. However regarding the number and percentage of staff in the various health facilities, CHEW makes up the greater percentage number (22%) that is closely followed by record staff (18%), EHO (16%), nurses (14%) and doctors (2%) being the least among the number of workers in the hospital. The highest educational level of the workers was MSc (4%) while ND and HND dominate with 38% each but those with school cert were 20% among the interviewed population studied. The use of waste bin containers was encouraging in the hospital (52%) compared with the health centres of 20% to curb the spread of micro-organism.

The methods of treatment after use was autoclave (32%) and microwave (12%) by hospital staff compared with PHC workers of zero percent, though 12% engage in chemical disinfection practice. The waste disposal methods mostly practiced in the facilities covered during this study was the dumping of waste into rivers by most PHC cleaners while the hospital properly dispose their waste using sanitary landfills and the incineration of solid/sharp objects at the LGA headquarters level. However some health facilities adopted the recycling and landfill methods in disposing their waste.

Surroundings of most health facilities were bushy thereby creating an uncondusive environment for admitted patients and staff on duty most especially during the night as the number of mosquitoes and their breeding ground increases from bad to worse. This study also reveal that regular fumigation of the facilities environment and the application of germ killers detergents to waters used in cleaning labor rooms after delivery are not being practiced regularly in some health centres visited during the study. Moreso, most of the facilities are lacking regular supply of electricity except some few ones having solar panels installed.

CONCLUSION

Though most health facilities have waste containers for keeping waste before segregation and treatment methods. However EHO deployed to health facilities should improve and do their utmost to ensure that regular and proper fumigation of the environment are done as this will help to reduce the spread of malaria parasite and related hospital waste diseases among patients, health staff and others visiting the facilities. Also dumping of HCW into rivers should be discouraged.

CONFLICT OF INTEREST: There is no any form of conflict regarding interest declared among the authors.

REFERENCES

- Abah SO, &Ohimain EI (2011). Healthcare waste management in Nigeria: A case study. *J Public Health Epidemiol.* 2011;3(3):99–110.
- Adusei-Gyamfi, J.; Boateng, K.S.; Sulemana, A.; &Hogarh, J.N (2022). Post COVID-19 recovery: Challenges and opportunities for solid waste management in Africa. *Environ.*
- Afolabi, A.S.; Agbabiaka, H.I.; Afon, A.O.; Akinbinu, A.A.; &Adefisoye, E.A. (2017). Solid waste management practice in ObafemiAwolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife Nigeria. *Manag. Environ. Qual. Int. J.* 29, 547–571
- Ali, M.; Wang, W.; Chaudhry, N. Management of wastes from hospitals: A case study in Pakistan. *Waste Manag. Res.* 2015, 34, 87–90.
- Ali,M.;Wang,W.;Chaudhry,N.;Geng,Y. (2017) Hospitalwastemanagementindevelopingcountries: Aminireview. *WasteManag. Res.* 2017, 35, 1–12.
- Anozie OB, Lawani LO, Eze JN, Mamah EJ, Onoh RC, Ogah EO, Umezurike DA, &Anozie RO (2017). Knowledge, Attitude and Practice of Healthcare Managers to Medical Waste Management and Occupational Safety Practices: Findings from Southeast Nigeria. *J ClinDiagn* 11(3)1–4.
- Awodele O, Adewoye AA, &Oparah AC (2016). Assessment of medical waste management in seven hospitals in Lagos, Nigeria. *BMC Public Health.* 16:269.
- Babatola JO (2008). A Study of HCW generation and management practice in Akure, Nigeria. *African Research Review.* 2008;2(3):291–305.
- Bazrafstan, E.; Mostafapoor, F.K. (2011). Survey of medical waste characterization and management in Iran: A case study of Sistan and Bauchestan Province. *Waste Manag. Res.* 29, 442–450.
- Chisholm, J.M.; Zamani, R.; Negm, A.M.; Said, N.; Abdeldaiem, M.M.; Dibaj, M.; &Akrami, M (2021) Sustainable waste management of medical waste in African developing countries: A narrative review. *Waste Manag. Res.* Vol. 39, 1–15.
- De Titto, E.; Savino, A.; &Townend, W.K (2013). Healthcare waste management: The current issues in developing countries. *Waste Manag. Res.*30, 559–561.
- Etim, M.A.; Academe, S.; Emenike, P.;&Omole, D (2021). Applications of multi-criteria decision approach in the assessment of medical waste management systems in Nigeria. *Sustainability* 2021, 13, 10914.
- Ezeoke, E.U.; Omotowo, I.B.; &Ndu, A (2017). Investigating knowledge, attitude and healthcare waste management by health workers in Nigerian tertiary health institutions. *Glob. J. Health Sci.* 9, 222–232.
- Ezeudu O, Ezeudu T, Ugochukwu U, Tenebe I, Ajogu A, Nwadi U &Ajaero (2022). Healthcare waste management in Nigeria: A Review. *Recycling* 7:87

- Ezirim, I.; &Agbo, F (2018). Role of national policy in improving healthcare waste management in Nigeria. *J. Health Pollut.* 8, 180-913.
- ICRC—International Committee of the Red Cross (2011). Medical Waste Management. Available online: <https://www.icrc.org/en/doc/assets/files/publications/icrc-002-4032.pdf>
- Idowu, I.; Alo, B.; Atherton, W.; Alkhaddar, R (2013). Profile of medical waste management in two healthcare facilities in Lagos, Nigeria: A case study. *Waste Manag. Res.* 31, 494–501.
- Khalid S, Haq N, Sabiha Z, Latif A, *et al.*, (2021). Current practices of waste management in teaching hospitals and presence of incinerators in densely populated areas. *BMC Public Health.* Vol. 21:1340
- Kwikiriza, S., Stewart, A. G., Mutahunga, B., Dobson, A. E. & Wilkinson, E. (2019) A Whole Systems Approach to Hospital Waste Management in Rural Uganda. *Frontiers in Public Health*, 7, 136.
- Lokobo JA, Solomon MU, Emmanuel O, Odikeme ED, Ewili AM (2024). Assessment of health care waste treatment and methods practiced in primary health care centres in Yenagoa Bayelsa state, Nigeria. *GPH International Journal of Research in Biological and Medicine Science* 07(05):01-14.
- Megan, C. (2019). *Treatment of Medical Waste*. Retrieved from <https://www.danielshealth.com/knowledge-center?type=2>
- Marinkovic, N.; Vitale, K.; Holcer, N.J.; Dzakar, A.; & Pavic, T (2008). Management of Hazardous medical waste in Croatia. *Waste Manag.* 28, 1049–1056.
- Nwachukwu NC, Orji FA, & Ugbohu OC (2013). Health care waste management—public health benefits, and the need for effective environmental regulatory surveillance in federal Republic of Nigeria. In: Rodriguez-Morales AJ, ed. *Current Topics in Public Health*. Vol. 2.
- Nwankwo, C (2018). Knowledge and practice of waste management among hospital cleaners. *Occup. Med.* 68, 360–363.
- Oli AN, Ekejindu CC, Adje DU, Ezeobi I, Ejiofor OS, Ibeh CC, & Ubajaka CF (2016). HCW management in selected government and private hospitals in southeast Nigeria. *Asian Pacific Journal of Tropical Biomedicine.* 6(1):84–9.
- Oli, A.N.; Ekejindu, C.C.; Adje, D.U.; Ezeobi, I.; Ejiofor, O.S.; Ibeh, C.C.; Ubajaka, C.F. (2015) Healthcare waste management in selected government and private hospitals in Southeast Nigeria. *Asian Pac. J. Trop. Biomed.* 6, 84–89.
- Oyekale A & Oyekale T (2017). Healthcare waste management practices and safety indicators in Nigeria. *BMC Public Health.* 17:740

Umegbolu, E.I.; Ozoejike, I.N (2017). Management of solid healthcare wastes in some government healthcare facilities in Enugu State, Southeast Nigeria: A cross-sectional study. *Int. J. Community Med. Public Health.* 4, 4031–4041.

Uzochukwu B, Ughasoro MD, Etiaba E, Okwuosa C, Envuladu E, &Onwujekwe OE (2015). Health care financing in Nigeria: Implications for achieving universal health coverage. *Niger J ClinPract.* 18:437–44.

World Health Organization (2018). Health Care Waste-Fact Sheet; WHO: Geneva, Switzerland

World Health Organization, (WHO, 2016). Safe management of wastes from healthcare activities. Geneva: