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Original Research Article

ASSESSMENT OF AWARENESS AND PRACTICES RELATED TO VETERINARY HEALTHCARE WASTE MANAGEMENT AMONG NON-VETERINARY STAFF IN DELTA STATE, NIGERIA

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ABSTRACT

This study was designed to assess the awareness of non-veterinary staff in veterinary health care facilities (VHCFs) in Delta state on health care waste (HCW). Inappropriate management of health care waste practices is a major concern in most developing countries. Well-structured questionnaires were used to obtain information from both private and government owned VHCFs. Descriptive statistical analysis was conducted using SPSS version 26 to summarize the data collected through the questionnaires. Most of the veterinary health care facilities (VHCF) visited were owned by private individuals (80.8%) while 19.2% were owned by the government of Delta state. The mean age of respondents was 26.88 ± 6.65 years. Most (61.5%) of the respondents were aware of the public health risk of improper disposal of these wastes but 7.7% of the respondents did not use any form of PPE while disposing wastes. There was a statistically significant association between awareness of the public health risks of improper healthcare waste (HCW) management and gender of respondents ($p = 0.016$). Additionally, the frequency of waste disposal was significantly associated with duration of service ($p = 0.047$). Despite a general awareness among respondents regarding the public health risks of improper healthcare waste (HCW) disposal, appropriate disposal practices were not consistently observed. Targeted staff training is recommended to enhance knowledge and promote effective HCW management and disposal.

Keywords: Delta state, health care waste, veterinary health care facilities

INTRODUCTION

Waste generated from activities conducted in healthcare facilities is commonly referred to as healthcare waste (HCW), also known as biomedical or medical waste. HCW is considered the second most hazardous type of waste after radioactive waste (WHO, 2014; Wafula *et al.*, 2019). It poses a significant threat to environmental and public health due to its composition, which includes potentially harmful substances (Aworh *et al.*, 2022). Healthcare waste comprises items such as sharps, materials contaminated with blood, blood and blood products, human body parts and tissues, chemicals, pharmaceuticals and radioactive materials (Hassan & Rahman 2018; WHO, 2024).

HCW are classified as either hazardous or non-hazardous and should be separated as such before disposal but this is mostly not the case in developing countries where these wastes are not sorted before they are disposed (WHO, 2018; Janik-Karpinska *et al.*, 2023).

Improper management and disposal of healthcare waste (HCW) can lead to serious environmental and public health challenges. Inadequate handling of HCW exposes individuals who come into contact with such waste to a heightened risk of infections and injuries. Those most at risk include healthcare workers, waste handlers, patients and their relatives, as well as members of the community where the waste is improperly disposed (Odugbemi *et al.*, 2014). The

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most vulnerable individuals in the community are children and scavengers living near healthcare facilities and waste disposal sites. They are at high risk of exposure to infectious waste, which may increase their likelihood of contracting diseases such as HIV/AIDS (Coker *et al.*, 2009; Adedigba *et al.*, 2010).

This work aimed at assessing the level of awareness of non-veterinary staff members in VHCF in Delta state and to make recommendations based on findings of this study.

METHODOLOGY

STUDY AREA

Delta State is located in the South-South geopolitical zone of Nigeria, lying approximately between longitude 5.00′ and 6.45′ East and latitude 5.00′ and 6.30′ North. The state covers a total land area of about 17,440 square kilometers, with nearly one-third of its terrain consisting of swampy and waterlogged areas. It shares boundaries with Edo, Ondo, Imo, Anambra, and Bayelsa States. To the southwest, Delta State has approximately 122 kilometers of coastline along the Bight of Benin, part of the Atlantic Ocean. The state comprises 25 Local Government Areas, with Asaba serving as the capital city. It also hosts several prominent commercial centers, including Warri, Ughelli, Abraka, Agbor, and Sapele. According to the most recent estimates, Delta State has a population of approximately 6,037,667 (https://deltastate.gov.ng/about, https://www.nipc.gov.ng/nigeria-states/delta-state/).

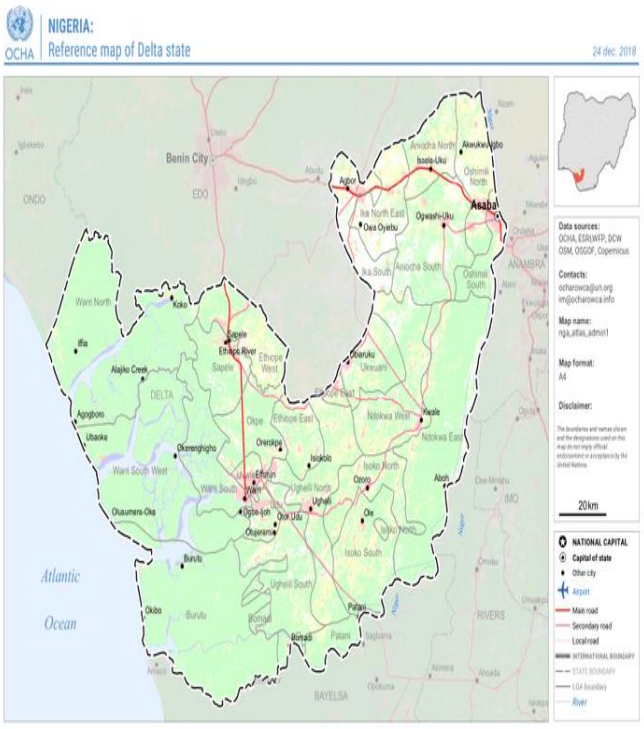

Figure I: Map of Delta State Nigeria. Source: OCHA

STUDY DESIGN

This study was a cross-sectional study, and was conducted in randomly selected veterinary healthcare facilities (VHCFs) in Delta State, Nigeria using well-structured self administered questionnaires to collect information from non veterinary staff. This study was conducted over a period of three months (August to October 2024). The questionnaire consisted of two sections: one for collecting socio-demographic information of the institutions, and another focused on waste management practices

STUDY POPULATION

There are thirty eight (38) veterinary health care facilities are registered with the Veterinary Private Practices Regulatory Committee (VPPRC) and 10 Delta state owned functional Veterinary clinics. A simple random sampling technique was used to select 38 veterinary healthcare facilities for this study. At the end of the data collection, 28 questionnaires were retrieved; however, only 26 contained complete information and were therefore included in the final analysis.

STATISTICAL ANALYSIS

Data were entered and analyzed using IBM SPSS version 26. Descriptive statistics were used to obtain the frequencies and percentages of the variables. The results were presented in tables using frequencies and percentages, with Microsoft Excel used for tabular presentation. The Chi-square test of independence was employed to assess if there was a significant association between the socio-demographic characteristics of the respondents and their level of awareness of awareness of HCW and it was assumed that both variables were categorical. Statistical significance was set at $p < 0.05$.

RESULTS

SOCIODEMOGRAPHICS

Most of the veterinary healthcare facilities (VHCFs) visited were privately owned (80.8%), while 19.2% were owned by the Delta State government (Figure II). The distribution of VHCFs across the various Local Government Areas (LGAs) of Delta State, as shown in Figure III, indicates that Ughelli North had the highest number of facilities. The age of respondents ranged from 18 to 45 years, with a mean age of 26.88 ± 6.65 years.

The majority of respondents (69.2%) were between 18 and 30 years of age. Most staff in the VHCFs held an Ordinary National Diploma (OND) qualification (34.6%). In terms of job roles, the majority were secretaries (53.8%), followed by managers (30.8%) and laboratory attendants/assistants (15.4%). Additionally, most respondents (96.2%) had less than five years of work experience in the facility.

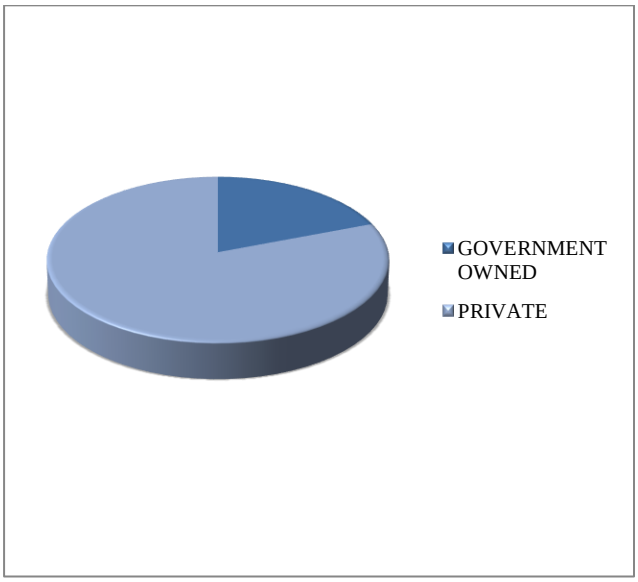

Figure II: Ownership of VHCF in Delta state used in this study

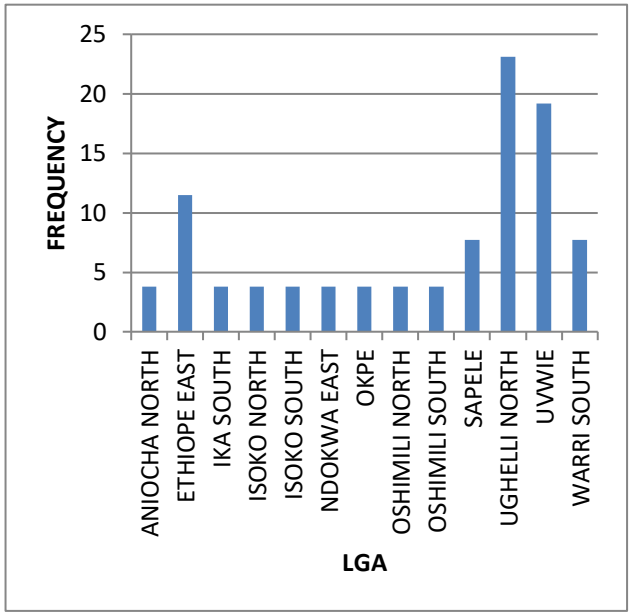

Figure III: Number of VHCF in the LGAs of Delta State

Nine VHCFs (34.6%) reported that flies and rodents came into contact with the waste at disposal sites.

Waste disposal from the VHCFs was mostly carried out on a daily to weekly basis, while only 11.5% of the facilities stored their waste for up to a month before disposal. Hand gloves were used by 65.4% of the VHCFs during waste disposal, whereas 7.7% of respondents reported not using any form of personal protective equipment (PPE) during the process (Table II).

TABLE I: SOCIODEMOGRAPHICS CHARACTERISTICSOF RESPONDENTS

VARIABLES	FREQUENCY	PERCENTAGE
Age		
< 18 Years	0	0
18-30 years	18	69.2
31-40 years	7	26.9
41-50 years	1	3.8
Educational qualification		
FSLC	5	19.2
OND	9	34.6
HND	2	7.7
NECO	1	3.8
WAEC	2	7.7
BSc.	7	26.9
Occupation		
Laboratory Assistance	4	15.4
Secretary	14	53.8
Manager	8	30.8
Work duration		
1-5 years	25	96.2
6-10 years	1	3.8

AWARENESS OF WASTE MANAGEMENT PRACTICES

As shown in Figure IV, the majority of waste generated from the veterinary healthcare facilities (VHCFs) visited was classified as sharps (42.3%), followed by pharmaceutical waste (34.6%) and infectious waste (7.7%). Most of the waste (76.9%) was stored in trash bins prior to disposal (Table II). However, only 30.8% of respondents reported separating waste before disposal. When separation was practiced, waste was primarily categorized into sharps, infectious, and pharmaceutical types

All respondents (100%) were involved in the disposal of hospital waste, and 61.5% were aware of the public health risks associated with improper waste disposal.

The risks identified by respondents included environmental contamination (23.1%), the spread of zoonotic diseases (34.6%), while 3.8% indicated awareness of both environmental contamination and the spread of zoonotic diseases (Table II). Out of the 10 VHCF where trainings have taken place, 30.8% of the trainings were on appropriate use of PPEs while 11.5% was on waste disposal.

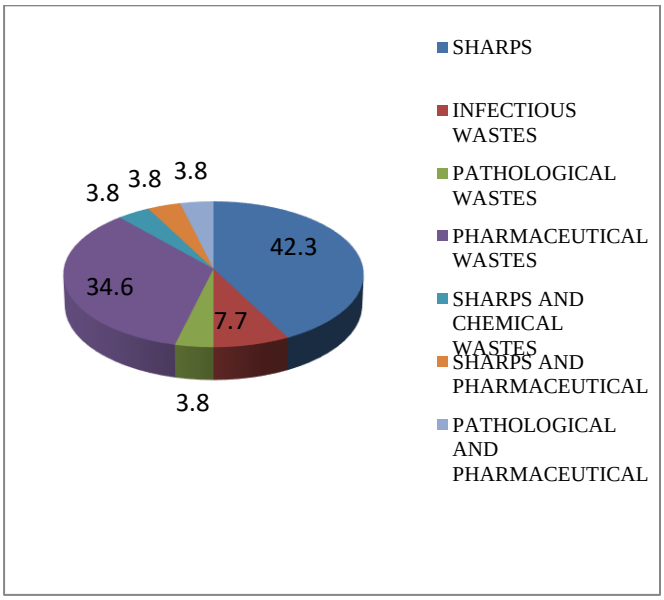

Figure IV: Types of hazardous waste generated from the VHCFs

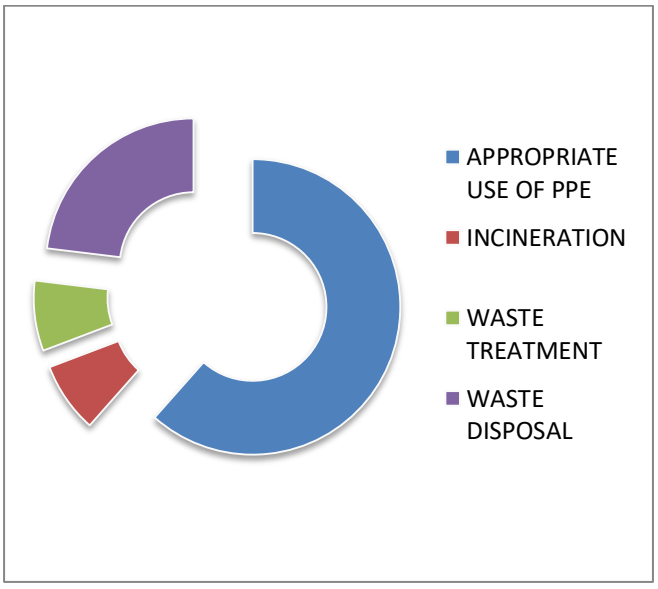

Figure V: Frequency of topics workers have received training on

ASSOCIATION OF DEMOGRAPHICS OF RESPONDENTS AND SOME VARIABLES

There was a statistical significant association between the awareness of public health risk of improper management of HCW (0.016) and gender of respondents (Table III) While frequency of waste disposal (0.047) was statistically significant with duration of service (Table V). The other associations in Tables III, IV and V were not statistically significant.

TABLE II: AWARENESS OF WASTE MANAGEMENT PRACTICES

VARIABLES	FREQUENCY	PERCENTAGE (%)
How is waste managed before disposal		
Kept in trash bins	20	76.9
Dumped in the surrounding	6	23.1
Are waste separated before disposal?		
Yes	8	30.8
No	18	69.2
Waste are often separated into		
Sharps	5	19.2
Infectious	1	3.8
Pharmaceuticals	2	7.7
Frequency of waste disposal		
Daily	11	42.3
Weekly	11	42.3
Monthly	3	11.5
As the need arises	1	3.8
Do flies and rodents have contact with the wastes?		
Yes	9	34.6
No	11	42.3
I don't know	6	23.1
What PPEs are used during disposal?		
Hand gloves	17	65.4
Facemask	1	3.8
Coverall	4	15.4
Head gears	1	3.8
All of the above	1	3.8
None	2	7.7
Awareness of possible public health risk?		
Yes	16	61.5
No	10	38.5
Any formal training on clinical waste disposal?		
Yes	10	38.5
No	12	46.1
Can't remember	4	15.4

TABLE III: ASSOCIATION BETWEEN DEMOGRAPHICS OF RESPONDENTS AND PUBLIC HEALTH RISK AWARENESS

VARIABLES		PUBLIC HEALTH RISK AWARENESS			
		YES	NO	X^2	P VALUE
Occupation	Lab. Assistance	3	1	0.801	0.670
	Secretary	4	4		
	Manager	9	5		
Gender	Male	5	8	5.850	0.016*
	Female	11	2		
Age	18-30 years	9	9	3.366	0.186
	31-40 years	6	1		
	> 40 years	1	0		
Education	BSC	5	2	6.444	0.265
	FSLC	3	2		
	HND	2	0		
	NECO	0	1		
	OND	6	3		
	WAEC	0	2		
Work duration	1-5 years	16	9	1.664	0.197
	6-10 years	0	1		

TABLE IV: ASSOCIATION BETWEEN DEMOGRAPHICS OF RESPONDENTS AND TRAINING ON CLINICAL WASTE MANAGEMENT

VARIABLES		TRAINING ON CLINCAL WASTE MANAGEMENT				
		YES	NO	DON'T KNOW	X^2	P -VALUE
OCCUPATION	Laboratory Assistance	1	2	1	2.871	0.580
	Secretary	3	5	0		
	Manager	6	5	3		
GENDER	Male	3	9	1	5.600	0.061
	Female	7	3	3		
AGE	18-30 years	6	9	3	3.366	0.186
	31-40 years	3	3	1		
	> 40 years	1	0	0		
EDUCATION	BSC	3	4	0	13.433	0.200
	FSLC	3	2	0		
	HND	1	0	1		
	NECO	0	0	1		
	OND	3	5	1		
	WAEC	0	1	1		
WORK DURATION	1-5 years	10	11	4	1.213	0.545
	6-10 years	0	1	0		

TABLE V: ASSOCIATION BETWEEN DEMOGRAPHICS OF RESPONDENTS AND FREQUENCY OF WASTE DISPOSAL

		FREQUENCY OF WASTE DISPOSAL					
VARIABLES		**DAILY**	**WEEKLY**	**MONTLY**	**AS THE NEED ARISES**	X^2	**P VALUE**
OCCUPATION	Lab. Assistance	2	2	0	0	4.981	0.546
	Secretary	3	5	0	0		
	Manager	6	4	3	1		
GENDER	Male	5	6	1	1	1.515	0.679
	Female	6	5	2	0		
AGE	18-30 years	7	8	2	1	2.564	0.861
	31-40 years	4	2	1	0		
	> 40 years	0	1	0	0		
EDUCATION	BSC	2	5	0	0	24.807	0.060
	FSLC	4	1	0	0		
	HND	1	1	0	0		
	NECO	1	0	0	0		
	OND	3	4	1	1		
	WAEC	0	0	2	0		
WORK DURATION	1-5 years	11	11	2	1	7.973	0.047*
	6-10 years	0	0	1	1		

DISCUSSION

The objective of this study was to assess the awareness of non-veterinary staff members in VHCFs on the management of waste generated from their daily activities. Improper management and disposal of healthcare waste (HCW) remain common in developing countries such as Nigeria. HCW is often classified as hazardous due to the significant direct threats it poses to human health (WHO, 1999; Manyele *et al*., 2003; Manyele, 2004). If not properly managed and disposed of, it can constitute a major health hazard to both humans and the environment.

Most of the wastes generated from VHCFs in this study were sharps and pharmaceuticals. Sharp wastes include items like needles, scalpel blades, contaminated glasswares, lancets, etc. Specific boxes should be provided for the disposal of sharps: and there should be instructive posters on waste segregation on display around the health facilities. This will further ensure that unauthorized persons stay clear of such waste thereby reducing the risk of infection.

Some veterinary healthcare facilities (VHCFs) store their waste in trash bins and separate it prior to disposal. The benefits of proper management and disposal of waste from healthcare facilities include creating a safer workplace for staff, controlling infections within the facility, reducing disease transmission, preventing the illegal reuse of contaminated materials—particularly needles—and helping to control zoonotic diseases transmitted between animals and humans (McLean *et al.*, 2007, Caniato *et al.*, 2015; Traveerse & Aceto, 2015, Rao *et al.*, 2017). Dumping and open burning of HCW causes emission of toxic chemicals (doxins and furans), direct and indirect transmission of infectious agents and dispersion of atmospheric pollutants. Dumping them in landfills attracts vermin, pollutes surface water and produces gas especially methane (Hossain *et al.*, 2011). The study by Gautam *et al.* (2010) observed that incinerators emit toxic air pollutants and toxic ash residues which were the main sources of dioxins in the environment.

It was observed that most staff wore only gloves while disposing of healthcare waste (HCW), a finding consistent with those of Awodele *et al*. (2016) and Aworh *et al*. (2022). According to Tilahun *et al*. (2023) and Afesi-Dei (2023), the lack of use or improper use of personal protective equipment (PPE) during HCW disposal significantly increases the risk of infection. The non veterinary staff suggested that trainings should be centered on appropriate use of PPEs, use of incinerators, waste management and waste disposal.

It was observed that most of the non-veterinary staff were aware of the public possible health risk associated with improper management and disposal of HCW This awareness included knowledge of the risks involved, such as environmental contamination and the spread of zoonotic diseases. However, most staff in the veterinary healthcare facilities (VHCFs) visited had not received any training on the proper management and disposal of healthcare waste

(HCW). Providing training on HCW management could help improve both the knowledge and practices of healthcare workers in this area (Olaifa *et al.,* 2018; Obubu *et al*., 2023).

CONCLUSION

It was concluded that although most respondents were aware of the public health risks associated with improper disposal of healthcare waste (HCW), they did not adequately dispose of their waste. To improve the management and disposal of HCW among non-veterinary staff, a strict policy should be developed and enforced. Additionally, continuous training and retraining of staff members in veterinary healthcare facilities (VHCFs) will enhance their ability to properly manage and dispose of HCW, thereby helping to prevent the spread of infections and reduce environmental contamination.

ACKNOWLEGMENTS

We sincerely appreciate the directors and staff of the veterinary healthcare facilities (VHCFs) visited for their cooperation and support during this study

CONFLICT OF INTEREST

The authors hereby declare that no conflict of interest was experienced during this study.

LIMITATION OF STUDY

The sample size (number of questionnaires retrieved) for this study was low and not a true representation of the VHCFs and might be a limitation therefore the authors strongly suggests that future studies should involve a larger study population. The results from this study may be prone to response bias since data used was generated from self report questionnaires therefore in further studies; authors are encouraged to use qualitative data, like interviews or observations which will also help to give an insight on why some practices are not followed. Also, the associations found in this study does not in any way imply cause and effect since it is a cross sectional study.

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