

## Knowledge, attitude and practice of paramedics towards health care waste in Port Harcourt, Nigeria

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### Abstract

Healthcare waste causes environmental and public health hazards. This study assessed the Knowledge, Attitude, and Practices of healthcare workers in Paramedical Centers in Port Harcourt Metropolis. A purposive sampling technique was employed. Data were collected using a well-structured questionnaire and on-the-spot observation. A total of 77 healthcare centers were sampled. Frequency of types of healthcare; pharmacy (33.8%), medical laboratory (28.6%), 'chemist' (27.3%), and drug store (10.3%). Females dominated (64.9%) against the males (35.1%). These facilities do not employ waste handlers (0%) to manage their waste. Majority, 75.3% had a first degree, 13.0% higher degree, and 11.7% had O' level certificate. All the healthcare centers (100%) produce biomedical waste, and 52.3% produce hazardous waste, 37.7% are aware of the correct guidelines for the disposal of biomedical wastes and only 35.1% of facilities practiced good waste disposal, 57.1% had no idea the kind of waste disposal practice and still dispose of their waste on road medians. Only 5.2% have undergone training. Only 37.7% segregate their wastes. In conclusion, the attitude and practice of the Healthcare workers towards waste in the area is low. It is recommended that advocacy be intensified as no one is safe until all of us are safe.

**Keywords.** Healthcare, Wastes, Biomedical, KAP, Disposal

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## INTRODUCTION

Healthcare activities protect and restore health and save lives. However, these activities leave behind trails of unwanted products known as healthcare waste. Healthcare waste has continued to be a concern across the whole world due to its potential to cause environmental and public health hazards (Ezeudu *et al.*, 2022). Healthcare waste includes all the waste generated by healthcare or medical establishments which include hospitals, clinics, medical centers, maternity homes, home health care, blood banks, veterinary offices, clinical facilities, research laboratories, clinical laboratories, Pharmacies, and all unlicensed and licensed medical facilities (Buppert, 2020).

The World Health Organization (WHO, 2022) defines biomedical waste as waste that is generated by healthcare activities, ranging from used needles and syringes to live antibodies, soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices, and radioactive materials. It also includes discarded surgical gloves and instruments, lancets, cultures, and swabs used to inoculate cultures and remove body organs. Healthcare waste generation and disposal is an important aspect, especially in countries with poor hygiene and high populations. It needs attention and action due to the growing population of patients (ILO,2012). Many countries have devised codes of practice and made recommendations for handling and disposal of medical waste from hospitals. All categories of solid wastes generated by healthcare facilities need to be handled, transported, and disposed of in a controlled manner to safeguard public health and prevent environmental pollution. This can be achieved only by the use of enforced codes of practice and guidelines for all aspects of the handling, storage, transport, and disposal of these wastes.

However, in developing countries, medical waste has not received sufficient attention. In many countries hazardous and medical wastes are still handled and disposed of together with domestic wastes, thus creating a great health risk to municipal workers, the public, and the environment (Da Silva *et al.*, 2005). Any measure taken to ensure the safe and environmentally sound management of health care wastes can prevent adverse health and environmental impacts from such waste including the unintended release of chemical or biological hazards, including drug-resistant microorganisms, into the environment thus protecting the

health of patients, health workers, and the general public (WHO,2018).

Globally, about 5.2 million people (including 4 million children) die each year from waste-related diseases (Win *et al.*, 2019). The waste generated from hospitals is now recognized as a serious problem that may have detrimental effects either on the environment or on human beings through direct or indirect contact (Zamparas *et al.*,2019). Whether the facility is a private medical practice, a veterinarian's office, a treatment or diagnostic center, a tattoo parlor, or a funeral home, the medical waste generated could have harmful impacts and spread infections and diseases to the community. Some of the effects of healthcare waste include fatal infections, genotoxicity and cytotoxicity, physical injuries, and public sensitivity (Ojah & Sharma, 2020). To the environment, air contamination, land contamination, water contamination, and specific infections in humans include but are not limited to HIV/AIDS, hepatitis C, hepatitis B, typhoid, and cholera (Johannessen, 2000). According to WHO, A person who experiences one needle stick injury from a needle used on an infected source patient and not properly disposed of has risks of 30%, 1.8%, and 0.3% respectively of becoming infected with HBV, HCV, and HIV (WHO, 2018). In the same vein, poorly managed waste from healthcare centers can bring about environmental nuisances such as foul odour, flies, cockroaches, rodents, and vermin (Kyomba *et al.*, 2021).

Healthcare waste poses a serious threat to public health care as it could lead to adverse health effects. These wastes must be properly disposed of to prevent them from becoming hazards in the environment. Improper disposal of medical waste can cause multiple problems and put the community, the environment, people, and animals at risk for illnesses. The WHO recommended that the proper handling, transportation, and disposal of biomedical waste are crucial to prevent the spread of diseases and to protect the environment from hazardous materials (WHO, 2018). Unfortunately, many biomedical centers do not seem to be very responsible when it comes to the proper disposal of wastes generated in these centers and therefore wastes are deposited openly in waste dumps and surrounding environs often alongside non-hazardous solid wastes (Abah & Ohimain,2011). Good and correct knowledge, attitude, and practice of healthcare workers remain crucial towards medical waste disposal and management.

Therefore, this study is aimed at assessing the knowledge, attitudes, and practices among healthcare workers in the minor Biomedical Centers in Port Harcourt metropolis.

## **MATERIALS AND METHODS**

### **Study area**

This study was carried out in the Port Harcourt metropolis. Port Harcourt is the capital of Rivers State, Nigeria. Rivers State is located in the Southern part of Nigeria with a population of 5,198,716 according to the official census conducted in 2006 ((NPC, 2006). In 2019, a projected figure of 7,034,973 was recorded by the National Bureau of Statistics. Rivers State has a total area of 11,077 km<sup>2</sup> (4,277 sq mi), making it the 26th largest state in Nigeria (NBS, 2019). Port Harcourt has an estimated population of 1,865,000 inhabitants. It lies along the Bonny River (An eastern dis tributary of the Niger River) 41 miles (66 km) upstream from the Gulf of Guinea. Port Harcourt has an estimated number of 110 registered biomedical centers scattered all over the city including hospitals, pharmacies, medical laboratories, chemists, and drug stores.

### **Study population**

A total number of 77 healthcare centers including chemists, drug stores, medical laboratories, and pharmacies were interviewed for this study. These facilities could be loosely referred to as providing Primary care services which is the initial point of contact between a patient and the healthcare system that provides individuals with access to the information and resources they need for optimal health outcomes.

### **Study design**

A purposive sampling technique procedure was employed to select the respondents for this study. The biomedical centers were interviewed based on their type and purposes.

### **Instrument for data collection**

A well-structured questionnaire for information gathering was used in this study, the questionnaire contained information on the socio-demographic characteristics of the respondents, information about the respondent's knowledge on healthcare waste management, and information on the attitude of the respondents towards biomedical waste management and disposal practices. This questionnaire was sent out to minor biomedical

centers which comprised pharmacies, drug stores, chemists, and medical laboratories. The questionnaire method was employed in order to get first-hand data on the handling of health care wastes in the different facilities.

### **Sampling techniques**

The sampling technique employed in this research is the stratified and simple random sampling method. It was used to draw out the number of respondents from each facility using a table of random numbers for the study. The biomedical centers were stratified according to the activities carried out; pharmacies, drug stores, medical laboratories, and chemists, and according to the professional groups; pharmacists, lab technicians, waste handlers, salespersons, and chemists.

### **Validity and reliability**

The questionnaire for this study was designed in simple language and pretested to ensure that the intention of this study was well captured and to avoid ambiguity, misinterpretation, or misunderstanding of the questions or statements.

### **Scoring the KAP questions**

A total of 22 questions were designed for the study. Six of the questions were to keep the respondents' minds free of bias while 16 were the core questions. The questions were designed to give a "yes" for the positive response "No" for the negative response and "I don't know" which represent no real information or not sure except for questions 5 under Knowledge Table 2 and under attitude (Table 3) questions 4,5,8,10 and 11 which required a name, colour or other specifics. Responses from individual variables were presented in percentages. 50 % and above were regarded as good while 49% and below were regarded as poor.

### **Statistical analysis**

Data from the questionnaire was calculated and analyzed by using the Statistical Package for Social Sciences (SPSS) programmer. Both deductive and descriptive tools were employed in this analysis.

## **RESULTS**

Four (4) types of healthcare centers were put in focus (Table 1): Medical laboratory, Pharmacy, Chemist, and Drug stores. Out of n=77 healthcare centers interviewed, Pharmacy had the highest frequency of n=26 and a

percentage of 33.8%, Medical laboratory had a frequency of 22 and a percentage of 28.6%, and Chemist recorded a frequency of n=21 and a percentage of 27.3%, while Drug store was the least interviewed with a frequency of n=8 and a percentage of 10.3%. Females dominated the facilities interviewed in Port Harcourt with a percentage of 64.9% against the male with 35.1%. The respondents' age-related data showed that most workers (32.5%) were between ages 26-30 years followed by those between ages 21- 25 years at 26.0%. Those within the age range of 31-35 years and 36 years above had lower frequency n=12 of biomedical workers and a percentage of 15.6% in each group. The majority of the interviewees had spent between 1-3 years in the job 32.5% had spent between 2-3 years, followed by those that spent between 1- 2 years 25.9%. Those that have spent less than a year were 22.1% while the least group 19.5% had spent 3 years and above.

It was observed also that these healthcare centers, do not employ waste handlers to manage their waste as waste handlers were 0% while pharmacists, lab technicians, and sales persons were 22.1%, 27.3%, and 10.3% respectively. Chemists and others were 27.3% and 13.0% respectively. The educational level of these workers showed that 9 (11.7%) of them were O' level certificate holders, 58 tertiary (75.3%), and 10 (13.0%) higher degree graduates.

All the healthcare Centers (100%) interviewed produce biomedical waste, 52.3% produce hazardous waste while n=36 (46.8%) does not produce hazardous waste. Among the respondents 37.7% are aware of the correct guidelines for the disposal of biomedical wastes and only n=27 (35.1%) facilities out of n=77 practice good waste disposal techniques, 57.1% are not aware of the kind of waste disposal practice they observe. On attitude and practice, Table 3, 5.2% have undergone waste management training, 11.7% dispose of plastic bags, 37.7% segregate their wastes, and 76.6% wear PPEs. As high as 57.1% still dispose of their waste on road medians while 20.8% dispose at dumpsites and 19.5% use waste collectors. Furthermore, the result shows that only 37.7% follow WHO guidelines on the segregation of biomedical waste in the study area.

The low percentage (26.0%) of biomedical facilities that use color coding indicates their level of understanding and its essence in the management of medical waste. As important as personal protective equipment is to personnel handling wastes, it was recorded that the only protective equipment 76.6% of the centers wore included hand gloves and laboratory coat and this is not consistent with WHO standard which require the use of duty gloves, boots and aprons.

Table 1: Socio-Demographic factors of the Health Care Workers in Port Harcourt

Socio economic characteristics	Frequency (n=77)	Percentage (%)
Type of biomedical center		
Medical laboratory	22	28.6
Pharmacy	26	33.8
Chemist	21	27.3
Drug store	8	10.3
Total	77	100
Sex		
Male	27	35.1
Female	50	64.9
Total	77	100
Age		
15-20	8	10.3
21-25	20	26.0
26-30	25	32.5
31-35	12	15.6
36- above	12	15.6
Total	77	100

Social economic characteristics	Frequency (n=77)	Percentage (%)
Length of experience in years		
Less than a year	17	22.1
1-2 years	20	25.9
2-3 years	25	32.5
3 years- above	15	19.5
Total		
Position held		
Pharmacist	17	22.1
Lab Scientists	21	27.3
Sales Person	8	10.3
Chemist	21	27.3
Waste handlers	0	0
Others	10	13.0
Total	77	13.0
Educational Level		
O' level	9	11.7
Tertiary	58	75.3
Higher degree	10	13.0
Total	77	100%

\*Chemist handles prescription medications and are licensed \*Drugstores handles only prepackage medications and healthcare products and not licensed to handle prescription medications.

Table 2: Knowledge of Healthcare workers towards Health Care wastes in Port Harcourt

Characteristics	Frequency (n=77)	Percentages (%)
Does your facility generate biomedical waste?		
Yes	77	100
No	0	0
I don't know	0	0
Total	77	100
Are the wastes generated hazardous?		
Yes	41	53.2
No	36	46.8
I don't know	0	0
Total	77	100
Guidelines for biomedical waste disposal?		
Yes	29	37.7
No	12	28.6
I don't know	26	33.8
Total	77	100
Correct waste disposal practice?		
Yes	27	35.1
No	6	7.8
I don't know	44	57.1
Total	77	100
Responsibility for safe waste disposal		
Facility owner only	2	2.7
Facility and the government	69	89.6
I don't know	6	7.8
Total	77	100

Table 3: Attitude and practices of health care workers towards health care wastes in Port Harcourt

Characteristics	Frequency (n=77)	Percentages (%)
Waste management training?		
Yes	4	5.2
No	73	94.8
Total	77	100
Plastic bag used for waste disposal in your facility?		
Yes	9	11.7
No	68	88.3
Total	77	100
Different colored bags used in the facility?		
Yes	20	26.0
No	57	74.0
Total	77	100
Disposal of biomedical plastics?		
Yellow	0	0
Blue	13	65.0
Red	1	5.0
White	0	0
Specify	6	30.0
Total	20	100
Soiled dressings are disposed		
Yellow	0	0
Blue	1	5.0
Red	17	85.0
White	0	0
Specify	2	10.0
Total	20	100
Do you segregate your waste?		
Yes	29	37.7
No	48	62.3
Total	77	100
Are needles and sharps disposed differently?		
Yes	61	79.2
No	16	20.8
Total	77	100
Responsibility of safe management of biomedical waste		
The government only	2	2.7
The government and facility owner	69	89.6
I don't know	6	7.8
Total	77	100
Yes	59	76.6
No	18	23.4
Total	77	100
Destination of biomedical waste?		
Septic	2	2.6
Road median	47	57.1
Dump sites	16	20.8

Characteristics	Frequency (n=77)	Percentages (%)
How often do you dispose your wastes?		
Once a week	10	13.0
Twice a week	17	22.0
Once a month	0	0
Please specify	50	65.0
Total	77	100

Biomedical waste disposal management is a critical aspect of waste management that should not be taken for granted in biomedical facilities as it can cause a lot of harm to persons who come in contact with them, the environment, and even animals. The finding from the present study showed that females dominated the health facilities interviewed in Port Harcourt with a percentage of 64.9% against the male 35.1% and it is similar to a study, preponderance of 67% female was reported against males in Yaoundé (Woromogo *et al.*, 2020); Also 73.3% females against 26.7% males was recorded in Sweden, and 89.5% females against 10.5% males in Hungary (Uloma *et al.*,2022). In both studies, females were more than the males. These findings, all agree with the WHO (WHO, 2023) report which stated that women account for 67% of the global health and social care workforce when they raised the issue of gender distribution in the health workforce.

Age-related data of the respondents showed that the majority of the workers (32.5%) were between ages 26-30 years. The finding is in tandem with the report of the study that recorded 27years as the median age of the health workers in Yaoundé (Da Silva *et al.*, 2005) and corroborates the results of Akkajit *et al.*, 2020) who reported 20-29years as the common age range with a frequency of 36.9% in their study but at variance with Alasia & Maduka (2021) who reported that majority (40.8%) of healthcare workers were in the 31-40 years age range. This variation may be a result of the setting and the type of health facility where the study was carried out for example, Alasia & Maduka (2021) did their study in a referral and tertiary health facility with patients who received care through hospitals designated for COVID-19 treatment in River's state as against the present study conducted within minor health facilities- Pharmacies, private laboratories, Chemists and drug stores. It was observed that these minor healthcare

centers in the present study do not employ waste handlers to manage their waste. It is assumed that only hospitals (i.e. major biomedical centers) actually employ waste handlers and janitors. These facilities depend on one person-fit-all as waste handlers may increase their wage bill thereby increasing the running cost. Of course, any efforts at conserving funds are the primary interest of a business-oriented facility.

On the knowledge of the Healthcare workers about the wastes generated, 100% are aware that they generate biomedical wastes and 53.2% accepted that the wastes generated are hazardous and can create health risks if not properly handled/ managed. This agrees with 58% awareness reported by Uloma *et al.* (2022).

On the cognition about the guidelines for biomedical waste disposal, only 37.7% are knowledgeable. Even though the finding here is an improvement over 25% reported in Northwest, Nigeria (Omoleke *et al.*, 2021), It is low compared with where only 11% and 5% respectively stated that they do not have knowledge of guideline implementation (Uloma *et al.*,2022). The noted discrepancies could be a result of the location and the urban nature of the study area and the level of education of the respondents since it has been noted that doctors, nurses, and Laboratory scientists have been found to have better knowledge than sanitary staff regarding biomedical waste management (Bassey *et al.*, 2006).

In the present study, 35.1% of the respondents know about the correct waste disposal practice. This finding is low when compared with 79.2% reported in private hospitals and 53.5% in public hospitals (Assemu *et al.*,2020), 62% in private health facilities (Tope *et al.*,2018) in urban communities in Nigeria, and 75.1% and 72.0% in Hungary and Sweden respectively (Uloma *et al.*,2022). The variation could be a result of the type of health facilities and the location.

A greater majority of the respondents (89.6%) believed that it is the responsibility of facility owners and the Government to ensure safe waste disposal. This is not far from the truth as the waste duty of care expects waste producers to be responsible for wastes generated, collected, transported, and disposed of without affecting the environment and it has no limit. The role of the Government is defining pertinent regulations, offering necessary funding, enforcing laws vigilantly, educating the public, and collaborating with the private sector, and doing so robustly.

The general attitude and practice of the respondents towards healthcare waste are poor. Mainly because the majority (94.8%) of them have never received any training on handling waste. This finding is at variance with where at least 41% of the staffers were trained on the management of medical waste (Omoleke *et al.*, 2021). This lack of training may have likely to affected their attitude and practice as it was observed that lack of training is a contributor to poor attitude of healthcare waste management (Ndie, 2015; Mouankie *et al.*, 2015). Meanwhile, it is recommended that staff members from all levels of every organization, whether junior staff or senior executives, all require a certain level and dosage of learning at frequent intervals on waste management so as to protect the community from severe environmental and health issues.

The poor attitude also showed in the practice as 62.3% of the respondents do not segregate their wastes. Proper waste segregation reduces landfill disposal and environmental impact. Lack of knowledge of waste segregation is responsible for the poor practice. This may not be unconnected with the fact that they had not received any training, since people are only limited by what they know. This also shows in the destination of the disposal of the healthcare waste by the respondents as the majority of them (57.1%) disposed their wastes at the road median or the median strip for the refuse collectors and not even at the dumpsite and this is similar to the report of study where 71.4% of healthcare facilities disposed of their wastes in public waste-bin (Basse *et al.*, 2006). The consequences of improper disposal of waste are grievous; ranging from poor health and incurable diseases such as AIDS (Udofia *et al.*, 2017). In the same vein, needle sticks can be highly infectious if discarded inappropriately. Injury by these contaminated needles can lead to a high risk of active infection of HBV or HIV (Padmanabhan & Barik, 2019), HIV/AIDS, hepatitis C, hepatitis B, typhoid, and cholera (Johannessen, 2000). Also, there is a high chance that

the sharps might puncture the waste bags and injure the waste handler (Blenkharn, 2008). To the environment, air contamination, land contamination, water contamination, and specific infections in humans. Poorly managed waste from healthcare centers can bring about environmental nuisances such as foul odour, flies, cockroaches, rodents, and vermin (Kyomba *et al.*, 2021). Poor healthcare waste management affects environment, humans and animals, and the communities.

## CONCLUSION

There is a knowledge, Attitude, and Practice gap among these set of healthcare providers regarding the handling, transportation, and disposal of Healthcare Wastes in the study area. It is recommended that intentional advocacy targeted at the group be mounted as no one is safe until all of us are safe. The implication of improper disposal of healthcare waste is grievous therefore every healthcare waste generator must be involved in the proper disposal.

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## Ethical Considerations

This was not an interventional or trial study that involved animals or humans. The study adhered to the University of Port Harcourt institution's guidelines. Permission to undertake this study was sought and obtained from the research ethics committee of the University of Port Harcourt with approval number UPH/CEREMAD/REC/MM78/005.

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