FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 9 No. 8, August, 2025, pp 55 – 64
DOI: https://doi.org/10.33003/fjs-2025-0908-3769

PREVALENCE, AWARENESS, AND FREQUENCY OF BIOLOGICAL RISK EXPOSURE AMONG HOSPITAL HOUSEKEEPERS IN OSHIMILI SOUTH, DELTA STATE, NIGERIA

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ABSTRACT

The health risks associated with to biological wastes in the job description of hospital housekeepers are often overlooked. Hospital housekeepers are constantly being exposed to biological hazards, but their job risks are frequently disregarded. This study evaluated the prevalence, awareness, and frequency of biological risk exposure among hospital housekeepers in Oshimili South, Delta State, Nigeria. A structured questionnaire was used to conduct a cross-sectional survey of 120 randomly selected hospital housekeepers. Demographics, exposure to biological materials, use of personal protective equipments (PPE), health problems, and infection control training were all determined using descriptive statistics and Chi-square test. Majority of the respondents (54.2%) were females and between the ages of 31 to 40 (33.3%). Although, 85% were aware of biological dangers, only 50% had formal infection control training. Urine (76.7%), blood (73.3%), and faeces (69.2%) were the most common sources of exposure, with 56.7% of cases being accidental. Hand gloves usage was highest (86.7%) PPE known, but only 45% reported consistent PPE availability. Significant association were found between education level and awareness ($\chi^2 = 9.63$, $p = 0.008$), exposure frequency and infection history ($\chi^2 = 10.25$, $p = 0.017$), PPE availability and accidental exposure ($\chi^2 = 11.82$, $p = 0.009$), as well as IPC training and infection history ($\chi^2 = 8.47$, $p = 0.037$). There were no significant associations detected between gender and glove use, or marital status and symptom reporting. Targeted training and increased PPE access are critical for risk reduction among hospital housekeepers in the study area.

Keywords: Biological risk, Hospital housekeepers, Infection control training (IPC), Occupational hazards, Personal protective equipment (PPE)

INTRODUCTION

Hospital housekeepers are individuals employed to keep hospitals and healthcare facilities hygienic and tidy (Dancer, 2023). They are specifically in charge of keeping patient rooms, restrooms, medical equipment, and waste bins clean in order to prevent the spread of illnesses. Despite frequently working behind the scenes, the duties of hospital housekeepers are crucial in maintaining a secured environment for patients, employees, and guests. While doing their responsibilities, they are frequently exposed to biological hazards, such as blood and bodily fluids (BBFs)and infectious garbage which may harbour pathogenic organisms (Dancer, 2023). It has been reported by Beltrami *et al*. (2020) that hospital workers who clean contaminated surfaces and handle used items are always in danger of contracting major infectious diseases like HIV, Hepatitis B virus, skin disorders and other blood-borne disorders. The risk increases in hospital settings that do not adhere to correct waste segregation, sharp objects disposal, and infection prevention measures (Dancer, 2023; Ibrahim *et al*., 2023). Many developing countries, particularly those in Africa, such as Nigeria, are faced by healthcare system challenges as a result of inadequate safety measures and poor waste management (Auta *et al.,* 2017). Similarly, Sahiledengle *et al*. (2020) noted that in many developing countries, healthcare personnel are at high risk of exposure to BBFs, especially in hospitals where hazardous practices such as manually handling used sharps object and wastes are still frequent.

Despite being the first line of defense in maintaining hospital cleanliness, hospital housekeepers are usually overlooked when it comes to job risks. They frequently lack the necessary training on proper equipment handling and disposal techniques (Lakbala *et al.,* 2012; Ream *et al.,* 2016; Mugabi *et al.,* 2018; Bannour *et al.,* 2024). It has been recently observed by Hakim *et al.* (2024) that in order to reduce cross-contamination, hospital settings must be completely and consistently cleansed with appropriate disinfectants, and personnel must use personal protective equipment (PPE). According to Dancer (2014), several diseases contracted while in the hospital have been attributed to poor cleaning and low hygiene standards. These diseases can range from acute infections with short-term symptoms such as fever, cough, rashes, and diarrhoea to chronic and potentially fatal problems that develop as a result of recurrent or severe exposure (Ibrahim *et al*., 2023). In many low-resource settings, the risk is exacerbated by none-use of PPE, a lack of infection control training, and a delayed access to post-exposure prophylaxis or medical treatment (Bannour *et al.,* 2024). These issues endanger not only the health and safety of housekeepers, but also raise the risk of hospital-acquired infections (HAIs), which can harm patients, clinical staff, and the general public (Dancer, 2014).

Numerous recent studies have identified similar concerns both globally and within Sub-Saharan Africa. Padde *et al*. (2022) evaluated biosafety and biorisk management practices among medical laboratory students in Uganda and discovered that, despite working in clinical laboratories, many had just theoretical knowledge and did not adhere to practical biosafety regulations. This knowledge gap was linked to an increased risk of biohazard exposure, particularly among direct-entry students who lacked field preparation. The study underscored the critical necessity for practical, hands-on biosafety training to prevent occupational health hazards. Supporting this concern, Aliyo and Gemechu (2023) reported the frightening needlestick and sharp injury rates among Ethiopian healthcare workers, which were mostly due to poor infection control methods and inadequate safety training. Their findings revealed that a lack of PPE, the absence of standard operating procedures, and inadequate supervision greatly increased non-clinical health workers' sensitivity to occupational exposures. Yan *et al*. (2023) conducted an administrative and structural biosafety audit of laboratories in Jiaxing, China, and discovered inadequacies in laboratory cleanliness, biosafety signs, and worker training. These systemic flaws in biosafety protocols highlight the need for enhanced risk communication and thorough workplace safety monitoring, both of which are equally important in hospital housekeeping departments. In Nigeria, Oladeinde *et al*. (2013) conducted one of the few national biorisk assessments of medical diagnostic laboratories, demonstrating significant deficiencies in both public and private facilities. Their findings revealed extremely low compliance with established biosafety measures, an absence of biosafety officers, and inadequate reporting of incidents or biological exposures. These inadequacies in institutional control and worker protection are extremely important, as hospital housekeepers are similarly exposed but less likely to benefit from official biosafety oversight.

Majority of available data focused on specific clinical staff, students, or laboratory personnel, whereas supportive staff, who are critical to infection prevention and hospital sanitation, were frequently overlooked. Despite this high-risk workplace, several workers lack adequate training, PPE, and institutional support. These neglected job hazards increase their risk of infections and compromise overall hospital biosafety (Ibrahim *et al*., 2023). This situation is especially evident in Delta State, where resource constraints and systemic gaps may exacerbate their vulnerability. Considering the dangers associated with the lack of awareness associated with the job of hospital cleaners, the current study aims to assess the level of biological risk exposure, evaluate current safety standards, and identify associated risk factors among hospital housekeepers in Oshimili South, Delta State. The findings will help to promote practical steps, enhance workplace health standards, and urge safety policies that safeguard all sorts of healthcare workers, not just doctors and nurses in the study area.

MATERIALS AND METHODS

Study Area

The study area was Oshimili South Local Government Area (6.10°N; 6.75°E) of Delta State, Nigeria. The area has a tropical climate with a rainy season from April to October and a dry season from November to March. Annual rainfall averages 8,667 mm, peaking in July with a short break in August, and temperatures range from 39 °C to 44 °C (Osakwe *et al*., 2021). Oshimili South is a semi-urban area with various public and private health facilities, including general hospitals, missionary hospitals, and private clinics. The indigenous population is mainly involved in civil service, trading, farming, and artisanal occupations, with many also working in the informal sector, such as hospital and domestic cleaning services. These healthcare facilities employ a significant number of support staff, including hospital housekeepers responsible for cleaning and maintaining hygienic standards in wards, toilets, outpatient departments, and surgical units. The area was selected due to its strategic role in healthcare delivery within Delta State and the reported frequency of hospital-acquired infections in recent times (Nezianya and Nwankwo, 2025).

Study Design

This study was conducted using a cross-sectional survey design. Data from respondents were collected using a structured questionnaire presented by an interviewer. The study included hospital housekeepers from various hospitals in Oshimili South. Using the formula for sample size determination (Bolarinwa, 2020), a sample size of 120 respondents was drawn using a simple random sampling procedure, taking into account the feasibility and the total number of housekeepers available in the selected facilities.

Inclusion and Exclusion Criteria

Male and female hospital housekeepers who had worked for at least one year in a hospital setting and consented to the study were included. Newly hired staff with less than one year of service, as well as administrative personnel were excluded from the study.

Ethical Consideration

Ethical approval was obtained from Delta State Ministry of Health and each hospital before the study commenced. During the study, all participants provided informed consent after being informed about the purpose, protocols, and voluntary nature of the study. Throughout the research process, anonymity and confidentiality were maintained, and participation was completely optional, with the option to leave at any point without consequence.

Collection of Data

A structured questionnaire were given to each of the 120 randomly selected hospital housekeepers to examine various elements of biological risk exposure among hospital housekeepers. The questionnaire included both closed and open-ended questions about demographics, kind and frequency of biological risk exposures, use of PPE, and understanding of hospital infection control procedures. To enhance the reliability and validity of the data, the questionnaire underwent a pilot test with a small group of housekeepers before the main data collection. Feedback from the pilot test was used to adjust the questionnaire, addressing any ambiguities or issues identified where necessary.

Data Analysis

The data were processed using Microsoft Excel® (Window 7) for descriptive statistics to summarize demographic data, awareness levels, exposure patterns, and preventative actions, with results presented as frequency tables and percentages. Cross-tabulations were performed in Excel®, while the Chi-square (χ^2) test for relationships between categorical variables was conducted using SPSS version 25. Statistical significance was defined at $p < 0.05$.

RESULTS AND DISCUSSION

Social Demographic Characteristics

Table 1 summarizes the demographic statistics of the 120 hospital housekeepers in Oshimili South, Delta State. The data showed that the majority of respondents (33.3%) were between the ages of 31 to 40. The 20-30 and 41-50 age categories each accounted for 25.0%, with only 16.7% being ≥ 50 years old. More women (54.2%) than males (45.8%) took part in the survey. In terms of educational credentials, the majority (58.3%) had completed secondary school, while primary and higher education were equally represented at 20.8% each. Majority of respondents (54.2%) were married, with singles accounting for 29.2%. The remaining 16.7% were separated, widowed, or divorced. In terms of years of experience, 33.3% had worked for 11-15 years, whereas 25.0% had 5-10 years, while 16.7% had worked for 1–5 years, and 12.5% had worked for 16–20 or more years.

Table 1: Social Demographic Characteristics of Selected Hospital Housekeepers in Oshimili South, Delta State (n=120)

Variables	Characteristics	Frequency (n)	Percentage (%)
Age group (years)	20 – 30	30	25.0
	31 – 40	40	33.3
	41 – 50	30	25.0
	≥ 50	20	16.7
Gender	Male	55	45.8
	Female	65	54.2
Educational Level	Primary	25	20.8
	Secondary	70	58.3
	Tertiary	25	20.8
Marital Status	Single	35	29.2
	Married	65	54.2
	Separated/Widowed/Divorced	20	16.7
Years of service as hospital housekeeper	1 – 5	20	16.7
	5 – 10	30	25.0
	11 – 15	40	33.3
	16 – 20	15	12.5
	> 20	15	12.5

Awareness of Biological Risks

A large proportion (85.0%) of the housekeepers in the survey had heard about biological dangers. Among these, 70.0% said formal training was their primary source of information. Others gained knowledge via coworkers (42.5%), personal experience (36.7%), and posters/notices (32.5%). Only 10.0% learnt from other sources, including television shows, health seminars, and social media. In terms of biological hazard labeling, 59.2% claimed it was done, 21.7% said it wasn't, and 19.2% were unsure. When asked if they understood the risk of infection, 70.8% said yes, while 75.0% were aware of hospital-acquired illnesses. However, only 50.0% of responders had undergone infection control training (Table 2).

Table 2: Awareness of Biological Risks Among the Selected Hospital Housekeepers in Oshimili South, Delta State (n=120)

Awareness indicator	Characteristics	Frequency (n)	Percentage (%)
Heard of biological hazards	Yes	102	85.0
	No	18	15.0
Source of awareness	Formal training	84	70.0
	Co-worker explanation	51	42.5
	Personal experience	44	36.7
	Poster/notices	39	32.5
	Others	12	10.0
Biological hazards labeled in workplace	Yes	71	59.2
	No	26	21.7
	Not sure	23	19.2
Understands risks of infectious diseases	Yes	85	70.8
	No	35	29.2
Awareness of hospital acquired infection	Yes	90	75.0
	No	30	25.0
Received training on infection control	Yes	60	50.0
	No	60	50.0

Frequency of Exposure to Biological Hazards

About 38.3% of the hospital housekeepers surveyed had daily contact with bodily fluids, while 28.3% did so weekly. Another 23.3% claimed it happened infrequently, while 10.0% stated they had never had such interaction. Urine (76.7%) and blood (73.3%) were the most common wastes handled, followed by feces (69.2%), bandages/swabs (65.8%), and saliva/sputum (55.0%). Only 15.0% of respondents reported handling other sorts of waste, such as vomit, dirty cotton wool, needles, scalpels, and soiled

personal protective equipment. Moreover, half (56.7%) of the respondents reported inadvertent interaction with these waste items. Furthermore, 37.5% reported being sick and treated, whilst 62.5% had never been infected. Of those infected, the majority (66.7%) had 1-10 episodes, 22.2% had 11-15 episodes, and 11.1% had 16-20 episodes. Nobody reported more than 20 occurrences (Table 3).

Table 3: Frequency of Exposure to Biological Risks Among the Selected Hospital Housekeepers in Oshimili South, Delta State (n=120)

Variables	Characteristics	Frequency (n)	Percentage (%)
Contact with bodily fluids	Daily	46	38.3
	Weekly	34	28.3
	Occasionally	28	23.3
	Never	12	10.0
Types of waste handled	Blood	88	73.3
	Urine	92	76.7
	Faeces	83	69.2
	Saliva/Sputum	66	55.0
	Bandages/Swabs	79	65.8
	Others	18	15.0
Accidental contact with biological materials	Yes	68	56.7
	No	52	43.3
Infected and Treated workers	Yes	45	37.5
	No	75	62.5
Frequency of Infection Episodes	1 – 10	30	66.7
	11 – 15	10	22.2
	16 – 20	5	11.1
	>20	0	0.0

Use and Availability of PPE

Gloves (86.7%) were the most commonly utilized PPE, followed by face masks (80.8%), aprons (73.3%), boots (60.0%), and goggles/facial shields (46.7%). However, PPE was not always accessible. According to the respondents, only 45.0% of the housekeepers claimed it was always available, 33.3% said it was sometimes, 13.3% said it was seldom, and 8.3% said it never. When PPEs were not accessible, 48.3% informed their superiors, 28.3% improvised, 20.0% continued to work without them, and 3.3% took alternative actions.

Table 4: Use of PPE Among the Selected Hospital Housekeepers in Oshimili South, Delta State (n=120)

PPE Items		Use of personal protective equipment (PPE)			
		Yes (n)	(%)	No (n)	(%)
Types	Gloves	104	86.7	16	13.3
	Facemask	97	80.8	23	19.2
	Apron	88	73.3	32	26.7
	Goggles/face shield	56	46.7	64	53.3
	Boots	72	60.0	48	40.0
Availability	Always	54	45.0	-	-
	Sometimes	40	33.3	-	-
	Rarely	16	13.3.	-	-
	Never	10	8.3	-	-
If unavailable	Continue work	24	20.0	-	-
	Report to supervisor	58	48.3	-	-
	Improvise	34	28.3	-	-
	Others	4	3.3	-	-

Exposure Risks among Hospital Housekeepers

Table 5 displays some of the most common symptoms reported after being exposed to biological dangers. Fever was the most prevalent symptom (40.0%), followed by cough/catarrh (35.0%) and skin rashes (31.7%). Others reported eye irritation (25.0%), diarrhea (21.7%), or no symptoms (17.5%). In terms of open communication among the exposed persons, 60.0% disclosed their symptoms to management, whereas 40.0% did not. It was discovered that 55.0% received medical treatment, 31.7% did not, and 13.3% stated that therapy was not appropriate.

Table 5: Reported Health Problems to Exposure Biohazards Among the Selected Hospital Housekeepers in Oshimili South, Delta State (n=120)

Varables	Characteristics	Frequency (n)	Percentage (%)
Health related issues/ Symptoms	Skin rashes	38	31.7
	Cough/Catarrh	42	35.0
	Eye irritation	30	25.0
	Diarrhea	26	21.7
	Fever	48	40.0
	None	21	17.5
Reported to management	Yes	72	60.0
	No	48	40.0
Medical treatment	Yes	66	55.0
	No	38	31.7
	No applicable	16	13.3

Infection Prevention and Control (IPC) Practices

The findings on infection prevention and control (IPC) procedures indicated that the majority of respondents (68.3%) had undergone IPC training, while 31.7% did not. Of those trained, 29.3% received it monthly, 26.8% quarterly, and 22.0% only once a year or when they were working (Table 6). When asked if management prioritizes health and safety, 48.3% replied yes, 33.3% said no, and 18.3% were unsure.

Table 6: Reported Health Problems to Exposure Biohazards Among the Selected Hospital Housekeepers in Oshimili South, Delta State (n=120)

Variables	Characteristics	Frequency (n)	Percentage (%)
Received infection, prevention and control (IPC) training	Yes	82	68.3
	No	38	31.7
Frequency of training (For those trained)	Monthly	24	29.3
	Quarterly	22	26.8
	Yearly	18	22.0
	Only at employment	18	22.0
Management prioritizes health & safety	Yes	58	48.3
	No	40	33.3
	Not sure	22	18.3

Analysis of Relationships Between Variables

Education level and biological hazard awareness ($\chi^2 = 9.63$, $p = 0.008$), exposure frequency and infection history ($\chi^2 = 10.25$, $p = 0.017$), PPE availability and unintentional exposure ($\chi^2 = 11.82$, $p = 0.009$), and IPC training frequency and infection history ($\chi^2 = 8.47$, $p = 0.037$) were all found to be statistically significantly correlated. On the other hand, no significant correlations were found between marital status and symptom reporting ($\chi^2 = 2.91$, $p = 0.234$) or between gender and glove usage ($\chi^2 = 1.42$, $p = 0.233$).

Table 7: Relationships Between Socio-Demographic Characteristics, Exposure Frequency, and Biohazard Risks Based on Chi-Square Tests (N = 120)

S/N	Variables Compared	χ^2 Value	*p*-Value
1	Education Level × Awareness of Biological Hazards	9.63	0.008
2	Frequency of Exposure × Infection History	10.25	0.017
3	PPE Availability × Accidental Exposure	11.82	0.009
4	IPC Training Frequency × Infection History	8.47	0.037
5	Gender × Use of Gloves	1.42	0.233
6	Marital Status × Reporting Symptoms to Management	2.91	0.234

Significance level at $p < 0.05$

Discussion

Socio-Demographic Characteristics

The current study demonstrates thatmajority of hospital housekeepers were middle-aged people with considerable job experience over the years. Similar age trends were noted in other studies conducted in Enugu, Nigeria, where a significant percentage of hospital house keepers were between the ages of 30 and 45 (Obi *et al.,* 2015; Onoh, 2021; Omeke *et al*., 2022). People in this age range are seen to be physically healthy and capable of handling the rigorous nature of hospital cleaning duties, which might be the reason for this trend. The finding that there were more women than males participating in this study is consistent with a number of other studies that show that women dominate the cleaning and support positions in hospitals (Unge *et al.,* 2007; Salerno *et al.,* 2012; Ilesanmi *et al.,* 2015; Alobaid *et al.,* 2020; Okereke *et al*., 2020). This might be related to cultural and social norms that view household chores as a feminine role.

This study also shows that many hospital cleaners have little formal education, which may hinder their understanding of occupational health hazards and their ability to apply efficient IPC procedures. Majority of the respondents had secondary school education, which is consistent with findings from comparable research performed in Ghana and other African nations (Kigozi *et al.,* 2024; Tawiah *et al.,* 2024). In contrast, cleaners in industrialized nations are more likely to have a higher education level or to undergo systematic, continuous training. Such training considerably improves their capacity to adhere to health and safety rules precisely. According to Zhang *et al.* (2024), ongoing professional development and

training are critical in improving IPC compliance among healthcare personnel, especially support staff such as cleaners.

The most prevalent marital status among the participants was married, which is consistent with the findings from studies conducted in most African nations (Salerno *et al*., 2012; Kimani *et al*., 2014. Married workers are commonly regarded as more stable and trustworthy, which may explain why they are frequently engaged in support positions (Gammarano, 2020). The majority of participants had been working for several years. This is a good indicator, as more experience typically equals a greater understanding of the medical setting. However, without frequent training, expertise may not be sufficient to assure appropriate practices. Previous studies have shown that even experienced hospital professionals may lack sufficient information about health hazards if they do not receive frequent updates or training (Farotimi *et al.,* 2022; Singh *et al.,* 2023).

Awareness of Biological Risks

This study found that the majority of hospital housekeepers (85%) knew of the biological dangers associated with their job, which is a positive indicator. It indicates that they are aware that blood, bodily fluids, and microorganisms in the hospital might cause illnesses. Most of the respondent (70%) stated that they obtained this information through official training, while others acquired from coworkers, personal experience, posters, and announcements. Several others indicated that they learned via TV, health seminars, or social media. This finding is comparable to that of Singh *et al.* (2023) where nursing students in India who received organized infection control training were more aware of the dangers. Our findings also with a research conducted in Lagos by Farotimi *et al.* (2022), which found that trained cleaners were better knowledgeable about reducing hospital infections. However, only half of the housekeepers (50%) had undergone infection control training. This implies that the other half may be unaware of the proper precautions to take to safeguard themselves and others. This training gap was also observed in Uganda, where Kigozi *et al.* (2024) discovered that many hospital cleaners lacked adequate expertise and required more frequent training sessions. Even while 70.8% claimed they knew the dangers of infection, and 75% had heard about hospital-acquired infections (HAIs); awareness alone is insufficient if training is not available. Majority of them learnt via informal sources, such as coworkers and personal experience, which are not necessarily precise or adequate. On marking biological dangers in the workplace, the study showed that about 59.2% indicated these dangers were listed, while a sizable proportion (40.9%) claimed they were not labeled or were unsure. This uncertainty can be dangerous because it indicates that not all employees are aware of hazardous materials in their workplace. Zhang *et al.* (2024) stressed the importance of adequate labeling and communication of workplace dangers in preventing accidents and infections.

Frequency of Exposure to Biological Hazards

In terms of exposure to biological dangers, we discovered that hospital housekeepers were constantly exposed to bodily fluids and other biological wastes at work. Moreover, one-third (38.3%) of participants indicated they come into touch with bodily fluids on a daily basis, while 28.3% claimed they did so frequently. This implies that a high number of housekeepers are regularly exposed to potentially infectious items, which might constitute a health concern. Urine (76.7%), blood (73.3%), and feces (69.2%) are all recognized infectious agents. Other items, such as saliva, sputum, and used bandages carry bacteria that might spread disease if not handled appropriately. These findings are consistent with a previous study conducted in Ghana by Tawiah *et al*. (2024), which found that many hospital cleaners are exposed to blood and other fluids without sufficient protective equipment, placing them at high risk of infections and injuries. In this study, more than half (56.7%) of the housekeepers reported inadvertent encounter with biological items, implying that there may be gaps in training, the usage of safety equipment, and/or how cleaning duties are monitored. The risk increases when cleaners do not have gloves, aprons, or sufficient training for handling hazardous trash. This issue was also documented in Uganda by Kigozi *et al*. (2024), who reported that hospital cleaning workers frequently lacked PPE and had little or no infection control training. It is concerning that 37.5% of the housekeepers claimed to have been afflicted and treated for diseases that were most likely caused by these exposures. Some had been sick more than once, with 11.1% reporting up to 16-20 episodes of infection. This highlights the critical need for enhanced workplace safety protection, training, and routine monitoring. Findings from Singh *et al.* (2023) in India also support this concern.Their study revealed that when health professionals and cleaners got systematic infection control training, their comprehension and practices increased significantly. This indicates that expertise alone is insufficient; training makes a significant impact in risk reduction. Handling "other" sorts of waste, such as needles, scalpels, discolored cotton wool, and dirty PPE, is also a public health risk, despite the fact that only 15.0% of respondents mentioned it. According to World Health Organization publications (2024), these products can cause needle-stick injuries and transmit illnesses such as Hepatitis B, Hepatitis C, and HIV.

Use and Availability of Personal Protective Equipment (PPE)

This study showed that majority of hospital housekeepers use basic protective equipment, particularly gloves (86.7%) and face masks (80.8%), which are necessary to avoid direct contact with dangerous biological agents. Other PPE, such as goggles/face shields (46.7%) and boots (60.0%), were used less frequently, presumably owing to discomfort, limited availability, or a lack of training. Despite its relevance, only 45.0% of the respondents stated that PPE was always available at work. Others said that it was only accessible occasionally (33.3%), seldom (13.3%), or never (8.3%). When PPE was not available, 48.3% of workers reported the issue to their superiors, although some improvised (28.3%) or kept working without protection (20.0%), increasing their risk of infection. Other studies have reported similar concerns. For example, Hakim *et al*. (2024) noted that many low- and middle-income nations have insufficient supply of basic PPE in health institutions, endangering both patients and personnel. Ream *et al.* (2016) found that hospital housekeepers frequently confront biological dangers due to a lack of access to protective equipment, particularly in underdeveloped nations. In their study, Ibrahim *et al.* (2023) reported that waste segregation practices in Ethiopian hospitals were poor, owing in part to an inconsistent supply of PPE, whereas Auta *et al.* (2017) discovered that many health workers across Africa had experienced occupational exposure to body fluids due to non-use or non-availability of PPE. In a similar vein, another study in Lagos found that while cleaners had a decent understanding of infection prevention, their adherence to safety protocols was hampered by a lack of PPE and inadequate institutional support (Farotimi *et al.,*

2022). Similar to the improvisation seen in this study, another study conducted in Botswana discovered that a large number of health personnel reported working without protection or recycling disposable PPE (Mugabi *et al.*, 2018). Poor cleaning techniques and inadequate equipment can lead to hospital-acquired illnesses (Dancer, 2023), highlighting the significance of always providing all cleaning personnel with the right PPE. The World Health Organization also reported that 15% of all healthcare waste was dangerous, including products contaminated with blood and physiological fluids (WHO, 2024). Housekeepers are thus at risk of illnesses such as Hepatitis B, C, and HIV if they do not wear PPE on a regular basis (Beltrami *et al.,* 2000), particularly while handling wastes such as blood-stained objects, vomitus, or sharps.

Exposure Risks among Hospital Housekeepers

A substantial proportion of the hospital housekeepers in Oshimili South were found to be often exposed to biological dangers, which had a notable impact on their health. Fever was the most often reported health problem, impacting 40.0% of respondents. Cough or catarrh (35.0%), skin rashes (31.7%), eye discomfort (25.0%), and diarrhea (21.7%) were the next most common. Surprisingly, 17.5% of individuals reported no symptoms despite the exposure. These symptoms are typical of illnesses produced by biological agents such as bacteria and viruses. They can also be caused by contact with toxic medical waste or contaminated surfaces, particularly if preventive measures are inadequate or neglected. This mirrors the daily hazards encountered by hospital support personnel, who frequently handle garbage or clean polluted areas without sufficient protective equipment. Other studies conducted in other climes have shown similar results. Dancer (2023) documented that hospital cleaners are continually exposed to polluted surfaces and airborne germs, which frequently cause fever, respiratory ailments, and skin diseases. In Brazil, Ream *et al.* (2016) found that housekeepers were frequently exposed to body fluids, resulting in infections and skin irritations. Likewise, Ilesanmi *et al.* (2015), in Southwest Nigeria, identified that cleaners suffered from similar symptoms due to poor hygiene practices and a lack of protective equipment. A more recent study by Tawiah *et al*. (2024) in Ghana also revealed that hospital support staff were exposed to body fluid splashes, with fever and eye irritation being common outcomes. This finding is in line with the findings of the current study. Although symptoms were reported by a majority of respondents, not all of them communicated their health conditions to management. Only 60.0% reported their symptoms, while a concerning 40.0% did not. A number of reasons might be behind this underreporting, including a fear of being stigmatized, a fear of losing one's work, ignorance, or the belief that the symptoms were not severe enough to be cause for worry. Underreporting of occupational illnesses, regardless of the cause, compromises prompt care and raises the possibility of future spread. Hakim *et al.* (2024) and Padde *et al*. (2022) expressed this worry and emphasized the value of early reporting in halting the spread of occupational illnesses. Health institutions cannot successfully protect employees or contain possible epidemics without open communication. Furthermore, of the impacted housekeepers, 31.7% did not obtain medical attention, while 55.0% did. Another 13.3% said that there was no need for therapy. These figures imply that not all impacted people got the attention they need. Lack of occupational health rules, restricted access to healthcare, or systematic disregard for lower-level employees like janitors and cleaners might all be contributing factors to this disparity. This conclusion was corroborated by reports by Aliyo and Gemechu (2023) and Farotimi *et al*. (2022) that hospital support staff, particularly the housekeepers and cleaners, are frequently disregarded when it comes to follow-up treatment following biological exposure. Despite the fact that cleaners and other support personnel suffer comparable, if not higher, dangers as a result of their frequent contact with garbage and polluted surfaces, hospital resources and rules frequently prioritize physicians and nurses.

Infection Prevention and Control Practices among Hospital Housekeepers

The results show that 31.7% of respondents had not undergone IPC training, compared to 68.3% who had. Given the vital role housekeepers play in preserving sanitary conditions in hospital settings, this is a significant figure. One significant worry is the irregularity in the training schedule. Only 29.3% of the participants got monthly training; the remaining participants were only exposed to IPC teaching upon on boarding, quarterly, or yearly. This aligns with the findings of Zhang *et al*. (2024), who highlighted the value of continuous professional development and training in preserving successful IPC compliance and lowering the incidence of healthcare-associated infections (HAIs). Similarly, Singh *et al.* (2023) reported that organized IPC training greatly enhanced healthcare trainees' perceptions and knowledge, emphasizing the necessity of recurring refresher courses. Only 48.3% of participants believed that hospital administration put their safety first, despite some training exposure; 33.3% disagreed, and 18.3% were unsure. This demonstrates a glaring communication breakdown and maybe insufficient cleaning occupational health assistance. This is in line with the findings of Farotimi *et al.* (2022) who showed that hospital cleaners in Lagos had less than ideal IPC compliance due to a lack of involvement and uneven training reinforcement. According to an earlier study, hospital cleaners' susceptibility to infection is well-established. Ream *et al.* (2016) emphasized that the regular exposure of cleaners to polluted surfaces and medical waste poses a significant biological danger. According to Ilesanmi *et al.* (2015), hospital cleaners in Southwest Nigeria faced occupational dangers that were exacerbated by inadequate training and a lack of attention to safety procedures. Furthermore, Aliyo and Gemechu (2023) found that inadequate waste management procedures and a lack of training were important risk factors for needlestick and sharp injury among Ethiopian healthcare workers. Risk is also increased by improper management and segregation of medical waste. Ibrahim *et al.* (2023) found a substantial correlation between the frequency of training and the implementation of institutional policies and waste management practices among healthcare professionals in Ethiopia. This is probably the case in the study region as well. The significance of a well-structured and successful IPC education was further highlighted by Bannour *et al*. (2024) who showed that focused training programs greatly enhanced waste management and IPC practices among healthcare professionals in Tunisia. Another important element affecting hospital-acquired infections is the degree of regular environmental cleanliness maintenance. For cleaners to efficiently maintain hygiene and stop the spread of microorganisms, Dancer (2023) submitted that they need to be properly taught, outfitted, and supported by management. Lastly, a larger systemic disregard for this labor sector may be reflected in the supervisors' alleged lack of attention to hospital housekeeper safety. This is consistent with research by Kigozi *et al.* (2024), who found that limited institutional recognition and a lack of empowerment were frequently

associated with hospital cleaners in Uganda having inadequate training and low IPC understanding.

Analysis of Relationships Between Variables

The important role that educational attainment plays in ensuring occupational safety is highlighted by the strong correlation found between knowledge of biological risks and educational achievement. Oladeinde *et al.* (2013) and Padde *et al.* (2022) have observed that a greater comprehension of occupational hazards and better access to health information are frequently associated with higher education levels. This association implies that focused health education initiatives can successfully improve lower-educated workers' awareness of hazards. More frequent interaction with potentially infectious materials raises the chance of contracting occupational infections, according to the correlation between exposure frequency and illness history.

This result is consistent with other studies that found that employees who often come into contact with bodily fluids, such as blood, have increased infection rates (Auta *et al.,* 2017; Sahiledengle *et al.,* 2020). Regular exposure without proper protection may make one more susceptible to biohazards such as needlestick injuries. The connection between unintentional exposure and PPE availability emphasizes even more how crucial regular access to PPE is for reducing workplace hazards. According to Hakim *et al.* (2024), frontline workers' safety is directly jeopardized by the pervasive issue of inadequate PPE supply in many low- and middle-income nations. Furthermore, Bannour *et al*. (2024) found that having PPE available and receiving the right training greatly increases compliance and lowers biological hazards. Regular training promotes safe behaviors, which reduces the risk of occupational infections, according to the substantial correlation shown between the frequency of IPC training and infection history. Structured and continuous infection control education may greatly improve information retention and result in safer workplace behavior, as reported by Singh *et al.* (2023) and Zhang *as al*. (2024). On the other hand, this study found no significant correlation between gender and glove use, indicating that glove usage patterns may be identical for male and female employees, maybe as a result of shared risk perception or consistent institutional regulations. Our findings are in agreement with the report of Alobaid *et al*. (2020),who pointed out that gender-based disparities in occupational health behaviour are context-specific and frequently driven by access and organizational culture rather than just gender. Similarly, the lack of a substantial correlation between symptom reporting and married status may suggest that a person's personal situation has little impact on their propensity to disclose health issues. Gammarano (2020) also noted that although marital status could have an impact on more general labor market results, it might not have a direct impact on how people communicate about health-related issues at work.

CONCLUSION

This study found that most hospital housekeepers in Oshimili South, Delta State, are aware of biological dangers and frequently utilize PPE. However, there are significant gaps, such as infrequent infection control training, insufficient PPE supplies, and inadequate assistance from hospital administration. While 85% were aware of infection hazards, barely half had received appropriate training, and fewer than half had frequent access to PPE. More than half had unintentional contact with bodily fluids such as blood and urine, and many reported symptoms such as fever, cough, and skin rash. Significant correlations between training and infection history, exposure and infection history, PPE availability and unintentional exposure, as well as education and awareness were found by statistical analysis. To mitigate these hazards, hospitals should enhance safety rules, have PPE always available, and conduct frequent infection control training. The hospital will be safer for everyone if these precautions are taken to safeguard housekeepers.

REFERENCES

Aliyo, A., and Gemechu, T. (2023). Prevalence and risk factors of needlesticks and sharp injuries among healthcare workers of hospital in Bule Hora, West Guji Zone, Ethiopia. *Journal of Multidisciplinary Healthcare,* 16: 2679–2686. https://doi.org/10.2147/JMDH.S431578.

ALobaid, A.M., Gosling, C.M., Khasawneh, E., McKenna, L., and Williams, B. (2020). Challenges faced by female healthcare professionals in the workforce: A scoping review. *Journal of Multidisciplinary Healthcare,* 13: 681–691. https://doi.org/10.2147/JMDH.S254922.

Auta, A., Adewuyi, E.O., Tor-Anyiin, A., Aziz, D., Ogbole, E., Ogbonna, B.O., and Adeloye, D. (2017). Health-care workers' occupational exposures to body fluids in 21 countries in Africa: Systematic review and meta-analysis. *Bulletin of the World Health Organization,* 95(12): 831–841F. https://doi.org/10.2471/BLT.17.195735.

Bannour, R., Ben Cheikh, A., Bhiri, S., Ghali, H., Khefacha, S., Ben Rejeb, M., and Laatiri, H.S. (2024). Impact of an educational training about healthcare waste management on practices skills of healthcare workers: A pre-experimental study in a tertiary Tunisian hospital. *Antimicrobial Resistance and Infection Control,* 13: 122. https://doi.org/10.1186/s13756-024-01446-w.

Beltrami, E.M., Williams, I. T., Shapiro, C.N., and Chamberland, M.E. (2000). Risk and management of blood-borne infections in health care workers. *Clinical Microbiology Reviews, 13*(3): 385–407. https://doi.org/10.1128/cmr.13.3.385-407.2000.

Bolarinwa, O.A. (2020). Sample size estimation for health and social science researchers: The principles and considerations for different study designs. *Nigerian Postgraduate Medical Journal,* 27(2): 67–75.

Dancer, S.J. (2014). Controlling hospital-acquired infection: Focus on the role of the environment and new technologies for decontamination. *Clinical Microbiology Reviews,* 27(4): 665–690. https://doi.org/10.1128/CMR.00020-14.

Dancer, S.J. (2023). Hospital cleaning: Past, present, and future. *Antimicrobial Resistance and Infection Control,* 12: 80. https://doi.org/10.1186/s13756-023-01275-3.

Farotimi, A. A., Ademuyiwa, I.Y., Nweke, C.I., and Simeon-Popoola, C.O. (2022, August 19). Knowledge and practice of infection control measures among cleaners in Lagos University Teaching Hospital, Idi-Araba Lagos. *Nigerian Quarterly Journal of Hospital Medicine,* 31(3–4): 18–26. https://doi.org/10.4314/nqjhm.v31i3.4.229975.

Gammarano, R. (2020). *International Day of Families: how marital status shapes labour market outcomes*. ILOSTAT. https://ilostat.ilo.org/blog/international-day-of-families-how-marital-status-shapes-labour-market-outcomes/.

Hakim, S., Chowdhury, M.A.B., Uddin, M.J., and Leslie, H.H. (2024). Availability of basic infection control items and personal protection equipment in 7948 health facilities in eight low- and middle-income countries: Evidence from national health system surveys. *Journal of Global Health,* 14: 04042. https://doi.org/10.7189/jogh.14.04042.

Ibrahim, M., Kebede, M., and Mengiste, B. (2023). Healthcare waste segregation practice and associated factors among healthcare professionals working in public and private hospitals, Dire Dawa, Eastern Ethiopia. *Journal of Environmental and Public Health,* 2023: 8015856. https://doi.org/10.1155/2023/8015856.

Ilesanmi, O.S., Omotoso, B., and Falana, D. (2015). Hazards of hospital cleaners in a tertiary health facility in Southwest Nigeria. *International Journal of Occupational Safety and Health,* 4(1): 27–31. https://doi.org/10.3126/ijosh.v4i1.10083.

Kigozi, E., Kamoga, L., Ssewante, N., Banadda, P., Atai, F., Kabiri, L., and Mbalinda, S.N. (2024). Infection prevention and control: Knowledge, practices and associated factors among cleaners at a National Referral Hospital in Uganda. *Infection Prevention in Practice,* 6*(*3): 100376. https://doi.org/10.1016/j.infpip.2024.100376.

Kimani, J.K., Ettarh, R., Warren, C., and Bellows, B. (2014). Determinants of health insurance ownership among women in Kenya: Evidence from the 2008–09 Kenya Demographic and Health Survey. *International Journal for Equity in Health,* 13, Article 27. https://doi.org/10.1186/1475-9276-13-27.

Lakbala, P., Ebadi Azar, F., and Kamali, H. (2012). Needlestick and sharps injuries among housekeeping workers in hospitals of Shiraz, Iran. *BMC Research Notes,* 5*:* 276. https://doi.org/10.1186/1756-0500-5-276.

Mugabi, B., Hattingh, S., and Chima, S.C. (2018). Assessing knowledge, attitudes, and practices of healthcare workers regarding medical waste management at a tertiary hospital in Botswana: A cross-sectional quantitative study. *Nigerian Journal of Clinical Practice,* 21(12): 1627–1638. https://doi.org/10.4103/njcp.njcp_270_17.

Nezianya, L.A., and Nwankwo, C.U. (2025). Peri-operative nurses' knowledge on surgical site infection prevention and adherence to WHO's guidelines in selected hospitals in Oshimili South Local Government Area, Delta State. *African Journal of Health, Nursing and Midwifery (AJHNM),*8(1): 140–156.

Obi, I.E., Aniebue, P.N., Okonkwo, K.O.B., Okeke, T.A., and Ugwunna, N.C.W. (2015). Prevalence of depression among health workers in Enugu, South East Nigeria. *Nigerian Journal of Clinical Practice,* 18(3): 342–347.

Okereke, E., Unumeri, G., Akinola, A., Adebajo, S., and Awoniyi, O. (2020). Female clients' gender preferences for frontline health workers who provide maternal, newborn and child health (MNCH) services at primary health care level in Nigeria. *BMC Health Services Research,* 20(1): Article 365. https://doi.org/10.1186/s12913-020-05251-0.

Oladeinde, B.H., Omoregie, R., Odia, I., Osakue, E.O., and Imade, O.S. (2013). Biorisk assessment of medical diagnostic laboratories in Nigeria. *Safety and Health at Work*, 4(2): 100–104. https://doi.org/10.1016/j.shaw.2013.04.006.

Omeke, C.A., Enebe, J.T., Ugwu, A.I., Onyishi, N.T., Omeke, M.C., Enebe, N.O., Izuka, E.O., and Aniwada, E. C. (2022). The magnitude and predictors of cervical squamous intraepithelial lesions among women in Enugu, Nigeria: A cross-sectional study of women in a low-resource setting. *Pan African Medical Journal,* 41(130): https://doi.org/10.11604/pamj.2022.41.130.28173.

Onoh, L.U.M. (2021). Health care workers' perception on the current and additional safety measures to be provided in Enugu State University Teaching Hospital, G.R.A. Enugu, Nigeria. *International Journal of Innovative Healthcare Research,* 9(2): 15–20.

Osakwe, S.A., Akpoveta, O.V., and Osakwe, J.O. (2014). The impact of Nigerian flood disaster on the soil quality of farmlands in Oshimili South Local Government Area of Delta State, Nigeria. *Chemistry and Materials Research,* 6(3): 68-77.

Padde, J.R., Akiteng, W., Edema, W., Atiku, S.M., Tibyangye, J., Tekakwo, J., Andruga, C., Hope, D., Musinguzi, B., Gesa, J.B., Amadile, L., and Agondua, R. (2022). Assessment of biosafety and biorisk management practices among medical laboratory students in two institutions in Uganda. *African Journal of Laboratory Medicine*, 11(1): 1590. https://doi.org/10.4102/ajlm.v11i1.1590.

Ream, P.S.F., Tipple, A.F.V., Barros, D.X., Souza, A.C.S., and Pereira, M.S. (2016). Biological risk among hospital housekeepers. *Archives of Environmental and Occupational Health,* 71(2): 59–65. https://doi.org/10.1080/19338244.2014.927347.

Sahiledengle, B., Tekalegn, Y., Woldeyohannes, D., and Quisido, B.J.E. (2020). Occupational exposures to blood and body fluids among healthcare workers in Ethiopia: A systematic review and meta-analysis. *Environmental Health and Preventive Medicine,* 25: 58. https://doi.org/10.1186/s12199-020-00897-y.

Salerno, S., Kolman, V., Livigni, L., Magrini, A., Bosco, M.G., and Figà-*Talamanca*, I. (2012). Women's working conditions in hospital cleaning: A case study. *Work*, 41(Suppl 1): 4315–4319. https://doi.org/10.3233/WOR-2012-0726-4315.

Singh, S., Kaur, K., Saini, R.S., Singh, S., Aggarwal, H.K., and Chandra, H. (2023). Impact of structured training program about hospital infection control practices on knowledge and perception of nursing students at public and private nursing teaching institute of Northern India: An interventional study. *Journal of Education and Health Promotion,* 12: 168. https://doi.org/10.4103/jehp.jehp_1471_22.

Tawiah, P.A., Appiah-Brempong, E., Okyere, P., and Ashinyo, M.E. (2024). Splash of body fluids among healthcare support staff in Ghana: A cross-sectional study. *SAGE Open Medicine,* 12: 20503121241234473. https://doi.org/10.1177/20503121241234473.

Unge, J., Ohlsson, K., Nordander, C., Hansson, G.-Å., Skerfving, S., and Balogh, I. (2007). Differences in physical workload, psychosocial factors and musculoskeletal disorders between two groups of female hospital cleaners with two diverse organizational models. *International Archives of Occupational and Environmental Health,* 81(2): 209–220. https://doi.org/10.1007/s00420-007-0208-x

World Health Organization (WHO) (2024). *Health-care waste*. https://www.who.int/news-room/fact-sheets/detail/health-care-waste

Yan, Y., Li, C., Xu, J., Gao, L., Jiang, Z., Lv, S., Li, P., Xiang, Z., He, P., Ren, G., Zhu, G., and Chen, Z. (2023). *Biosafety status analysis and risk assessment of laboratories from 2021 to 2023 in Jiaxing, China*. Frontiers in Public Health, 11: 12040964. https://doi.org/10.3389/fpubh.2023.12040964.

Zhang, M., Wu, S., Ibrahim, M.I., Md Noor, S.S., and Wan Mohammad, W.M.Z. (2024). Significance of ongoing training and professional development in optimizing healthcare-associated infection prevention and control. *Journal of Medical Signals and Sensors,* 14: 13. https://doi.org/10.4103/jmss.jmss_37_23.