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Evaluation of Preservative Practices and Occupational Exposures in Nigerian Public and Private Mortuary Settings

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ABSTRACT

Morgue workers in resource-limited settings face hazards, with the availability of personal protective equipment, risk exposure, and safety training as key determinants of safety. This study employed a descriptive, cross-sectional survey design to systematically evaluate the availability of personal protective equipment, the prevalence of risk exposure, and the accessibility of safety training among morgue workers in public and private mortuaries within the Oredo Local Government Area (LGA), Benin City, Nigeria. A stratified random sampling technique was utilized to recruit a total of 60 morgue workers, and data were collected via structured questionnaires. Quantitative data underwent descriptive statistical analysis using the Statistical Package for the Social Sciences. The findings revealed a statistically significant disparity in personal protective equipment availability, with workers in public mortuaries reporting access to a significantly lower range of personal protective equipment compared to their counterparts in private facilities (p=0.001). Furthermore, a significantly higher proportion of public morgue workers (53.8%) reported exposure to physical risks compared to private morgue workers (0.0%) (p=0.001). Access to safety training also demonstrated a statistically significant difference, with 84.6% of public morgue workers reporting a lack of training compared to 45.5% in private mortuaries (p=0.022). This study underscores inter-institutional disparities in personal protective equipment availability, risk exposure, and access to safety training. Public mortuaries exhibit heightened vulnerability due to inadequate provisions, while private mortuaries demonstrate better safety measures. These findings necessitate targeted interventions - financial investment and safety training programs in public mortuaries - to enhance the occupational health and safety of this essential workforce.

Keywords: morgue workers, occupational hazards, personal protective equipment, risk exposure

INTRODUCTION

Globally, the occupational environment plays a significant role in determining the health and safety of workers, with over 2.3 million premature deaths reported annually due to work-related factors[1]. Among these, 2 million deaths result from occupational diseases, while the remaining fatalities are due to work-related injuries[2]. Daily, approximately 6400 workers die from occupational diseases, and nearly 860,000 deaths occur as a result of workplace accidents[3]. These alarming statistics underscore the importance of effective occupational health and safety (OHS) practices across various industries, including healthcare.

Mortuary workers represent a vital, though frequently overlooked, segment of the healthcare workforce, face significant occupational hazards in the course of their duties. Their responsibilities include collecting, transporting, and temporarily storing corpses[3]. In some facilities, their roles extend to performing or assisting with postmortem examinations and embalming procedures. These activities expose mortuary workers to numerous risks, including biological hazards from infectious agents, physical injuries from sharp objects, and chemical exposure during embalming. Additionally, operational areas such as waiting rooms and viewing sections—frequented by hospital staff and members of the public—pose secondary risks, further complicating safety concerns[4].

A study identified six primary occupational health and safety hazards in autopsy-related practices: sharp objects, electrical risks, physical dangers, biological agents, radiation, and chemical exposure[4]. Among these, biological and chemical hazards stand out as particularly dangerous for mortuary workers due to their direct exposure to human remains and embalming agents such as formaldehyde. The degree of exposure to these hazards varies based on the specific tasks performed, the environment, and the availability of safety measures[5].

Poor occupational health and safety (OHS) practices have widespread implications, affecting both employers and employees. Employers may face financial burdens such as medical expenses, compensation claims, and legal liabilities, in addition to the potential damage to their reputation. Furthermore, decreased productivity due to the absence of injured workers or those attending medical care exacerbates operational challenges[5]. For employees, the consequences can be severe, ranging from physical injuries and chronic illnesses to reduced earning potential and shortened career spans[6].

While there is growing recognition of occupational risks in many industries, the mortuary sector has received relatively little attention in research and policy development. In South Africa, for example, studies on OHS practices in mortuaries are limited. Al-Jobory *et al.*[7] conducted a risk assessment study at Umtata General Hospital's mortuary in 1998, focusing on exposure risks among workers, the prevalence of risk factors, and the effectiveness of existing control measures. The study concluded that the safety measures in place at the time were inadequate and unsatisfactory[7]. These findings highlight the urgent need for additional studies to inform policy and improve safety standards in mortuaries.

The situation in Nigeria mirrors the global challenges faced by mortuary workers, compounded by resource constraints, inadequate training, and inconsistent enforcement of safety protocols. Mortuaries in Nigeria, particularly in urban centers such as Benin City, handle a high volume of corpses, increasing the likelihood of exposure to hazardous conditions[8]. Biological risks are particularly pronounced, as corpses may carry infectious diseases like tuberculosis, hepatitis, or HIV. The prolonged exposure to embalming fluids and cleaning agents presents

serious chemical hazards, contributing to long-term health complications like respiratory diseases and various cancers. Despite these challenges, there is a lack of comprehensive data on the knowledge, attitudes, and practices of mortuary workers in Nigeria regarding OHS[9].

Furthermore, the disparity in resources and safety standards between public and private mortuaries complicates the issue of risk exposure and occupational hazards. Public mortuaries often operate with limited funding, outdated equipment, and insufficient training programs for staff, leading to suboptimal safety practices. In contrast, private mortuaries may have better resources but are not always subject to stringent regulatory oversight, which can result in inconsistent adherence to safety guideline[10]. This dichotomy raises questions about the overall effectiveness of OHS practices across different types of facilities.

In addition to safety concerns, the methods used for corpse preservation in Nigerian mortuaries necessitate further investigation. Preservation techniques such as refrigeration, embalming, and chemical treatments are essential for maintaining the integrity of human remains, especially in cases requiring prolonged storage[10]. However, these procedures carry their risks if not performed correctly. For example, improper handling of embalming chemicals can expose workers to harmful fumes, while inadequate refrigeration facilities may lead to decomposition, increasing biological hazards[10].

Given the critical role of mortuary workers in maintaining public health and dignity in death, it is imperative to address the challenges they face. Studies focusing on their working conditions, safety practices, and preservative methods can provide valuable insights for improving their occupational environment. This is particularly relevant in the context of Benin City, where both Public and private mortuaries serve a large and diverse population. This study aims to assess preservative procedures and occupational safety practices among morgue workers in public and private centers in Oredo Local Government Area (LGA), Benin City, Nigeria.

MATERIALS AND METHODS

Research design

The research design adopted for this study is a descriptive cross-sectional survey. This design was selected to provide a snapshot of the preservative procedures and working conditions of morgue workers at a specific point in time, across different mortuaries in Oredo LGA and other neighboring LGAs. The cross-sectional survey allows for the collection of quantitative data from a diverse sample of morgue workers, enabling comparisons between public and private mortuaries[11].

Study area

The study was conducted in Oredo Local Government Area (LGA) and other neighboring LGA, one of the major administrative areas in Benin City, Edo State, Nigeria. Oredo LGA is densely populated and has several healthcare facilities, including public and privately-owned mortuaries. Benin City is the capital of Edo State, a commercial and cultural hub in the South-South geopolitical zone of Nigeria. It has a high demand for mortuary services due to the population density, socio-cultural practices surrounding death, and the need for body preservation for delayed burials[12]. The research was carried out in Oredo communities around GRA, Ogbe, Uzebu, Urubi, Ikpema.

Population of the study

The population for this study comprises all morgue workers working in public and private mortuaries within Oredo LGA and other neighbouring LGA. These morgue workers are responsible for handling and preserving bodies, providing

essential services related to body preservation, embalming, refrigeration, and maintaining sanitary conditions in the mortuaries. The population includes morgue workers from public mortuaries associated with public hospitals and clinics, and private mortuaries owned and operated by private entities.

Sampling technique

The study employed a stratified random sampling technique. The stratification is based on the type of mortuary (public or private), ensuring that both sectors are proportionately represented. Within each stratum, participants are selected randomly to avoid bias. The stratified sampling method ensured that the study captured the variations in working conditions and procedures between public and private mortuaries.

Inclusion and exclusion criteria

The selection of participants was based on their willingness to participate, as well as the length of time they had worked in their respective mortuaries (a minimum of six months). This ensured that the participants had sufficient experience to provide informed responses regarding preservative procedures and working conditions.

Data collection methods

Quantitative and qualitative methods were used to gather comprehensive data. The data collection tools included questionnaires and interviews.

*Questionnaires***:** A structured questionnaire was designed to collect quantitative data from the morgue Workers. The questionnaire was divided into sections covering demographic information (e.g., age, gender, years of experience), preservative procedures used in the mortuaries (e.g., embalming, refrigeration), working conditions (e.g., workload, availability of personal protective equipment) and health and safety practices (e.g., exposure to formaldehyde, handling infectious bodies).

The questionnaire used both closed-ended and Likert scale questions to gather numerical data for analysis. The use of Likert scale questions allowed for measuring the extent of agreement or disagreement with statements regarding working conditions and preservative techniques[11].

Interviews: Selected morgue workers participated in semi-structured interviews, allowing us to gather essential information and qualitative insights into their experiences and challenges in public and private mortuaries. The interviews focused on exploring deeper aspects of their work, including psychological impacts, coping mechanisms, and specific challenges related to the availability of resources and equipment. This allowed for a richer understanding of the nuances behind the quantitative data collected[13].

Data collection procedure

Data collection was conducted over a period of four weeks. The questionnaires were distributed to morgue workers during their working hours, and appointments were made for the interviews. The researcher ensured confidentiality by using codes instead of names on the questionnaires. The semi-structured interviews were conducted in private settings to encourage open and honest responses from the participants.

Data analysis

Data analysis was conducted using both quantitative and qualitative techniques. The data collected through the questionnaires were coded and entered into the Statistical Package for Social Sciences (SPSS) software for analysis. Descriptive statistics such as frequencies, percentages, and mean values were calculated to summarize the data on preservative procedures, working conditions, and health risks. Additionally, inferential statistics such as Chi-square tests were used to determine

significant differences between the working conditions in Public and private mortuaries at p= 0.001[11].

Ethical considerations

The study complied with all ethical guidelines for research involving human participants. Ethical approval was obtained from the Ethics Committee of Ambrose Alli University. Participants were fully informed about the study, their role, and their right to withdraw at any time without repercussions. Written consent was obtained from all participants before data collection commenced. Confidentiality was maintained by anonymizing data and securely storing all records.

RESULTS

Availability of personal protective equipment among morgue workers in public and private centers

The availability of personal protective equipment (PPE) among morgue Workers was assessed in both Public and private centers in Oredo LGA, Benin City. The findings indicate significant differences in PPE availability between the two settings.

Table 1: Availability of personal protective equipment (PPE) among morgue workers

PPE-Availability	Public Morgue n(%)	Private Morgue n(%)	X^2	P value
12 PPE	6(46.2%)	0(0.0%)	35[a]	0.001*
15 PPE	7(53.8%)	0(0.0%)		
16 PPE	0(0.0%)	7(31.8%)		
17 PPE	0(0.0%)	1(4.5%)		
20 PPE	0(0.0%)	9(40.9%)		
22 PPE	0(0.0%)	5(22.7%)		

n= sample size, X^2 = chi-square, * p value <0.005 is significant

Risk exposure and safety training access among morgue workers in public and private centers

The study also assessed the exposure of morgue Workers to various risks and their access to safety training in both public and private centers. A significant difference was observed in the exposure to physical risks, with 53.8% of Public morgue workers reporting exposure, while none in private morgues did (p=0.001). Regarding biological hazards, 92.3% of public morgue workers and 95.5% of private morgue Workers reported no exposure, with no significant difference between the two (p=0.698). The exposure to physiological risks showed a similar pattern, with 84.6% of Public morgue Workers and 77.3% of private morgue Workers exposed, but the difference was not statistically significant (p=0.600). Additionally, a significant difference was found in access to safety training, with 84.6% of Public morgue Workers lacking training compared to 45.5% in private morgues (p=0.022).

Table 2: Risk exposure and safety training access among morgue workers

	Response	Public Morgue	Private morgue	X^2	P value
Exposure to physical risk	No	6(46.2%)	22(100%)	14.8[a]	0.001*
	Yes	7(53.8%)	0(0.0%)		
Exposure to a biological hazard	No	12(92.3%)	21(95.5%)	0.15[a]	0.698
	Yes	1(7.7%)	1(4.5%)		
Exposure to physiological risk	No	2(15.4%)	5(22.7%)	0.28[a]	0.600
	Yes	11(84.6%)	17(77.3%)		
Safety training access	No	11(84.6%)	10(45.5%)	5.22[a]	0.022*
	Yes	2(54.5%)	12(54.5%)		

n= sample size, X^2 = chi-square, * p value <0.005 is significant

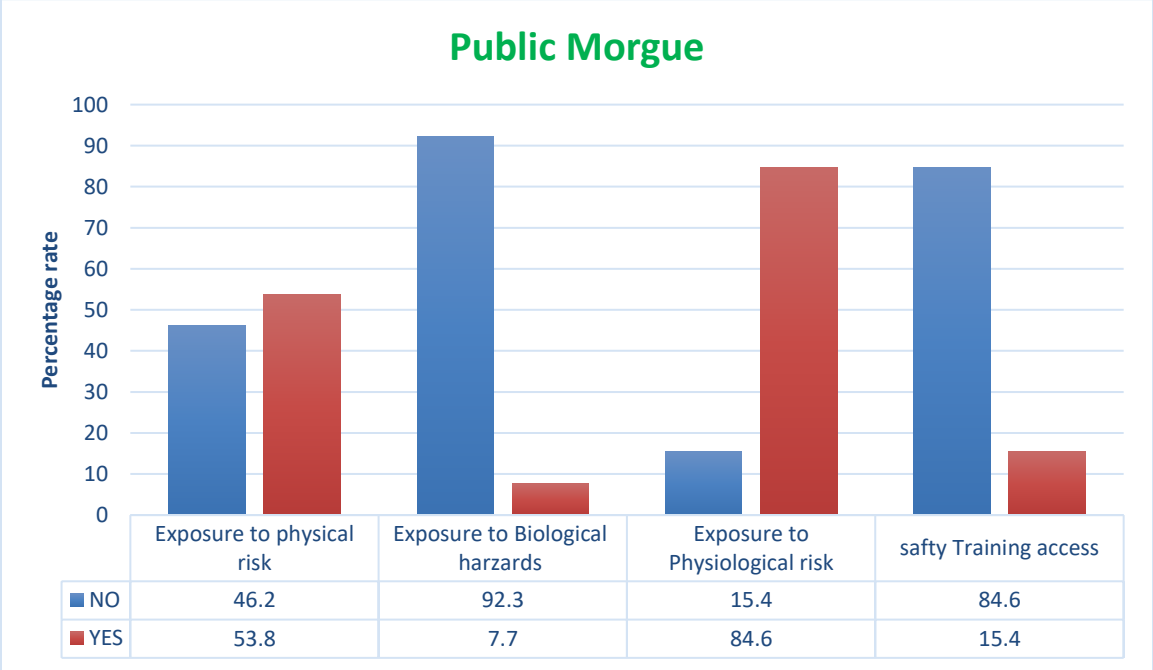

Figure 1: Bar chart showing exposure to risk and safety training in the public morgue

The chart shows that 53.8% of Workers were exposed to physical risk, while 46.2% were not. Regarding biological hazards, 7.7% of the Workers reported exposure, while 92.3% did not. For physiological risks, the majority (84.6%) were exposed, with 15.4% not exposed. Concerning safety training, only 15.4% of Workers had access to safety training, while a significant 84.6% had no training.

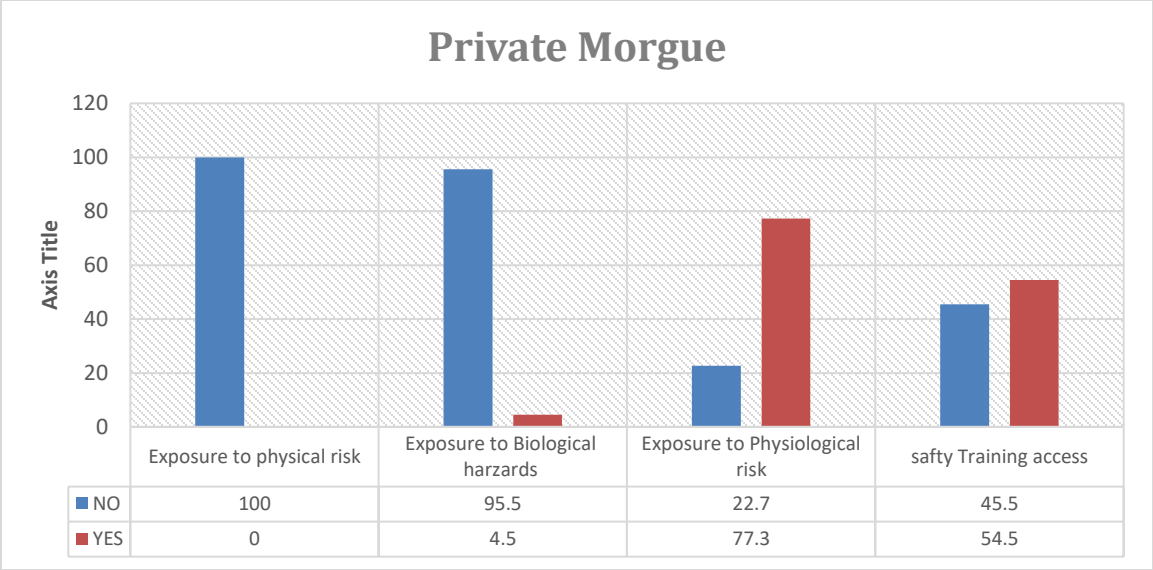

Figure 2: Bar chart showing exposure to risk and safety training in a private morgue

The chart reveals that no Workers in the private morgue were exposed to physical risk (0.0%), while 100% were not exposed. Regarding biological hazards, 4.5% of Workers reported exposure, and 95.5% were not exposed. In terms of physiological risks, 77.3% of Workers were exposed, while 22.7% were not. As for safety training, 54.5% of Workers had access to safety training, whereas 45.5% did not.

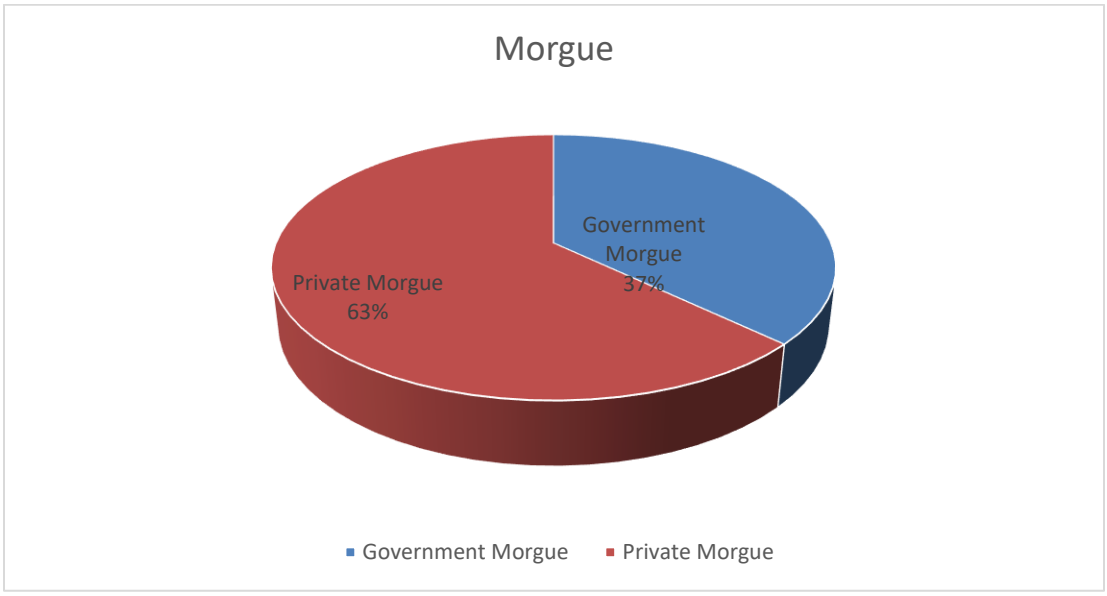

Figure 3: Pie chart showing the percentage of private and public morgues in this study

The chart shows that 63.0% of the morgues included in the study were private, while 37.0% were Public morgues.

DISCUSSION

This investigation aimed to characterize the preservative procedures and occupational safety practices among morgue workers within public and private facilities in Oredo Local Government Area, Benin City, Nigeria. The findings reveal discernible differences in the protective measures afforded to staff across these two settings.

A primary observation was the significant disparity in the availability of personal protective equipment (PPE). While public morgue workers demonstrated some access to a comprehensive suite of PPE, private morgues consistently exhibited a higher provision of these crucial protective items. This outcome resonates with previous research, which often highlights resource inadequacies, particularly funding and allocation constraints, as a limiting factor for PPE provision in public healthcare institutions [14]. Conversely, the enhanced PPE availability in private facilities likely reflects their superior financial capacity, enabling a more robust investment in staff safety. This aligns with previous observations that well-resourced healthcare facilities typically ensure adequate PPE for their personnel [15]. The observed divergence underscores the critical role of financial capability, with public facilities in developing nations often contending with budget limitations that impede comprehensive staff protection[14]. Consequently, policy reforms are imperative to ensure that public morgues, which frequently manage higher caseloads, are equipped with sufficient resources to safeguard their workforce.

A critical finding of this study pertained to the differential exposure to physical risks. Public morgue workers reported a significantly higher likelihood of encountering hazardous physical conditions, including handling deceased bodies in varying states of decomposition and managing associated hazardous materials such as blood and bodily fluids. This increased vulnerability in public settings is consistent with reports from Molewa *et al*.[16], who documented the prevalence of physical hazards in underfunded public morgues often characterized by inadequate infrastructure and limited staff training. In contrast, private morgues exhibited a commendable absence of reported physical risk exposure. This outcome supports the premise that enhanced financial backing and advanced infrastructure in private facilities enable effective implementation of risk minimization strategies. Furthermore, the elevated availability of PPE in private morgues likely contributes to the observed reduction in physical risks for their staff.

Notably, the study revealed no significant difference in exposure to biological and physiological risks between the two settings. This suggests that the management of biological hazards, such as infection risks from corpse handling, is broadly consistent across both public and private mortuary environments. Similarly, despite the variations in physical exposure, physiological risks, such as physical strain from the demanding tasks of body handling and lifting, were comparable. This indicates that such physiological stressors are intrinsic to the mortuary environment, irrespective of the institutional status[16].

Access to safety training constituted another focal point of the investigation. A concerning disparity was observed, with public morgue workers demonstrating a notable lack of access to formal safety training compared to their counterparts in private facilities. This absence of training is a significant concern, as it can directly impede appropriate responses to workplace hazards and compromise overall risk management. Dyreborg *et al*.[17] have previously emphasized the pivotal role of safety training in mitigating workplace injuries and enhancing risk management capabilities within healthcare settings. The profound difference in training access between public and private morgues necessitates increased investment

in comprehensive staff training programs, particularly in public facilities where occupational risks are more prevalent. This research illustrates a concerning inverse relationship in public morgues, where a high proportion of workers face physical risks but possess limited safety training, signifying inadequate preparedness. Conversely, private morgue workers demonstrated better safety training, indicating a clear advantage in risk preparedness and management, aligning with previous observations on the efficacy of training programs in enhancing hazardous situation management [18].

However, a consistent overarching trend emerged across both settings: despite enhanced PPE availability and safety training in private morgues, the overall exposure to risks, particularly physiological risks, remained noteworthy, especially within public morgues. This suggests that while PPE and training are indispensable elements of risk mitigation, they alone may not be sufficient to comprehensively safeguard workers. Additional factors, including the overarching work environment conditions, staffing levels, and the frequency of exposure to hazardous materials, likely exert considerable influence on the overall safety profile of morgue workers.

The observed distribution of morgues in this study, with a higher representation of private facilities, may reflect the greater prevalence of private mortuary services in urban centers such as Benin City, driven by increased demand for advanced services. Private morgues often thrive in economically robust regions and typically offer specialized services, including forensic autopsies, catering to both public and private clientele. Conversely, public morgues, serving a broader populace, frequently contend with elevated caseloads amidst constrained resources. These findings are consistent with the general trends reported by other researchers that private mortuary facilities typically possess superior resources, more robust staff training, and higher PPE availability compared to their public counterparts [19, 20].

CONCLUSION

Our study reveals significant disparities in safety standards between public and private morgues, with public facilities experiencing greater challenges in PPE availability, risk management, and staff training. These findings underscore an urgent need for increased funding, improved infrastructure, and comprehensive safety training in public morgues to enhance worker safety.

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