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Assessment of Occupational Risks and Health Hazards Among Healthcare Workers In A Ghanaian Hospital

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Abstract

Information on measuring risks prevalent among healthcare workers in Ghana and globally is limited. With anecdotal evidence suggesting a high level of occupational injuries among health workers working in a Ghanaian University Hospital, this study was conducted to identify the common hazards faced by the health workers and use the decision matrix risk assessment technique to determine the risks associated with some hazards identified. The study also determined these workers' knowledge, attitude, awareness, and practices toward occupational health and safety. A triangulation of methods was used. The study used a survey, a review of incident registers, and an expert evaluation. There were a total of 133 participants made up of various health professional groups, with nurses and midwives being the majority (31.6%). Knowledge, attitude, awareness, and practices towards occupational health and safety were high. Knowledge scores were significantly associated with age groups (X2-18.996, p-0.001) and cadre of staff (X2-14.690, p-0.005). Attitude was significantly associated with age groups (X2-10.467, p-0.033), years of working (X2-11.112, p-0.011), and cadre of staff (X2-15.467, p-0.004). Awareness was significantly associated with years of working (X2-8.57, p-0.035). There was a high prevalence of self-reported needle stick injuries. A review of incident registers revealed a high underreporting rate of occupational injuries. Staff were found to be at high risk of musculoskeletal injuries and stress.

INTRODUCTION

Workplace safety is key to ensuring that jobs are performed more efficiently and with great satisfaction. There are still hundreds of millions of workers today employed under unsafe and unhealthy working conditions. The International Labour Organization (ILO) estimates that every year about 2.3 million people globally succumb to work-related diseases and accidents. This translates into about 6300 deaths daily(International Labour Organization, 2016). A "hazard" is any source of potential harm or

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adverse health effects to personnel or any source of potential harm or damage to property and the environment (Canadian Centre for Occupational Health and Safety, 2022), and a "risk" is defined as the likelihood that a hazard will cause harm ((Canadian Centre for Occupational Health and Safety, 2022)). Occupational risk is an inevitable part of the daily life of every organization including healthcare facilities. Risk assessment is the systematic process of identifying hazards, analyzing or evaluating the risk associated with the identified hazards, and determining the most appropriate ways to eliminate or control the hazards (Biron et al., 2006). Based on identified and analyzed risks, risk assessment allows policymakers to determine which risks will be treated and with what priority (Pascarella et al., 2021).

Health workers globally are known to operate in environments considered to be among the most hazardous occupational settings (Mossburg et al., 2019). They are therefore more at risk of injuries and infections than the rest of the general public. The World Health Organization (WHO) estimates that sharp injuries contribute to about 30% of all new cases of Hepatitis B infections and about 2.5% of HIV infections among health workers in sub-Saharan Africa every year (World Health Organization, 2022). Factors known to increase the risk of health workers to occupational injuries and infections include not wearing appropriate protective equipment (Debelu et al., 2023), and work-related stress (Appiagyei et al., 2021).

Many studies have been conducted to identify occupational hazards among healthcare workers globally and in Ghana (Kumar et al., 2022; Tawiah et al., 2022). Previous studies in Ghana have found a high prevalence of occupational injuries (Appiagyei et al., 2021; Lori et al., 2016), high levels of knowledge, attitude, and practices on occupational safety (Tawiah et al., 2022), low uptake of the hepatitis B vaccine (Ansa et al., 2019; Konlan et al., 2017) and high psychological stress among nurses (Kaburi et al., 2019). These studies, however, were mainly based on self-reports by respondents with none combining staff's opinion with expert evaluation. Also, no previous research had attempted to calculate risks associated with hazards identified in the healthcare setting in Ghana. Over the years, the University of Cape Coast has recorded high incidents of workplace injuries among staff. There is a need therefore to determine the knowledge, attitude, and practices of staff on occupational health and safety and to assess common risks such as workplace injuries. This study was therefore designed to address these gaps in knowledge by employing a triangulation of methods to identify risks and to use a decision matrix to assess the identified risks.

METHODS

Materials and Methods

Study Setting

The study was carried out at the University of Cape Coast Hospital. The University of Cape Coast is a collegiate public university located in the historic town of Cape Coast in the central region of Ghana. It is one of the rare sea-front universities in the world. Geographically, the area occupied by the university lies at latitude 5.1155° North of the Equator, and longitude 1.2909° West of the Prime Meridian. This study was conducted at the University of Cape Coast Hospital because of anecdotal reports of many staff experiencing workplace injuries over the years.

Study Design and Duration

This was a cross-sectional study that employed triangulation of methods. It involved a survey, expert evaluation, and the review of incident registers. The study was conducted in April 2023.

Study Population, Sample, and Data Source

The study population included all staff at the University of Cape Coast Hospital involved in direct healthcare provision and had worked at the hospital for at least one year. These were doctors and other prescribers (21), nurses and midwives (45), pharmacists (3), laboratory technicians (12), laundry workers (14) and conservancy workers (41). The census sampling technique was applied to all 136 staff who were eligible per the inclusion criteria.

Potential Sources of Bias

The potential sources of bias included the provision of socially desirable responses by participants and the element of subjectivity in the risk assessment process. A triangulation of methods using other data sources such as incident registers and an observation checklist was employed to address the potential sources of bias mentioned. Further to that, three experts independently assessed the risks to reduce potential bias due to subjectivity.

Study Variables

The study design had two response variables with eleven explanatory variables. In this cross-sectional study, the response, or dependent variables were metric scale variables which were the levels of knowledge of respondents and their

practices of safety precautions. The explanatory or independent variables included one categorical but ordinal variable (educational level), one categorical but nominal variable (occupation), and seven metric scale variables: age, working experience, attitude, perceived risk, awareness, and availability of PPEs.

Statistical Methods

Summaries of continuous variables were made using means and standard deviations. Comparisons between groups were done with t-tests. Categorical variables were summarized using frequencies and percentages. The association between the dependent variables and the independent variables was estimated using chi-square and multiple linear regression analysis where appropriate. Adjusted analyses were performed with multivariable linear regression. In dealing with the problem of multicollinearity, the independent variables with a bivariate correlation of more than 0.70 were not included in the multiple regression analysis. The final multiple linear regression model was diagnosed and evaluated for fitness and robustness using several indicators and tests. Backward regression analysis was deployed to succinctly eliminate collinear as well as non-significant predictors in the model to arrive at the best-fitting model for the data. The data processing was performed using SPSS v 22 computer software packages. Statistical significance was set at 5% and 95% Confidence Intervals.

Instruments

Questionnaire

A structured questionnaire that took about 30 minutes to complete was administered to participants. Appropriate measures were taken to ensure the validity and reliability of the questionnaire. These included pre-testing the questionnaire which allowed necessary adjustments to be made to enhance its face validity. Also, validated tools used in previous studies were adapted (Adu-Gyamfi, 2020). Additionally, expert opinions were sought during the designing stages of the questionnaire and observational checklist. To enhance reliability, the scores of three independent experts were compared. There were six (6) sections. Section A collected data on the socio-demographic characteristics of respondents. Section B, sought to determine the levels of knowledge, awareness, and practice of respondents on occupational health and safety. Section C determined the attitude of respondents towards hazards and some common safety practices. Section D aimed at collecting data on the occurrence of exposures to hazards at work among respondents. Section E sought to collect data on measures available to control hazards whilst Section F asked respondents to choose from a list of health conditions encountered in the last year and state whether they would attribute their health conditions to their working environment or not.

Observational Checklist

An observational checklist developed by reviewing relevant literature (Dehdashti et al., 2020) was used in this study. It was made up of 9 sections. These were general safety, electrical safety, fire safety, hazardous material safety, general security, and availability of PPEs, first aid, and policies on OHS as well as the use of PPEs by workers.

Incident Register

The Incident Register for the hospital used to record all occupational accidents was reviewed to determine the occupational accidents that had occurred in the past year (April 2022 – April 2023) and the frequency of occurrence.

Risk Assessment Form

A risk assessment form was designed using a validated risk assessment matrix adopted from a previous study (Uca & Alizadehebadi, 2021), and modified to reflect hazards identified in the survey. Experts used the form to estimate risks associated with various hazards based on findings from the use of the observational checklist and review of the incident register.

Risk Calculation

The Risk score (R) was calculated by multiplying the probability of the event (P) and the severity of the event (S). Table 2 demonstrates the definitions of the risk scores: insignificant risk (1), tolerable/low risk (2, 3, 4, 5, and 6), moderate/medium risk (8, 9, 10, and 12) significant/high risk (15, 16, and 20), and intolerable risk (25).

Description of Variables

The main variables in this study were measured as follows:

To measure knowledge, questions such as what do you understand by occupational health and safety? Do you know about occupational hazards? And what types of occupational hazards are you aware of? Scores were assigned: a correct score was 1, and a wrong score was 0. Higher total scores indicate high knowledge of OHS.

Attitude towards safety practices was measured using 11 questions on a Linkert-type scale.

Table 1. 5x5 L-shaped Risk Matrix

			Severity		
Probability	1 Negligible	2 Minor	3 Moderate	4 Significant	5 Severe
1 Very unlikely	1 Insignificant	2 Low	3 Low	4 Low	5 Low
2 Unlikely	2 Low	4 Low	6 Low	8 Medium	10 Medium
3 Possible	3 Low	6 Low	9 Medium	12 Medium	15 High
4 Likely	4 Low	8 Medium	12 Medium	16 High	20 High
5 Very likely	5 Low	10 Medium	15 High	20 High	25 Intolerable

Table 2. Risk Assessment Interpretation

Risk Score	**Result**
25=R	Intolerable risk, the operation must be stopped immediately.
15=R<20	High risk, it should be improved in the short term.
8=R<15	Significant risk, it can be improved in the long term.
R<8	Acceptable risk, control measures must be maintained

Scores were assigned as follows: strongly agree = 5, agree = 4, undecided = 3, disagree = 2, strongly disagree = 1.

OHS practices were measured by asking respondents whether they used available PPEs. Scores were assigned as follows: always=2, sometimes=1, never=0. High total scores indicated good safety practices.

Exposure to hazards was determined by asking respondents if they had been exposed to some common hazards in their workplace in the past year. Occupational hazards were categorized into biological and non-biological hazards. Biological hazards were defined to include needle pricks, cuts to body parts by working tools, direct contact with body fluids, and exposure to infectious agents. Non-biological hazards included environmental hazards and psychosocial hazards. Scores were assigned as follows: more than three times=3, twice=2, once=1, never=0. Higher total scores meant high vulnerability to hazards. Exposure was then categorized into yes (if exposed in the past year) and no (if not exposed in the past year).

To measure awareness of safety practices, respondents were asked if they were aware of some safety precautions that pertain to their routine work. Scores were assigned as follows: a correct answer = 1, a wrong answer =0. Higher total scores indicated a high level of awareness.

The perception of healthcare workers was determined by asking respondents if they thought they were at risk of occupational hazards and to what degree.

For knowledge, attitude, practices, and awareness variables, cumulative scores were aggregated and categorized into good and poor (knowledge and practice); low and high (awareness) while attitude was categorized as positive and negative (Aluko et al., 2016). The categorization was based on the attained median score for each variable. A score equal to or greater than the median was categorized as high/good/positive whilst a score less than the median was categorized as low/poor/negative.

RESULTS AND DISCUSSION

A total of 133 health workers participated in the study representing 98.2% of all eligible respondents. Of these 76 (57.1%) were males. The majority, 61(45.9%) were in the age group of 30 – 39 years whilst about 40.6% had worked as health professionals for over 15 years. Participants were of various professional backgrounds with the majority 42 (31.6%) being nurses and midwives (Table 3).

Knowledge of Occupational Health

The majority of respondents 86 (64.6%) had good knowledge with an overall score (SD) of 4.3 ± 1.8 out of a maximum score of 8. This finding is consistent with what was found in si-

milar studies in Ghana (Bello et al., 2021) and in other parts of the world (Kumar et al., 2022). Even though most respondents 126 (94.7%) reported that they knew about occupational health and safety, only 75 (56.4%) knew that occupational hazards could be categorized into physical, chemical, biological, mechanical, and ergonomic hazards. The distribution of respondents' awareness of the various categories of hazards were biological 110 (82.7%), chemical 107(80.4%), physical 108(81.2%), mechanical 64(48.1%), and ergonomic 47 (35.3%). Similar findings were also made by studies conducted in Nigeria (Aluko et al., 2016). This could be due to the content of educational modules on occupational health that usually emphasize the importance of biological hazards with little information on ergonomic hazards. There is therefore the need to increase education on ergonomic hazards emphasizing their importance to the occupational health of health workers. Knowledge scores of participants were significantly associated with their age groups (X2- 18.996, p- 0.001) and cadre of staff (X2- 14.690, p- 0.005) (Table 3). Multiple regression was run to predict knowledge scores from age groups, cadres of staff, and scores of attitudes toward occupational health. These variables statistically predicted knowledge, $F(3, 129) = 12.554$, $p < 0.001$, $R2 = 0.226$. The general form of the equation predicting knowledge scores from age group, attitude scores, and cadres of staff is Knowledge = 4.681-0.519 (age group)-0.40 (cadre of staff) + 0.058 (attitude score). The professional grouping of staff being significantly associated with their knowledge of occupational health is similar to what was found in an earlier study (Aluko et al., 2016). This may be due to the higher educational requirements associated with professions such as doctors and nurses. Such professionals are more likely to have received training on occupational health whilst in school or as part of continuous professional development courses after school compared to other professional groups. Whilst this study found that the age of respondents was significantly ($p=0.001$) associated with knowledge, with a majority (78.6%) of those in the 30-39 age group having their knowledge level rated as "good", some earlier studies (Abuduxike et al., 2021; Kumar et al., 2022) found younger participants (< 25 years) to be more knowledgeable. This could probably be because the majority of respondents in this study were in the age group of 30-39 years who are more likely to have completed higher degrees and therefore more likely to have some prior education on occupational health.

Only 44(33.1%) knew about existing protocols in the hospital that dealt with issues on occupational health. The majority of respondents, 84 (63.2%), reported they did not know of a designated unit in the hospital that manages occupational health issues when they arise.

Perception of Occupational Risk

Most participants, 125 (94.0%) thought that they were at risk of occupational hazards due to the nature of their jobs. Among these, 90 (72.0%) classified their job as high risk, whilst the remaining 35 (28%) reported their job as medium risk. This finding is lower than the 96.2% found in an earlier study in Nigeria (Aluko et al., 2016). This could probably be due to the different professional groups involved in these studies. Whilst the Nigerian study involved only clinical staff such as doctors, nurses, and nursing assistants (Aluko et al., 2016) the current study included many other cadres of health workers such as cleaners, laundry workers, and pharmacy staff who may perceive their work to be less risky as compared to clinical staff.

Attitude Towards Occupational Hazards and Safety Practices

The majority of respondents, 70 (52.6%) had positive attitudes towards occupational hazards and safety practices. Overall, there was a positively high mean score ± SD of (47.26 ± 5.9) out of a maximum score of 55. Participants' age group (X2- 10.467, p- 0.033), years of working (X2- 11.112, p- 0.011), and the cadre of staff (X2- 15.467, p- 0.004) were significantly associated with their attitudes towards occupational hazards and safety practices when categorized into negative and positive as shown in Table 3. The highly positive attitude toward occupational health and safety practices among health workers is consistent with the findings of earlier studies (Aluko et al., 2016; Faq et al., 2022). This is unsurprising as many respondents perceived their job as risky and would be more safety conscious. The category of staff, a respondent belonged to was significantly associated with their attitude towards occupational health and safety. This finding agrees with what was found in an earlier Ghanaian study (Appiagyei et al., 2021) as some categories of staff may perceive their jobs as riskier and will therefore develop higher positive attitudes towards safety at the workplace.

Training on Occupational Health

Most respondents, 102 (76.7%), indicated that they had received at least one training

in occupational health in the year preceding the survey. However, only 7(5.3%) reported receiving any form of pre-employment orientation in occupational health. Receiving training on occupational health was found to be significantly associated with the knowledge level of respondents on occupational health (X2- 6.169, p- 0.04). There was no such significant association between receiving pre-employment orientation on occupational health and their current knowledge level (X2- 3.56, p- 0.168). An earlier study (Aluko et al., 2016) even though some respondents had received pre-employment training on occupational health, they still recorded poor knowledge scores. Several studies have demonstrated the positive impact of training on occupational health and safety on the knowledge and practice of health workers (Barati Jozan et al., 2023; Zhang et al., 2022). It is therefore not surprising that participants in this study reported that their commonest source of knowledge on occupational health was training workshops (74.4%), consistent with an earlier Nigerian study (Aluko et al., 2016). Other sources of knowledge were during school 19(14.3%), personal readings 7(5.3%), pre-employment orientation 5(3.7%), and the media 3(2.3%).

Availability and Use of Personal Protective Equipment (PPEs)

There was a high level of reported mean availability scores ± SD (12.1 ± 2.8) with a maximum score of 16. The most available PPEs were hand washing facilities, as 132 (99.2%) respondents reported. Only 70 (52.6%) reported the availability of mosquito nets and sprays.

Respondents reported high usage of PPEs, with a mean score ± SD of 10.1 ± 2.3 (maximum score of 16). This study found a strong positive correlation between the availability of PPEs and their usage (r=0.614, p=.001).

Table 3. Association between socio-demographic characteristics of respondents and their knowledge, attitude, awareness, and practice of safety precautions

Demographic Variable	Frequency (%)	Knowledge		Attitude		Practice of Safety Precautions		Awareness	
Age (years)		Poor	Good	Negative	Positive	Poor	Good	Low	High
20-29	6 (4.5)	4	2	3	3	2	4	3	3
30 - 39	61 (45.9)	13	48	30	31	36	25	21	40
40 - 49	34 (25.6)	10	24	13	21	11	23	12	22
50 - 59	28 (21.1)	17	11	14	14	13	15	12	16
≥ 60	4 (3.0)	3	1	3	1	0	4	0	4
Total (%)	133 (100)	47 (35.4)	86 (64.6)	63 (47.4)	70 (52.6)	62 (46.6)	71 (53.4)	48 (36.1)	85 (63.9)
Sex									
Male	76 (57.1)	29	47	31	45	34	42	27	49
Female	57 (42.9)	18	39	32	25	28	29	21	36
Working Experience (years)									
<5	13 (9.8)	4	9	3	10	5	8	2	11
5-10	30 (22.6)	9	21	18	12	22	8	17	13
11-15	36 (27.1)	8	28	15	21	14	22	11	25
>15	54 (40.6)	26	28	27	27	21	33	18	36
Cadres of Staff									
Doctors / Prescribers	21 (15.8)	3	18	8	13	14	7	6	15
Nurses / Midwives	42 (31.6)	15	27	21	21	25	17	15	27
Laboratory Staff	12 (9.0)	3	9	1	11	4	8	3	9
Cleaners	41 (30.8)	23	18	24	17	10	31	16	25
Others	17 (12.8)	3	14	9	8	9	8	8	9

Perceived Effects of Occupational Hazards on Health

Participants were asked to report any chronic health problems they had at the time of the survey and if they attributed that to occupational hazards. The findings are shown in Table 5. The most common health problems reported by respondents were low back pain 105 (78.9%) and neck pain 92 (69.2%), with a majority reporting these attributing them to work-related exposures 84 (63.2%) and 70 (52.6%), respectively. Some previous studies in Ghana (Abla Kofi- Bediako et al., 2021; Boakye et al., 2018) also found health workers at high risk for work-related musculoskeletal disorders. The prevalence of low back pain in this study is higher than the 39.6% found in Uganda (Aleku et al., 2021)and the African average of 41.9% (Morris et al., 2016). The prevalence in this study is, however, similar to the incidence of 70% - 85% that pertains globally (Buchbinder et al., 2018). This high prevalence of work-related musculoskeletal disorders among respondents in this study is not surprising as health workers' work includes lifting and moving patients, frequent twisting and bending, sitting, and standing for long hours. The prevalence of low back pain in this study was higher among nurses (85.7%) compared to doctors (76.2%). This finding is consistent with what was reported in a previous study (Aleku et al., 2021). Nurses are known to be more involved in many manual activities including lifting of patients compared to other health workers. There is therefore the need to pay more attention to the ergonomic hazards at the workplace.

Self-reported stress among respondents in this study was very high (95.4%). This is higher than the 69.5% and 52.5% reported by some earlier studies conducted in Ghana (Odonkor & Adams, 2021) and Ethiopia (Gebeyehu & Zeleke, 2019) respectively. It is however similar to the 98.5% found in an Egyptian study (Aly et al., 2021). The main causes of the self-reported stress in this study were work overload (60.6%) and low remuneration (15.7%). Thus, to improve the stress level of health workers, their working conditions must be improved by increasing staff strength and increasing salaries.

There was a self-reported Hepatitis B prevalence of 14(10.5%) with 8 (57.1%) of them attributing their infection to occupational exposure.

Awareness of Safety Precautions

Awareness was high among the majority of participants 85 (63.9%). There was an overall awareness score (SD) of 11.6 ± 1.78 out of a maximum of 14. This is consistent with the findings of an earlier study conducted in Nigeria (Kumar et al., 2022). Even though there was a high level of awareness among respondents on the importance of complete immunization against Hepatitis B, 88 (66.2%), and Tetanus 82 (61.7%), only 63 (47.4%) reported having completed their hepatitis B immunization, while only 42 (31.6%) had immunized against Tetanus. A previous study (Ogunnowo et al., 2010) had found no association between awareness and practice of safety precautions among some health workers. Therefore, regular in-service education and training are needed to translate awareness of safety practices into actual practice of these measures. Awareness of safety precautions was not significantly associated with a cadre of staff (X2- 2.197, p—0.700), age group (X2- 3.401, p—0.493), or sex of participants (X2- 0.024, p—0.876).

The Practice of Safety Precautions

The overall mean score ± SD for the practice of safety precautions was found to be high (16.72 ± 5.3) among respondents, with a maximum score of 25. The level of safety practice was good in the majority, 71 (53.4%) of participants. The practice of safety precautions was found to be significantly associated with age group (X2- 10.467, p- 0.033), years of working experience (X2- 11.112, p- 0.011), and cadres of staff (X2- 15.467, p- 0.004) as shown in Table 3. A significant positive but weak correlation (r = 0.275, p= 0.001) between scores for awareness and practice of safety precautions was found. This weak positive relationship was exemplified by the low uptake of Hepatitis B immunization 63 (47.4%) despite a high level of awareness 88 (66.2%). The practice of safety precautions was significantly associated with working experience (X2- 11.112, p- 0.011), cadre of staff (X2- 15.467, p- 0.004), and age group (X2- 10.467, p- 0.033). it was, however, not significantly associated with the sex of participants. Knowledge levels were not significantly correlated to the practice of safety precautions (r = 0.014, p= 0.870). The low uptake of Hepatitis B vaccines coupled with the high incidence of needle stick injuries found in this study is very worrying considering the likelihood of contracting blood-borne pathogens. It must be adequately addressed through policies that mandate all health workers who are Hepatitis B negative to get vaccinated. The Ghana Health Service advises in its occupational health policy (Occupational Health Policy, 2010), that all health staff must be made aware and provided with appropriate immunizations. The level of Hepatitis B uptake

in this study (47.4%) was lower than the 53.4% found in an earlier study (Ansa et al., 2019) but similar to the 44.4% uptake found among nurses in another Ghanaian study (Konlan et al., 2017).

Exposure to Hazards

All participants (100%) reported having experienced at least one occupational hazard in any form in the last year before the survey. This finding confirms that the healthcare setting is one of the most hazardous workplaces. Self-reported exposures to some occupational hazards are shown in Table 4. The most prevalent category of hazards was biological (67.9%), followed by environmental (51.3%) and psychosexual (42.9%). A previous study conducted in Ghana (Tawiah et al., 2022) found exposure to biological hazards to be the most common (55.8%) among health workers. A Chinese study (Shi et al., 2020), however, found psychosocial and organizational hazards to be the commonest occupational exposures.

Exposure to environmental hazards accounted for 51.3% of responses. The most frequently reported environmental hazards were high temperatures in the working areas, 76(57.1%), poor lighting, 75(56.4%), and trips 72(54.4%) as shown in Table 4.

The most prevalent biological hazard was exposure to airborne microbes 115 (86.5%), followed by exposure to mosquito bites 111 (83.5%). The high self-reported incidence of mosquito bites in this study is alarming as the situation could increase the likelihood of an increase in mosquito-borne infections such as malaria among staff and patients. All possible routes of entry used by mosquitoes as well as any breeding sites such as the pockets of stagnant water observed must be addressed properly. In an earlier study conducted in Nigeria (Efunshile et al., 2021), 94% of staff considered mosquito bites in the hospital as problematic.

The self-reported prevalence of needle stick injuries among participants was 62.4% as shown in Table 4. This incidence is higher compared to the 27.4% found in an earlier study conducted among health professionals in Ghana (Appiagyei et al., 2021), and the 8.4% found in a Saudi Arabian study (Alfulayw et al., 2021). Most of these injuries occurred among nurses, doctors, and laboratory workers. These categories of health workers were also found to be the most at risk of needle stick injuries in some similar studies (Alfulayw et al., 2021; Appiagyei et al., 2021). This is probably because these cadres of staff use a lot of needles and other sharp instruments at work. This study as a limitation did not ascertain the possible causes of this high incidence.

The reported occurrence of psychosexual hazards among respondents was low 42.9%. The most reported psychosexual hazards were working for long hours 116 (87.2%), and time pressures, skipping meals, and medications 105 (78.9%). The reported incidence of sexual harassment was low 20 (15.0%). There was a significant association between reports of sexual harassment and sex (X2- 11.73, p- 0.001) with 12 (60.0%) being females. This incidence of sexual harassment is low compared to the findings of earlier studies conducted among nurses in Ghana (Boafo et al., 2016) and Ethiopia (Dagnaw et al., 2022). The low incidence in this study could be because, unlike the other studies which were conducted only among nurses who are mostly females, this study included many categories of staff with the majority being males.

Only 73(54.9%) indicated that they ever reported their occupational hazard exposures to relevant authorities. Among the 60 (45.1%) who have never reported their occupational hazard exposures, reasons for not reporting were given as follows: not knowing who to report to (34, 56.7%), being busy (20, 33.3%), because injuries were minor (17, 28.3%), thinks nothing will be done about it when reported (17, 28.3%), and forgot to report (10, 16.7%).

Table 4. Exposure to hazards among respondents

Type of Hazard	Exposed Frequency (%)	Not Exposed Frequency (%)
Biological		
Latex allergies	37 (27.82)	96 (72.18)
Needle pricks	83 (62.41)	50 (37.59)
Mosquito bites	111 (83.46)	22 (16.54)
Contact with body fluids	106 (79.70)	27 (20.30)
Airborne microbes	115 (86.47)	18 (13.53)
Total	452 (67.97)	213 (32.03)

Type of Hazard	Exposed Frequency (%)	Not exposed Frequency (%)
Environmental		
Falling / flying objects	52 (39.10)	81 (60.90)
Trips / slips	72 (54.14)	61 (45.86)
High temperatures	76 (57.14)	57 (42.86)
High noise	67 (50.38)	66 (49.62)
Poor lighting	75 (56.39)	58 (43.61)
Poor ventilation	69 (51.88)	64 (48.12)
Lack of privacy	64 (48.12)	69 (51.88)
Exposure to radiation	63 (47.39)	70 (52.61)
Total	614 (51.29)	583 (48.71)
Psychosexual		
Sexual harassment	20 (15.04)	113 (84.96)
Verbal assaults from clients	46 (34.59)	87 (65.41)
Verbal assaults from supervisors	38 (28.57)	95 (71.43)
Physical assaults from clients / supervisors	25 (18.80)	108 (81.20)
Verbal assaults from colleagues	50 (37.59)	83 (62.41)
Working for long hours	116 (87.22)	17 (12.78)
Time pressures, skipping meals and medications	105 (78.95)	28 (21.05)
Total	400 (42.96)	531 (57.04)

Incident Register

A review of the incident register revealed that there were 31 incidents recorded in the last year before the survey. The majority of these were body splashes with body fluids such as blood and amniotic fluids, 16 (51.6%), followed by needle stick injuries 12 (38.7%), and slips/falls/hitting head against furniture 3(9.7%). In general, physicians 13 (41.9%), nurses and midwives 13 (41.9%), cleaners 3 (9.7%), and laboratory workers 2 (6.5%) were the main victims of the documented occupational exposures. This incidence of needle stick injuries is higher compared to the 27.4% found in an earlier study conducted among health professionals in Ghana (Appiagyei et al., 2021), and the 8.4% found in a Saudi Arabian study (Alfulayw et al., 2021). Most of these injuries occurred among nurses, doctors, and laboratory workers. These categories of health workers were also found to be the most at risk of needle stick injuries in some similar studies (Alfulayw et al., 2021; Appiagyei et al., 2021)This is probably because these cadres of staff use many needles and other sharp instruments at work.

While all who experienced needle stick injuries were offered post-exposure prophylaxis (PEP), only 5 (31.2%) who were exposed to splashes of body fluids were put on PEP. Most cases of needle stick injuries occurred during the use of sharp items, such as during surgeries 6 (50%), and recapping of needles 6 (50%). Exposure to body fluids was mainly among midwives during delivery 8 (50%), nurses 1 (6.3%), and doctors 7 (43.8%) during surgeries.

The review of the incident register revealed a high degree of underreporting of occupational injuries compared to the self-reported injuries found through the survey, as only 31 cases of occupational exposure were reported. This finding contradicts the occupational health policy of Ghana for health workers that states that all accidents to staff, patients, and visitors must be reported through an incident reporting system (Occupational Health Policy, 2010). Similar under-reporting of occupational injuries was found in a study conducted in Sweden (Orellana et al., 2021). A systematic review conducted among workers in the United States of America found that 20-91% of them did not report their work-related injuries (Kyung et al., 2023). In this study, the main reasons for under-reporting were the severity of the injuries or exposures and not knowing who to report to. Some previous studies have also identified some reasons for under-reporting. These included injury type and severity (Kyung et al., 2023), and the general health of the

worker (Yang et al., 2019).

Expert Evaluation

Using an observational checklist, a team of three experts identified and evaluated risks at the various work sites in the hospital. Regarding environmental safety, the experts observed that lighting was adequate in all working areas. However, there were areas of darkness at night on the hospital compound, which may negatively impact staff and client security. The average temperature in the working areas was 28.7 0C, with noise levels determined qualitatively as normal. There were pockets of stagnant water on the compound, and mosquito larvae were observed in them.

Many health workers were observed working using ergonomically inappropriate chairs. Most equipment was lifted manually. No patient-lifting equipment was seen, as clients were lifted manually by the nurses and midwives on the wards.

Regarding electrical safety, most electrical outlets observed were in good condition, with no electrical cords strung across walkways. No overloaded electrical sockets were seen. However, some sockets were found to be malfunctioning in the wards and offices.

Overall, fire safety was good. All working areas had unexpired fire extinguishers and smoke detectors. However, not all working areas had emergency exits, especially offices in the only high-rise building at the hospital. Most doors were found to open inwards, which may hinder efforts to escape during emergencies.

All staff observed at the post were wearing the appropriate PPEs. However, the laboratory did not have safety showers or eyewash fountains.

Regarding the availability of policies, there were no standard operating procedures for staff and patients to follow in case of an emergency. Even though there was a safety manager, he was not well-resourced and had no office. There was also no occupational health and safety committee.

Risk Assessment Matrix

Table 5, shows the findings of the decision matrix risk assessment conducted by the experts at the University of Cape Coast Hospital.

Staff were found to be most at risk of musculoskeletal injuries (Risk Score 20), stress (Risk Score 20), needlestick injuries (Risk Score 16), and contracting malaria from mosquito bites (Risk Score 15).

Table 5. Risk Assessment Matrix

Risk / Activity	Hazards	Probability of Occurrence (P)	Severity (S)	Risk Score (PxS)	Outcome	Control Measures
Needle stick injuries/ working with needles and sharps	Inadequate practice of safe injection practices, lack of needles with safety features, work overload, patient reactions	4	4	16	HIGH RISK	Reducing the workload on surgeons, increasing training in safe injection practices
Slips and falls/ moving around in the facility	Lack of safety sign for slippery surfaces, lack of proper footwear for cleaners	3	2	6	LOW RISK	Provision of safety signs for slippery surfaces and adequate foot wear for cleaners
Musculoskeletal injuries/ manual lifting of patients and equipment	Non-adjustable table and chairs, no equipment for lifting patients	5	4	20	HIGH RISK	Urgent need for adjustable table and chairs, and equipment for lifting patients

Risk / Activity	Hazards	Probability of Occurrence (P)	Severity (S)	Risk Score (PxS)	Outcome	Control Measures
Stress	Heavy workload, verbal abuse from clients, night shifts	5	4	20	HIGH RISK	Need to employ more staff to reduce work load, regular engagement with clients to reduce verbal abuse
Fire explosion	Lack of fireproof doors and walls, no emergency exits in many offices	1	5	5	LOW RISK	Create emergency exits in the various offices
Burns from chemical exposure	Ineffective general ventilation system, lack of functional showers, lack of emergency eye washes	3	2	6	LOW RISK	Create effective ventilation system, functional showers and eye washes
Contracting malaria from mosquito bites	High burden of mosquitos, night shifts, inadequate mosquito nets and sprays	5	3	15	HIGH RISK	Reducing the mosquito burden, providing mosquito sprays and repellents
Blood and body fluids splash	Not wearing goggles and aprons	5	2	10	MEDIUM RISK	Increase education on the use of goggles, aprons and other PPEs

Assessing the risks associated with specific and common activities in the healthcare setting will allow authorities to decide how to mitigate the impact and likelihood of occurrences of these risks. In this study, the risk of needle stick injuries was found to be very high, requiring urgent attention. There is, therefore, the need to engage in intense education through staff training on handling sharp instruments. Also, authorities must consider the procurement of needles with safety features while reducing work overload by improving staff strength.

The risk of contracting malaria from mosquito bites was also found to be high, considering the high burden of mosquitoes due to the pockets of stagnant water and the inadequate measures in place to protect staff and patients from mosquito bites. All pockets of stagnant water must be drained, and staff and patients must be provided with mosquito repellents and bed nets for all beds on the wards.

The risk of musculoskeletal injuries and stress was found to be high due to the observed absence of ergonomically appropriate chairs and the unavailability of patient lifting equipment. This can be mitigated by acquiring appropriate swivel chairs and equipment for lifting patients.

CONCLUSION

This study revealed that using a triangu-

lation methodology to investigate occupational health and safety issues in the healthcare setting is useful. It helped to identify both real and perceived hazards affecting healthcare workers. The findings of this study have huge implications for the health of workers in the healthcare provision industry. Through policy, pre-employment orientation on occupational health and safety must be institutionalized. The rate of occupational injuries at this hospital in Ghana is unacceptably high. Routine training on occupational health and safety, especially on the safe use and disposal of sharp instruments among doctors, nurses, midwives, and laboratory workers, must be frequently organized. Also, all health workers should be encouraged to immunize against vaccine-preventable pathogens they are commonly exposed to, such as hepatitis B and Tetanus. A major cause of stress among the health workers was work overload. This must be addressed by strategically implementing measures to increase staff strength and ensuring that all staff take their annual vacation rest without failure. Ergonomic hazards were found to negatively impact the health of staff, leading to a high prevalence of musculoskeletal disorders. Thus, measures such as providing comfortable chairs and tables and patient lifting equipment must be done to mitigate the situation. Even though fire safety was good, emergency exits must be created for all work areas.

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