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Assessment of Occupational Risks among Academic Staff in a Ghanaian Public University

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Abstract

The occupational health and safety of academic staff in institutions of higher learning in Ghana has attracted some attention in recent years due to the high numbers of secondary school graduates entering these institutions. This situation undoubtedly threatens the occupational health and safety of Lecturers in Ghana. This study was conducted among academic staff of the University of Cape Coast, Ghana, and sought to determine the common hazards affecting them and evaluate the associated risks using the decision matrix risk assessment technique. The study also determined these workers' knowledge, attitudes, awareness, and practices toward occupational health and safety. This cross-sectional study used a combination of techniques, including a survey and an expert evaluation using an observational checklist. There were 360 participants in total. Respondents' scores on knowledge, attitude, awareness, and practices toward occupational health and safety were high. There was a high prevalence of low back pain, neck pain, and stress. The main drivers of stress were the high workload and the inability to take annual leave. Risks of musculoskeletal injuries, voice disorders, stress among academic staff, and fire outbreaks on campus were found to be high. In conclusion, concerns about stress, voice issues, and musculoskeletal disorders seem to be prevalent among academic staff at the University of Cape Coast. Authorities should address the main drivers of occupational health issues identified in this study.

Keywords: *Academic Staff, Occupational Health, Risk Assessment, University of Cape Coast.*

Introduction

The work of Lecturers involves mainly teaching, researching, and engaging in community service [1]. Lecturers and Research Fellows who form the academic staff in institutions of higher learning are, therefore, to equip students with analytical and practical skills to prepare them for self-development [2]. Teachers face several hazards and associated risks in the course of their work. The International Labour Organization (ILO) defines a hazard as "the inherent potential to cause injury or damage to people's health" and a risk as "a combination of the likelihood of an occurrence of a hazardous event and the severity of injury or damage to the health of people caused by this event." [3]. The many hazards faced by Lecturers include musculoskeletal disorders [4], injury to vocal cords [5], high workload [6], and disruptive students [7]. The risks associated with these hazards must be regularly assessed to identify ways these hazards can be controlled. According to the ILO [3], risk assessment is the "process of evaluating the risks to safety and health arising from workplace hazards." In the

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university setting, risk assessment could be described as a method used to identify vulnerabilities that might prevent the academic institution from achieving its set goals and objectives. The occupational health and safety of academic staff in institutions of higher learning in Ghana has attracted some attention in recent years due to the high numbers of secondary school graduates entering these institutions. In 2017, the government of Ghana introduced the Free Senior High School policy, which aimed to increase opportunities for primary school graduates to gain access to secondary education. [8] This policy has significantly increased the number of students accessing universities and other tertiary institutions in Ghana. Still, there has been no corresponding increase in staffing and infrastructure. [2] This situation undoubtedly threatens the occupational health and safety of Lecturers in Ghana. Many previous studies conducted among academic staff of universities in Ghana focused mainly on their occupational stress. [9]. Our review of existing literature revealed a paucity of knowledge on the prevalence of other hazards among university academic staff in Ghana and around the globe. We therefore sought to identify the common hazards facing Lecturers at the University of Cape Coast, a public university in Ghana. We also used the decision matrix risk assessment technique to evaluate the risks associated with the identified hazards.

Materials and Methods

Study Setting

The study was conducted among academic staff at the University of Cape Coast, a collegiate public university located in the historic town of Cape Coast in the central region of Ghana.

Study Design and Duration

This cross-sectional study employed triangulation of methods. Hazard identification was performed in this study by using a questionnaire to collect opinions of academic staff on what constituted hazards in the work environment and inspecting the workplace with an observational checklist. The study was conducted in July 2023.

Study Population, Sample, and Data Source

The study population was all academic staff who have taught at the University of Cape Coast for at least one year. The total number of academic staff was 884, according to records obtained from the Human Resource Directorate of the University. Using the Yamane formula for calculating sample sizes for a finite population, a minimum sample size of 275 was obtained. To further increase the power of the study and compensate for any non-responses, the sample size was increased by 40%, resulting in a final sample size of 385. Employing the convenience sampling technique, all categories of academic staff who met the inclusion criteria were invited to participate in the study.

Potential Sources of Bias

There were some potential sources of bias associated with this study. These included the possibility that respondents would provide socially desirable answers and how experts evaluated risks qualitatively. A combination of other data sources was used to address these potential sources of bias. These included using an observational checklist to ascertain the veracity of participant claims. Additionally, three experts were made to independently assess the risks before a final decision was made on each one.

Study Variables

There were eleven explanatory variables and two response variables. The dependent variables were measured on the metric scale. These were respondents' knowledge and their practices of safety precautions. The independent variables were categorical but nominal (occupation), categorical but ordinal variable (education), and metric scale variables

(age, working experience, attitude, perceived risk, awareness, and availability of personal protective equipment (PPEs).

Statistical Methods

The means and standard deviations were used to summarize continuous variables. The t-test was used to compare the groups. The frequencies and percentages of the categorical variables were used to summarize them. Using chi-square, the relationship between the independent and dependent variables was estimated. Software programs for SPSS version 22 were used to process the data. Statistical significance was established at the 5% and 95% Confidence Intervals.

Instruments

Questionnaires

This study used a structured self-administered questionnaire; a pilot study was conducted on 10 Cape Coast Technical University academic staff members to ensure validity. This allowed necessary adjustments to be made to the questionnaire; additionally, the opinions of experts in the field of occupational health were sought when designing the questionnaire and observational checklist. Reliability was enhanced by comparing the assessment scores of three independent experts for the same risks. The questionnaire consisted of six sections: Section A aimed to gather data on respondents' sociodemographic characteristics;

Data on respondents' levels of awareness, knowledge, and practice on occupational health and safety were gathered in Section B. Participants' attitudes regarding risks and the application of workplace health and safety were ascertained in Section C. Section D evaluated the workers' self-reported exposure to workplace hazards. While Section F investigated the effects of occupational hazards on the staff the previous year, Section E was used to gather data on workplace measures available for hazard control.

Measuring Instruments

The Ingco Digital Humidity and Temperature Meter (Model: HETH 01) was used to measure the temperature at sampled offices and classrooms. The HETSL01 model of the Ingco Digital Sound Level Meter was used to measure the noise levels in offices and classrooms. Three distinct measurements were taken for ten minutes at each location. Next, the average value was noted.

Observational Checklist

After examining earlier comparable research, an observational checklist was created 15. It had eight parts. Sections on first aid, OHS rules, PPE use by employees, electrical safety, fire safety, general security, and availability of PPEs were among those covered.

Risk Assessment Form

A validated risk assessment matrix from a prior investigation [10] was used and modified to account for the risks found. Three experts utilized the form to assess the risks related to the hazards discovered throughout the risk identification procedures.

Risk Calculation

The probability (P) and severity (S) of the incident were multiplied to determine the risk score (R). The risk scores are defined as follows in Table 2: (1) inconsequential risk; (2) tolerable/low risk; (2, 3, 4, 5, and 6); (8, 9, 10, and 12); (15, 16, and 20); and (25) moderate/medium risk. Tables 1 and 2 were taken from a prior study. [10] and modified accordingly.

Table 1. 5x5 L-Shaped Risk Matrix used to Score Risk

	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 Scores 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

Ethical Consideration

The University of Cape Coast Ethical Review Board approved the study protocol and issued an ethical clearance ID (UCC/IRB/EXT/2023/13). We obtained informed consent in writing from every participant. To maintain anonymity, no names were included in the information gathered. To protect data, it was stored on a password-protected computer. The value of confidentiality was taught to every member of the research team during their training.

Results

Three hundred sixty participants were involved in the study, representing an overall 93.5% response rate. Of the respondents, 165 (45.8%) were in the 50-to-59-year-old age bracket. The majority of respondents, 235 (65.0%), were men. Most participants, 144 (42.0%), have been university teachers for 11–15 years (Table 3).

Table 3: Socio-Demographic Characteristics of Respondents

Characteristic	**Frequency**	**Percentage**
Age (years)		
30-39	87	24.2
40-49	90	25
50-59	165	45.8

>60	18	5
Gender		
Male	235	65.0
Female	125	35.0
Number of years taught at UCC (years)		
<5	18	5.0
5-10	63	17.5
11-15	144	40.0
>15	135	37.5
Academic Rank		
Professor	11	3.0
Senior Lecturer	148	41.1
Lecturer	172	47.8
Assistant Lecturer	29	8.1

Knowledge, Awareness, and Practice of Occupational Health and Safety

Respondents' knowledge of occupational health was good, with an overall mean score of 4.93 ± 1.4 (maximum score of 7). Despite almost all participants, 360 (100%), reporting they knew about occupational health, only 270 (75.0%) understood it to involve the welfare of employees, employers, and clients. Respondent's awareness of the appropriate safety precautions was high, with an overall score of 6.13 ± 1.6 (maximum score of 7). Occupational safety practice among the academic staff surveyed was good, with an overall mean score of 14.33 ± 2.5 (maximum score of 7).

The existence of processes in place at the workplace to address occupational hazards was unknown to a sizable portion of respondents (245, or 68.0%). If an occupational health issue arose, most participants (268, or 74.4%) were unaware of any assigned office or officer to handle it. In the twelve months preceding the research, only 189 (52.5%) respondents said they had received any OHS training, whereas 81 (22.5%) reported having formal occupational health training within one month before the survey. Only nine (2.5%) surveyed attended occupational health and safety pre-employment training.

Perception of Risk and Attitudes Towards Occupational Safety

Most Lecturers, 99 (82.5%) surveyed thought their work was dangerous. A good attitude towards OHS was expressed by most respondents (207, 57.5%), with a mean score of 36.50 ± 6.35 (maximum score of 40).

Perceived Effects of Occupational Hazards on Health

Respondents disclosed any health issues they had dealt with in the year before the poll, which could be attributed to their occupation. Table 4 presents the findings. Low back pain 333 (92.5%) and neck pain 261 (72.5%) were the two most common health issues mentioned by respondents. A self-reported prevalence of 162 vocal disorders (45.0%) was found. 324 (90.0%) of the respondents reported feeling stressed.

Table 4. Perceived Effects of Occupational Hazards on the Health of Respondents

Health Problem	**Yes**	**No**
	Frequency (%)	**Frequency (%)**
Low back pain	333 (92.5)	27(7.5)
Stress	324 (90)	36 (10)
Neck pain	261 (72.5)	99 (27.5)
Wrist joint pain	207 (57.5)	153 (42.5)
Vocal hoarseness	162(45.0)	198 (55.0)

Exposure to Hazards

Participants self-reported prevalence of exposure to any form of occupational hazards in the last year before the survey was 92.2%. Self-reported exposure to some occupational hazards are shown in Table 5.

The most frequently reported environmental hazards were high noise levels 69 (76.7%), poor lighting 57 (63.3%), and inadequate ventilation 54 (60.0%), as shown in Table 5.

The most prevalent biological hazard was cut to body parts by working tools 36 (40.0%), followed by exposure to mosquito bites 30 (33.3%). The majority of respondents, 51 (56.8%), indicated that they sometimes report their exposures to authorities, while 21 (23.3%) indicated that they always report, with 18 (20.0%) having never reported their occupational exposures. Among the reasons for not always reporting incidents were minor injuries, not knowing who to report to, forgetting to report, and thinking that nothing would be done about the complaints.

Only 54 (60.0%) knew about the existence of the workmen compensation law of Ghana. There were no reported incidents of sexual harassment. The most prevalent psychosexual hazards were working for long hours 54 (60.0%) and time pressures 48 (53.3%).

Table 5. Exposure to Occupational Hazards among Respondents

Type of Hazard	**Exposed**	**Not Exposed**
	Frequency (%)	**Frequency (%)**
Environmental		
Falling/flying objects	81 (22.5)	279 (77.5)
Trips/slips	153 (42.5)	207 (57.5)
High temperatures	216 (60.0)	144 (40.0)
High noise	261 (60.0)	99 (27.5)
Poor lighting	36 (10.0)	324 (90.0)
Poor ventilation	90 (25.0)	270 (75.0)
Lack of privacy	290 (80.6)	70 (19.4)
Lack of security	300 (83.3)	60 (16.7)
Total	1427 (49.5)	1453 (50.5)
Psychosexual		

Sexual harassment	54 (15.0)	306 (85.0)
Verbal assaults from clients	63 (17.5)	297 (82.5)
Physical and verbal assaults from co-workers and students	333 (92.5)	27 (7.5)
Working for long hours	306 (85.0)	54 (15.0)
Time pressures, skipping meals and medications	189 (52.5)	171 (47.5)
Total	945 (52.5)	855 (47.5)

Observation Checklist

General Safety: The lighting in the various offices and classrooms inspected was adequate. The streets on campus were well-lit at night, and no slippery floors were observed. However, most office and lecture hall chairs and tables were not ergonomically appropriate. Offices were congested. Some offices were shared by four lecturers. Lecture halls were usually full and some overcrowded.

Fire Safety: Most offices and lecture halls did not have fire extinguishers at vantage points, and many working areas did not have smoke detectors. Most offices had only one door that served as the entrance and exit. No fire exit signs were observed, and a few faulty sockets were in the lecture halls.

General Security: Many offices were visited, and lecture halls did not have adequate security officers.

First Aid: none of the offices visited had first aid boxes available for inspection.

Temperature: the average temperature was 25ºC in the offices and 34.7 ºC in the lecture halls.

Noise Measurement

The noise levels in the offices averaged 60 dBA, while that of the classrooms averaged 75 dBA.

Incident Register

None of the offices visited had an incident register to record occupational exposures, so no records of occupational injuries were available for review.

Risk Assessment

Table 6 reveals the findings of the decision matrix risk assessment conducted at the University of Cape Coast (UCC). This procedure assessed and identified common risks in the workplace.

Staff were found to be most at risk of musculoskeletal injuries (Risk Score 20), stress (Risk Score 20), voice disorders (Risk Score 16), and fire explosion (Risk Score 20).

Table 6. Risk Assessment Matrix Evaluating Common Hazards Identified at the University of Cape Coast

Risk / Activity	**Hazards**	**Probability of Occurrence (P)**	**Severity (S)**	**Risk Score (P x S)**	**Outcome**	**Control Measures**
Respiratory disorders	Overcrowded classrooms and congested offices	3	3	9	MEDIUM RISK	Improving ventilation in the offices and classrooms, decongesting offices and classrooms

Musculoskeletal injuries	Non-adjustable tables and chairs, standing for long hours	5	4	20	HIGH RISK	There is an urgent need for adjustable tables and chairs, and a reduction in teaching time
Stress	Heavy workload, inability to take annual leave, high expected outputs for promotions	4	5	20	HIGH RISK	Need to employ more staff to reduce workload, ensure leave periods, and offer support for academic outputs
Fire	Inadequate fire extinguishers, inadequate smoke detectors, Lack of fireproof doors and walls, no emergency exists in many offices	4	5	20	HIGH RISK	Create emergency exits in the various offices, provide adequate fire extinguishers
Voice disorders	Large class sizes, inadequate microphones, and high noise levels in the teaching areas	4	4	16	HIGH RISK	Provision of microphones, reduction in class sizes, improved acoustic conditions

Discussion

The study found a high level of knowledge among respondents. This is not surprising considering teachers' high academic qualifications in higher learning institutions. Even though we did not find any study that specifically determined the knowledge level of Lecturers on OHS, some studies conducted to determine the knowledge of primary and secondary school teachers on OHS were found [11, 12]. In a Malaysian study [11], teachers' knowledge in primary and secondary schools was good. Another study in Central Sweden found that teachers taught OHS mainly based on their own experiences and knowledge of OHS rather than the provided curriculum [12].

This Swedish study emphasizes the importance of educators acquiring high knowledge of OHS to impart accurate information to their students. After all, students are known to imitate what teachers practice [13]. Thus, it is worrisome to note in this study that a significant number of respondents (47.5%) did not receive formal training in the year preceding the study. In comparison, about 77.5% indicated they had not received any form of occupational health information in the last month before the study. Only 9 (2.5%) participants reported receiving any form of pre-employment orientation on OHS. This finding agrees with that of a Nigerian study [14]. Previous studies have demonstrated that training on OHS for workers positively impacted their attitudes and beliefs on OHS and prevented accidents [15]. Therefore, there is an urgent need for the public health section of the university to map up a strategy to disseminate information on OHS regularly to the university community, including students and lecturers. The study revealed that academic staff at the University of Cape Coast faced mainly environmental (49.5%) and psychosexual hazards (42.5%). A similar study conducted at the University of Medical Sciences, Iran [16], also found the existence of environmental hazards. The main reported environmental hazards in this study were high temperatures (60.0%), noise (72.5%), lack of privacy (80.6%) and lack of security (83.3%). The average temperature in the classroom of $30^{O}C$ can negatively affect teaching and learning. A cohort analysis [17] revealed that summer heat negatively affected student learning. Another study in India [18] noted that about 32% of teachers involved had experienced some form of sickness due to excessive classroom heat. Some teachers in a Sweden study [19] that assessed the impact of a heat wave reported that they experienced exhaustion and headaches. To reduce the effects of high temperatures on teaching and learning, classrooms and offices must be well-ventilated or fitted with air conditioners. Also, lectures could be scheduled during cooler times, such as early mornings or late afternoons.

The participants' report of noise as a main environmental hazard was supported by the high sound levels (75 dBA) recorded in the classrooms and the teaching areas. Noise significantly affects any task's performance accuracy, and errors are higher in high-noise environments [14]. In a study conducted at the Saudi University [20], the noise levels in laboratories and classrooms (50 – 70 dBA) were above the recommended levels (40-50 dBA). According to the WHO guidelines for community noise [21], the noise level in school classrooms during teaching should not exceed 35 dB and 55 dB during playtime. Since high noise levels are known to be associated with many health conditions, such as hearing loss and tinnitus, efforts should be made to educate both staff and students to keep the learning environment less noisy.

Most classrooms observed were overcrowded. This is partly due to the high number of students assessing higher education in Ghana [22]. An earlier study conducted in Ghana also found many lecture halls to be overcrowded, with some halls containing about 400 students at a time [9]. A study conducted among primary teachers in Ghana [22], reported that many participants described overcrowded classrooms as stressful. Overcrowded classrooms usually disrupt effective teaching and lead to problems with discipline and student appraisal [22]. Therefore, more lecturers need to be employed, and more lecture halls built to combat the negative effects of overcrowding.

The study also revealed that the issue of security was a major concern for participants, as most of them (83.3%) reported that they had no security at work. The level of protection against threats, harm, theft, and illegal conduct is known as security [23]. Security challenges have been reported in many universities around the globe [24, 25]. A study reported that office and room burglary, mobile phone snatching,

and physical assaults are among the major security concerns on many campuses [26]. This study observed that many teaching and learning areas did not have adequate security for men and women at the post. In some areas, there were none at post. This situation puts both students and lecturers at risk of violent attacks and other security threats.

The privacy of lecturers was another issue of concern found in this study. Many offices were congested, with as many as four lecturers sharing one office in some instances. Situations like this certainly leave no room for private activities and violate the private space of individuals. In a study conducted among some primary school teachers [27], participants reported that parents, students, and fellow teachers violated their private space.

Among the perceived effects of occupational hazards on participants' health were musculoskeletal disorders. Some previous studies have also found the burden of musculoskeletal pain among academic staff to be common. While this study found low back pain to be more common, a study conducted among academic staff at Mekelle University [28], found neck pain to be more common, followed by low back pain. Factors known to contribute to the incidence of musculoskeletal pain among university teachers include prolonged standing, sitting for long hours to read and write [29], and the prolonged use of the computer [4].

Most Lecturers (90%) who participated in this study indicated they experienced work-related stress. Stress is perceived pressure that exceeds an individual's coping ability [30]. Many studies have also found high-stress levels among university teachers globally [6,9]. This study reported the main causes of stress as heavy workload and the inability to take annual leave. An Ethiopian study found high job demands and low job control as the main drivers of stress among university academic staff [6].

Risk Assessment

The risk of fire at the various offices and classrooms was found to be high. Considering the high number of people who use these facilities at any given time, efforts should be made to reduce the fire risk by providing adequate fire extinguishers at all office areas and lecture halls. Also, emergency exits must be provided in all buildings, especially high-rise ones. Regular fire drills must be organized for all staff and students.

The widespread unavailability of first aid kits in the various offices and lecture areas is unacceptable. All offices should be provided with well-stocked first aid kits. This will allow prompt care for the injured before transport to the hospital. The finding that only a minority of respondents claimed they could provide adequate basic life support is worrying. Studies have proven that basic life support can help lower the risk of mortality in the event of cardiac arrest [31]. Almost 50% of all cardiac arrests are witnessed [32] and can, therefore, be saved by skilled bystanders. Since lecturers may be witnesses to such incidents in the offices or lecture halls, they should be well equipped with adequate knowledge of basic life support.

The risk of developing voice disorders, musculoskeletal disorders, and stress was found to be high among Lecturers at the University of Cape Coast. The provision of microphones, reduction of class sizes, and improvement of acoustic conditions in the classrooms will significantly reduce the risk of voice disorders in this population. Ergonomic chairs and tables should be provided at all offices while teaching time is reduced so that Lecturers will not have to stand for long hours to teach. These measures will reduce the risk of musculoskeletal disorders.

Limitations

Since only one university participated in the study, conclusions cannot be applied to other universities in Ghana. Furthermore, because the

study was cross-sectional, conclusions about causality could not be drawn. Due to the qualitative assessments used in the risk matrices, risks may be overestimated or underestimated.

Conclusion

This study has provided valuable surveillance information on occupational health and safety issues in an academic setting. Such information is necessary to prevent or reduce the harmful impacts of occupational hazards such as injuries, death, and infrastructural damages that may occur in institutions of higher learning. Because staff views from the survey were confirmed by the skilled use of an observational checklist and an evaluation of risks, using a combination of approaches in the risk assessment process has proven beneficial.

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Conflict of Interests

None.

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