

Health Hazards among Healthcare Workers and Associated Factors in Public Hospitals, Sana'a-Yemen

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Abstract—Healthcare workers (HCWs) in Yemen are exposed to a myriad of occupational health hazards, including biological, physical, ergonomic, chemical and psychosocial hazards. HCWs operate in an environment that is considered to be one of the most hazardous occupational settings. The current study aimed to assess the prevalence of occupational health hazards among Health care workers and associated risk factors in public hospitals in Sana'a City, Yemen. Descriptive cross-sectional design was utilized; out of 5443 totals of HCWs 396 were selected by multistage sampling technique was carried out in the public hospitals in Sana'a city, Yemen. More the half (60.6%) of HCWs were aged between 20-30 years, 50.8% were males, 56.3% were married, and 45.5% had a diploma qualification, while 65.2% of HCWs had less than 6 years of experience. The results show a high prevalence of occupational hazards (99%); ergonomic hazards (93.4%), biological hazards (87.6%), psychosocial (86.65%), physical hazards (83.3%), and chemical hazards (73.5%). There were no statistically significant differences between demographic characteristics and the prevalence of occupational hazards ($p > 0.05$). The study revealed that occupational hazards were highly prevalent among the participants. The most common biological hazard was exposure to sharp-related injuries, while the predominant physical hazard was slip, trip, and fall incidents. Ergonomic hazards manifested as back or neck pain during work. Chemical hazards were represented by allergic reactions to medical gloves powder. Psychosocial hazards included experiencing verbal and physical harassment. In conclusion, the study emphasized the importance of raising awareness among HCWs and conducting training courses to prevent occupational hazards.

Keywords—Health workers, occupational hazard, prevalence, risk factors.

I. INTRODUCTION

OCCUPATIONAL hazards refer to workplace factors with a potential for harm in terms of injury or ill health. Health hazards are classified in five categories [1]: Biological hazards (bacteria, viruses), Physical hazards (noise, radiation, extremes of temperature), Ergonomic or mechanical hazards (poor posture, heavy lifting), Chemical hazards (solids, liquids, and vapors), Psychosocial hazards (work-related stress, violence, bullying, and harassment). Exposure to any of these hazards can cause occupational diseases and work accidents [2].

The current global labor force stands at about 2.6 billion and is growing continuously each year, approximately 75% of them are in developing countries. Another 40 million people join the labor force, most of them are in developing countries [3].

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HCWs face a wide range of hazards in their job such as physical hazards, chemical hazards, latex allergies, and violence [3].

Occupational risks of health professionals can alter according to the profession, the work itself, as well as the unit of the hospital [4]. This is linked to both the recent globalization process and rapid industrialization which are common in poor countries that are not capable of maintaining effective occupational health and safety systems, so the call on the need to focus on health and safety is as paramount as ever. Therefore, the traditional hazard risk prevention and control tools are still effective but need to be completed by strategies designed to address the consequences of a continuous adaptation to a rapidly changing world of fatal work [5].

According to the Joseph, there are three million percutaneous sharps injuries among healthcare professionals each year which result in the transmission of the following diseases: 40% of hepatitis B, 40% of hepatitis C, and 4.4% of HIV. Even though it is regrettable that about 1000 HCW die from occupational HIV each year, which could and should have been prevented, in many parts of the world, close to 80% of HCWs are still unvaccinated (against Hepatitis B) [6].

In Saudi Arabia, the total number of air-borne infections reported by HCWs during the study period (2009-2012) was 48%, the most common was chicken pox representing 66.7%, followed by measles representing 29.2%, and the least prevalent was pulmonary tuberculosis representing 4.2%. It was reported that nurses were the most commonly affected category, as about 65% of all air borne infections during the study period (mainly chicken pox) were reported by nurses [7].

In Yemen, 126 health workers (23.1%) had a prior history of at least one needle stick injury, including one from a jaundiced patient. 54 health workers (9.9%) were positive for HBsAg and 32.0% were positive for anti-HBC, HBV markers [8]. In Yemen, like many developing countries, few efforts have been undertaken to raise awareness about protection from exposure to occupational hazard among HWC and hospital managers. Additionally, there is a lack of regulations and policies to protect HWC from exposure [9].

Study Objectives

Specific Objectives

- To identify the demographical characteristics of HWC.
- To find out the prevalence of health hazards among HWC.

- To determine the risk factors for health hazards.
- To identify any potential associations between the demographic characteristics of HCWs and the overall prevalence as well as risk factors of occupational hazards.

II. RESEARCH METHODOLOGY

Study Design

Descriptive, cross-sectional study was conducted to assess the prevalence of occupational hazards and associated risk factors among HCWs in public hospitals in Sana'a during the study period from November 1 to December 5, 2020.

Study Setting

The present study was conducted in the public hospitals of Sana'a city: Al-Thawra General Teaching Hospital, Al-Jomhuri Teaching Hospital, Al-Kuwait Teaching Hospital, Al-Sabeen Maternity and Child Hospital.

Study Population

The study population consisted of 5443 HCWs from various categories in the target hospitals, including physicians, nurses, laboratory specialists, radiologists, anesthesiologists, midwives, pharmacists, and medical support staff (cleaners).

Sample Size Calculation

The calculated sample size was 359 HCWs. To account for potential dropouts and ensure an adequate sample size, the sample was increased by 10%, resulting in a final sample size of 396 HCWs.

Sampling Method

A multistage sampling was carried out: A stratified random sampling technique was used to select the study population of different professionals. Sampling proportionate to the size was used to calculate the numbers of HCWs in each hospital.

The sample size calculation was prepared for each category of HCWs in each hospital using the following formula: $n/N * K = \text{sample size to each hospital}$ where: $n = \text{sample size}$ $N = \text{study population}$ $K = \text{population of each hospital}$.

This formula allowed for determining the appropriate sample size for each hospital based on the proportion of HCWs in each category within the study population.

Data Collection Technique and Tools

Data were collected using a structured questionnaire administered through face-to-face interviews. The questionnaire used in the study was adopted from previous studies, and modifications were made to suit the local context in order to collect the relevant data.

Data Processing and Analysis

Collected data were coded and entered into a Statistical Package for Social Sciences (SPSS) version 24 database. Data were analyzed, quantitative variables through descriptive statistics frequency tables and pie chart are used for establishing the data. The chi-square test was used to determine the relationship between variables such as age group, sex, level of education of HCWs, and variables such as biological, physical,

ergonomic, chemical, and psychological. Chi-square tests were also used to establish the relationships between the knowledge and prevalence of occupational hazards.

Validity and Reliability of Tool

Validity

In order to test the validity of the designed tool, the study tool was reviewed by three experts in the field of study. These experts assessed the tools for clarity, relevance, comprehensiveness, and applicability for implementation. Based on their opinions, any necessary adjustments or comments from the experts regarding the study tools were addressed.

Reliability

The reliability of the instrument was established by conducting a pilot study on 10% of the sample size. Cronbach's alpha, a measure of internal consistency based on the average inter-item correlation, was used to assess reliability. In this case, Cronbach's alpha was calculated for the dichotomous data or Likert scale used in the study. The obtained Cronbach's alpha value of 0.85 indicates very good reliability, suggesting that the instrument demonstrates strong internal consistency.

Pilot Study

Before the data collection at the target public hospitals, a pilot study was conducted. The pilot study included 10% of the target HCWs for the study. Based on the findings from the pilot study, minimal modifications were made to the layout and presentation of the instrument/questionnaire. It is important to note that the pilot sample, which was included in the pilot study, was excluded from the final study sample used for analysis.

Ethical Consideration

Ethical clearance for the study was obtained from the ethical committee of Al-Razi University. Official letters were sent to the administrative authorities of the target hospitals, informing them about the study and seeking their approval. The hospital managers were also informed about the objectives of the proposed study. Prior to their participation, written and verbal approval was obtained from the HCWs, ensuring their voluntary consent to take part in the study.

III. RESULTS

Demographic Characteristics of HCWs

Distribution of the HCWs according to age: The present study found that 60.6% of HCWs, were in age group 20-30 years. The minimum age group of participated HCWs was 20 years, while the maximum was 55 years. Regarding to the sex, about a half (50.8%) of the target HCWs were male, while the rest were female (49.2%).

III. DISCUSSION

Socio-demographic Factors

This study included 396 HCWs. The majority of HCWs (60.6%) fell within the age group of 20-30 years. This finding

aligns with a similar study conducted in India by Prajwal, which reported that 56.7% of HCWs were in the age group of 21-30 years [10]. In terms of gender distribution, approximately 50.5% of the participants in the present study were males. This result is consistent with a study conducted in Kashmir among HCWs by Wani et al., who found that 52.7% of the participants were males [11].

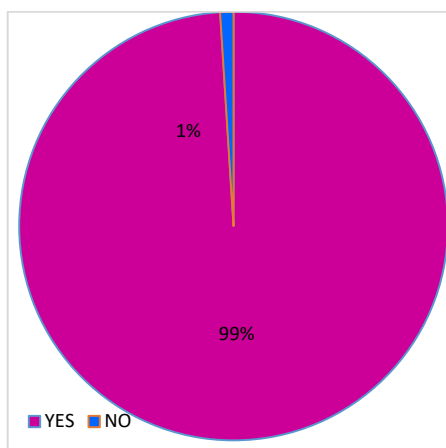


Fig. 1 Overall prevalence of occupational hazard

TABLE I
THE BIOLOGICAL HAZARDS AMONG HCWs REGARDING THE BIOLOGICAL RISK FACTORS

Biological risk factors	F	%
Exposure to sharp related injury (such as needle sticks).	228	57.6
Exposure to cuts and wounds.	186	47.0
Exposed to airborne diseases.	173	43.7
Direct contact with contaminated specimens/ biohazardous materials.	129	32.6
Infected with hospital infectious agents.	144	36.4
Get infection with influenzas COVID, SERS, H1N1.	92	23.2
Exposure to blood borne pathogens, vector borne diseases, and bioterrorism.	93	23.5
Lung disease which is occupation related.	144	36.4

TABLE II
THE PHYSICAL HAZARDS AMONG HCWs REGARDING THE PHYSICAL RISK FACTORS

Physical risk factor	F	%
Excessive noise.	161	40.7
Exposure to microwave radiation, and ionizing and non-ionizing radiation.	77	19.4
Exposure to electrical injuries.	103	26.0
Burns due to sterilizers, hot water and hot steam.	137	34.6
Slips /trip/fall at work.	192	48.5

Prevalence of Occupational Hazards

The results of the recent study showed that the overall prevalence of occupational hazards among HCWs in target hospitals in Sana'a city was 99%. This prevalence is due to the lack of knowledge toward occupational hazards and their consequences, as well as the lack of capabilities and protection tools, and the absence of systems that limit the prevalence of hazards, and instructions in this aspect. This result was higher than the result of the study that was conducted in Arua regional referral hospital, Arua District (82.4%) [12], in China by Shi

et al. (85.93%) [13], in India by Kumar et al. (83.1%) [14], and in Eastern Ethiopia by Zewde (60.1%) [15].

TABLE III
THE ERGONOMIC HAZARDS AMONG HCWs REGARDING THE ERGONOMIC RISK FACTORS

Ergonomic risk factors	F	%
Mechanical devices are available to help in carrying the patient in workplace.	234	59.1
Both hands are used during handling.	208	52.5
Exposure to injuries due to disrepair of the electrical system.	172	43.4
Back or neck pain during work.	182	46.0
Circulatory abnormalities due to standing for long periods of time (varicose, edema).	107	27.0
Exposure to muscles injuries.	121	30.6
Get fractures.	80	7.2

TABLE IV
THE CHEMICAL HAZARDS AMONG HCWs REGARDING THE CHEMICAL RISK FACTORS

Chemical risk factors	F	%
Suffered from poisoning as a result of exposure to medicines, sterilization fluids and anesthesia gases.	121	30.6
Exposed to dermatitis as a result of antiseptics and soaps detergent.	158	39.9
Irritation of eyes, nose and throat due to disinfectants and antiseptics.	166	41.9
Allergic to medical gloves powder.	119	69.9
Workplace contains harmful chemical, gases.	87	22.0

TABLE V
THE PSYCHOSOCIAL HAZARDS AMONG HCWs REGARDING THE PSYCHOSOCIAL RISK FACTORS

Psychosocial risk factors	F	%
Smoke excessively in an attempt to relieve work stress.	103	26.0
Take some tablets to induce sleep from night duty.	143	36.1
Suffer from anxiety because of work.	170	42.9
Suffer from social relations problems because spend long hours at work.	180	45.5
Assaulted form while at work.	180	45.5
Suffered from verbal and physical harassment during work.	208	52.5
Tiredness due to long and intensive work hours in shifts.	243	61.4

Prevalence of Biological Hazards

The result of the current study showed highly biological hazards among HCWs (87.6%). This finding was higher than the results reported by Senthil et al. (81.5%) [16], by Bin-Ghouth et al. (78%) [17], by Kumar et al. in India (83.1%) [14], and by Alqam in Palestinian (75%) [18], while it was less than the finding reported by Ogunnaike et al. in Nigerian tertiary health institution (95.5%) [19].

Regarding the biological risk hazards, our findings reported that 57.6% had been exposed to a sharp related injury (such as needle stick). Due to HCWs' ignorance of needle sticking, there is a significant prevalence of NSIs. These results were superior to those reported by Jahnavi et al. (47.1%) [21] and the research done in Tehran, Iran, by Amini et al. (50.2%) [20].

Prevalence of Physical Hazards

The results of present study showed that the physical hazards among HCWs were 83.3%. This result was not constant with the result of the study which was contacted in Ondo city southwest Nigeria by Osungbemiro et al. (77.7%) [22], and with

finding of the study that conducted in a Nigerian tertiary health institution (99%) [19]. Furthermore, a previous study conducted at Zagazig University related to radiation hazards found a high prevalence of health hazards, specifically 93% [23]. Regarding physical risks, the present study revealed that 48.5% of the participants experienced slip/trip/fall incidents in their workplace. This finding is similar to a study conducted by Courtney et al., where 36% of participants reported experiencing such incidents [24].

Prevalence of Ergonomic Hazards

The results of our study showed that the prevalence of ergonomic hazard among HCWs was 93.4%; this high prevalence due to the lack of knowledge about the ergonomic hazards and the lack of training courses to prevent occupational hazards, as well as the correct handling while moving and lifting the patient. This finding was higher than the findings reported by Ganiyu et al. in Borno (84.5%) [25] and by Osazuwa-Peters et al. in Nigeria (84.4%) [26].

Regarding ergonomic risks among HCWs, approximately 46.0% reported experiencing back or neck pain during work. Our findings align with a study conducted by Long et al., which reported a similar prevalence rate of 45% [27]. However, a study conducted by Simsek et al. reported a higher prevalence rate of 53%, which was slightly greater than our findings [28].

Prevalence of Chemical Hazards

The present study revealed that the prevalence of chemical hazards among HCWs was 73.5%. This increase can be attributed to a lack of knowledge about occupational chemical hazards, as well as the absence of instructions and safety procedures regarding the use of chemicals in hospitals. However, this finding was lower than the results of a study conducted in Nigerian tertiary health institutions by Ogunnaike et al., which reported a high prevalence of chemical hazards among HCWs (97.7%) [19]. On the other hand, it was similar to the findings of a study conducted in Palestinian governmental hospitals by Alqam, which reported a prevalence of chemical hazards of 70% [18].

In terms of specific chemical risks, the present study found that 69.9% of HCWs were allergic to medical gloves powder. This prevalence was higher than the results reported by Verna et al. in an Italian General Hospital (47%) [29], as well as the results reported by Al-Niaimi et al. in Italy (53%) [30].

Prevalence of Psychosocial Hazards

The prevalence of psychosocial hazards among the participants in our study was found to be 86.6%. This high prevalence can be attributed to the negligence of health institutions in implementing preventive measures for psychosocial hazards, excessive workloads, and inadequate organizational policies. A similar study conducted in a tertiary health facility in south-south Nigeria by Okefor and Alamina among HCWs reported a prevalence of psychosocial hazards of 83%, which closely aligns with our findings [31]. However, a study conducted in Nigeria by Onigbogi and Banerjee reported a lower prevalence of psychosocial hazards (62%), which contradicts our result [32].

IV. CONCLUSION

The results of this study conducted among HCWs at public hospitals in Sana'a city revealed a high prevalence of occupational hazards. Among the biological hazards, the most common was exposure to sharp-related injuries such as needle sticks, surpassing other biological hazards. In terms of physical hazards, slip, trip, and fall incidents were the most prevalent. Ergonomic hazards were reflected in the high occurrence of back or neck pain during work. Chemical hazards showed a higher prevalence of allergies to medical gloves powder. Psychosocial hazards were evident as HCWs reported experiencing verbal and physical harassment in the workplace.

V. RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed:

- Establishing records of accidents and worker injuries: It is essential to maintain accurate and comprehensive records of accidents and worker injuries. These data will provide valuable insights into the extent of exposure to hazards and aid in developing targeted preventive measures.
- Mandatory Hepatitis B vaccination: Hepatitis B vaccination should be made mandatory for all HCWs. This preventive measure can significantly reduce the risk of infection among HCWs and promote a safer working environment.
- Continuous security provision for HCWs: Adequate security measures should be put in place to ensure the safety of HCWs at all times. This includes measures to prevent and address problems such as attacks on healthcare service providers.
- Strengthening policy enforcement on occupational hazard and safety standards: The Ministry of Health and Population should take proactive steps to ensure the implementation and enforcement of policies and safety standards related to occupational hazards in all hospitals. This includes regular monitoring, audits, and appropriate measures to address any identified gaps or non-compliance.

By implementing these recommendations, healthcare institutions and policymakers can work towards creating a safer and healthier working environment for HCWs, ultimately improving the overall well-being and quality of care provided.

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