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Research Article

Assessing occupational hazards and safety: a study of healthcare workers' knowledge, attitudes, and practices in Iraq

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Abstract:

Objective: Occupational health and safety are vital in reducing morbidity and mortality from workplace hazards. This study examines healthcare workers' knowledge, attitudes, and practices regarding occupational risks to support targeted interventions and policy development.

Methods: A cross-sectional descriptive study was conducted at Baqubah General Hospital, Diyala Province, Iraq, between 11/20/2023 and 02/20/2024. 400 permanent healthcare worker —including doctors, pharmacists, nurses, technicians, and support staff—were selected through simple random sampling. Data were collected via a structured, face-to-face questionnaire adapted from validated knowledge, attitudes, practices surveys. The questionnaire included 8 knowledge, 5 attitude and 8 practice items, each scored as '1' for correct/positive and '0' for incorrect/negative responses. Median scores were used for evaluation.

Results: Most participants were aged 25–34(62%), with nearly equal gender distribution. About 38% had good knowledge of occupational hazards, higher among males (p=0.028), non-smokers (p=0.026), non-medication users (p=0.042). Only 32% exhibited a positive attitude toward safety, which was significantly associated with male gender (p=0.017) and medication use (p=0.034). Good safety practices were reported by 37%, higher in males (p=0.046), laboratory staff (p=0.006), and non-medication users (p=0.008). No significant associations with age, education or years of service.

Conclusions: The study identified significant gaps in occupational hazard awareness: only one-third had good knowledge, nearly two-thirds had poor knowledge, and less than one-third showed a positive attitude toward occupational health and safety. Healthcare institutions should improve safety by ensuring continuous supply of personal protective equipment and mandatory, targeted training.

Keywords: Occupational Hazards, Knowledge, Attitude, Safety Practices

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Introduction

Health care facilities (HCFs) provide a wide range of services—including counseling, clinical, surgical, and psychiatric care—to both healthy individuals and those who are ill or injured. Globally, they employ over 59 million workers and are considered high-risk workplaces due to healthcare workers' (HCWs) exposure to various harmful agents (1). Hazards refer to the inherent properties of substances, agents, or situations that may cause harm, while risk is the likelihood of such harm occurring. In occupational settings, hazards are work activities that can cause injury or illness, and occupational safety aims to control them to maintain acceptable risk levels, regardless of the profession (2).

The importance of occupational health and safety is highlighted by the substantial morbidity and mortality among exposed workers, with approximately 100,000 fatalities and 400,000 new cases of occupational diseases reported annually (4). The World Health Organization classifies hazards in HCFs as physical, biological, mechanical, ergonomic, chemical, or psychosocial. HCWs face risks such as blood-borne infections (e.g., HIV, HBV, HCV), musculoskeletal disorders, burnout, allergic reactions, chemical spills, radiation, and even patient violence. Contributing factors include negligence, lack of protective equipment, understaffing, heavy workloads, poor adherence to safety protocols, and inadequate training on modern healthcare technologies. In response, the U.S. Centers for Disease Control and Prevention (CDC) established standard precautions (SPs) for managing infectious materials and preventing occupational exposures, which have proven effective in reducing injuries and illnesses among HCWs (5). Moreover, the consequences of occupational hazards extend beyond physical injuries to include significant economic and psychological burdens on workers and their families. In developing countries such as Nigeria, HCWs—including medical doctors, nurses, and nursing assistants—are often ill-prepared to manage these risks, a situation worsened by inadequate facilities and equipment (6). The International Labour Organisation (ILO) maintains that safeguarding workers from occupational hazards is a fundamental component of social justice and a basic human right, a view reinforced by WHO's assertion that safe work is the cornerstone of decent employment. Despite considerable advances in occupational safety over the past century, significant risks persist, particularly in healthcare settings where HCWs—representing roughly 12% of the global workforce—are continuously exposed to both conventional and unique hazards inherent to their roles (7,8).

The present study aims to examine the knowledge, attitudes, and practices related to occupational hazards among HCWs, with the goal of identifying critical factors that can inform targeted interventions and policy improvements in occupational health and safety.

Methods

Study Design and Setting

The study was approved by the Ethics Committee for Non-invasive Clinical Research of Karabük University Medicine Faculty, under no: 2023/1461, date 08.11.2023. This cross-sectional descriptive study evaluated healthcare professionals' knowledge, attitudes, and practices (KAP) regarding occupational hazards at Baquba General Hospital in Diyala Governorate, Iraq. Conducted from November 20, 2023, to February 20, 2024, the study aimed to assess risk perceptions and workplace safety measures among doctors, pharmacists, nurses, medical technicians, and ancillary staff.

Sample Size and Selection Criteria

Based on the G-power analysis, a minimum sample size of 382 was determined to achieve 80% statistical power at a 95% confidence level. To account for non-response, this was increased by 5% (n=400). A simple random sampling method was employed to select participants. Inclusion criteria encompassed all permanent medical personnel at Baquba Hospital, while exclusion criteria excluded temporary/rotating staff, non-clinical personnel, and individuals declining participation.

Data Collection Procedure and Instrument

Data were collected via a structured, self-administered questionnaire adapted from validated KAP surveys in occupational health literature. The tool comprised 34 items across three sections:

1. **Socio-demographics**: Age, gender, education, and years of service.
2. **Occupational Risk Exposure**: Perceptions of workplace hazards, emergency response practices.
3. **Preventive Measures**: Use of protective equipment, health screenings, and awareness of safety protocols.

Pilot testing (n=20) ensured clarity and reliability (Cronbach's α = 0.78). Questionnaires were distributed in person, with a 92% response rate (368/400).

Scores for knowledge (8 items), attitude (5 items), and practice (8 items) were computed. Correct/positive responses were coded as 1 (incorrect/negative: 0). Total scores ranged 0–8 (knowledge/practice) and 0–5 (attitude). Median scores categorized performance:

- Knowledge: scores ≤ Median = "poor," ≥ Median = "good."
- Attitude: scores ≤ Median = "negative," ≥ Median = "positive."
- Practice: scores ≤ Median = "poor," ≥ Median = "good."

Statistical Analysis

Data were analyzed using SPSS v26. Normality was assessed via Shapiro-Wilk test (p>0.05). Descriptive statistics (frequencies, means, SDs) summarized demographics. Categorical variables were analyzed with Pearson's chi-square or Fisher's exact test (for expected counts <5). Associations between KAP scores and demographics were evaluated at α=0.05.

Results

Socio-demographic characteristics of participants

Among the total participants (n=400), the highest percentage (62%) falls within the age group of 25-34, followed by 20% in the 18-24 age group. The ratio between males and females is nearly 1:1, with males constituting 50.2% and females 49.8%. Most participants hold a bachelor's degree (49%) or a diploma (42.5%). Nurses comprise the largest professional group (30.8%), followed by medical technologists (22.8%). The majority have 1-10 years of experience (81.3%). Most participants (76.5%) do not use medications regularly. The majority are non-smokers (76%). The distribution of demographic

Table 1. Socio-demographic characteristics of participants

Characteristics	Frequency (n=400)	Percentage (%)
Gender		
Males	201	50.2
Females	199	49.8
Age groups (years)		
18-24	80	20
25-34	248	62
35-44	53	13.3
45-54	17	4.3
≥ 55	2	0.5
Educational level		
High School	12	3
Diploma	170	42.5
Bachelor's Degree	196	49
Master degree	17	4.3

Table 1. Socio-demographic characteristics of participants		
Characteristics	**Frequency (n=400)**	**Percentage (%)**
PhD degree	5	1.3
Profession		
Physician	10	2.5
Pharmacology	29	7.2
Nurse	123	30.8
Medical technology	91	22.8
Medical assistance	42	10.5
Others	105	26.3
Start working (years)		
18-24	269	67.3
25-29	107	26.8
30-34	19	4.8
35-39	5	1.3
Years of experience		
1-10	325	81.3
11-20	56	14
≥ 21	19	4.8
Using medications regularly		
No	60	15
Yes	34	8.5
Don't use	306	76.5
Smoking status		
No	304	76
Yes	78	19.5
Ex-smoker	18	4.5

characteristics of healthcare workers are seen in table 1.

Knowledge of participants toward occupational hazards and safety

The chi-square analysis revealed significant associations between healthcare workers' knowledge levels and demographic variables Male participants demonstrated notably higher proportions of "good" knowledge scores (57.3%) compared to female participants (42.7% ; $\chi^2 = 4.817$, $p = .028$). Similarly, non-smokers exhibited stronger knowledge outcomes (68.7%) than smokers ($\chi^2 = 7.269, p = .026$), and healthcare workers not using medication scored higher in knowledge (80.7%) compared to those using medication ($\chi^2 = 6.318$, $p = .042$). Conversely, no statistically significant associations were observed between knowledge scores and other demographic factors, including age, education level, or years of service ($p > .05$ for all), (Table 2). Approximately one-third of participants (38%) demonstrate good knowledge scores, while approximately two-thirds (62%) of respondents exhibit poor knowledge scores (Figure 1).

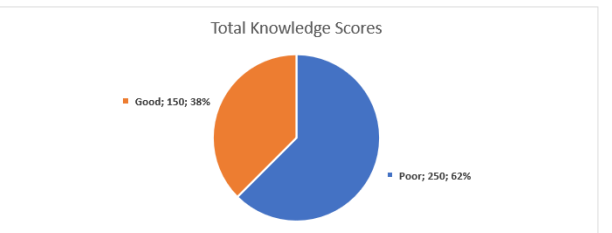

Figure 1. Total knowledge score of the study participants

Attitude of participants towards occupational hazards and safety

Chi-square analysis revealed significant associations between healthcare workers' attitude levels and select demographic variables. Male participants demonstrated a higher proportion of positive attitude scores (58.9%) compared to females (41.1%; $\chi^2 = 5.718$, $p = .017$). Similarly, healthcare workers not using medication exhibited more favorable attitudes (83.7%) than those using medication ($\chi^2 = 6.742$, $p = .034$). No statistically significant associations were observed between attitude scores and other demographic characteristics, including age, education level, years of service, or smoking

Table 2. Knowledge of participants towards occupational hazards

Characteristics		Total Knowledge Scores				X^2	P- value
	Poor		Good				
	n	%	n	%			
Age groups	18-24	49	19.6	31	20.67	1.995	0.737
	25-34	156	62.4	92	61.33		
	35-44	34	13.6	19	12.67		
	45-54	9	3.6	8	5.33		
	≥ 55	2	0.8	0	0		
Gender	Males	115	46	86	57.33	4.817	0.028
	Females	135	54	64	42.67		
Educational level	High School	9	3.6	3	2	4.294	0.368
	Diploma	102	40.8	68	45.33		
	Bachelor's Degree	123	49.2	73	48.67		
	Master degree	11	4.4	6	4		
	PhD degree	5	2	0	0		
Profession	Physician	3	1.2	7	4.67	9.122	0.104
	Pharmacology	23	9.2	6	4		
	Nurse	76	30.4	47	31.33		
	Medical technology	53	21.2	38	25.33		
	Medical assistance	28	11.2	14	9.33		
	Others	67	26.8	38	25.33		
Start working	18-24	174	69.6	95	63.33	7.282	0.063
	25-29	57	22.8	50	33.33		
	30-34	15	6	4	2.67		
	35-39	4	1.6	1	0.67		
Years of experiences	1-10	202	80.8	123	82	1.492	0.474
	11-20	38	15.2	18	12		
	≥ 21	10	4	9	6		
Using medications regularly	No	46	18.4	14	9.33	6.318	0.042
	Yes	19	7.6	15	10		
	Do not use	185	74	121	80.67		
Smoking status	No	201	80.4	103	68.67	7.269	0.026
	Yes	39	15.6	39	26		
	Ex-smoker	10	4	8	5.33		

Table 3. Practice of participants towards occupational hazards and safety

Characteristics		Total practice scores				X^2	P value
	Poor		Good				
	n	%	n	%			
Age groups	18-24	48	19.00	32	21.60	4.284	.369
	25-34	161	63.90	87	58.80		
	35-44	32	12.70	21	14.20		
	45-54	11	4.40	6	4.10		
	≥ 55	0	0.00	2	1.40		
Gender	Males	117	46.40	84	56.80	3.979	.046
	Females	135	53.60	64	43.20		
Educational level	High School	6	2.40	6	4.10	3.106	.540
	Diploma	104	41.30	66	44.60		
	Bachelor's Degree	125	49.60	71	48.00		
	Master degree	13	5.20	4	2.70		
	PhD degree	4	1.60	1	0.70		
Profession	Physician	6	2.40	4	2.70	10.334	.066
	Pharmacology	25	9.90	4	2.70		
	Nurse	74	29.40	49	33.10		
	Medical technology	51	20.20	40	27.00		
	Medical assistance	30	11.90	12	8.10		
	Others	66	26.20	39	26.40		
Start working	18-24	174	69.00	95	64.20	3.172	.366
	25-29	65	25.80	42	28.40		
	30-34	9	3.60	10	6.80		
	35-39	4	1.60	1	0.70		
Years of experiences	1-10	205	81.30	120	81.10	0.253	.881
	11-20	36	14.30	20	13.50		
	≥ 21	11	4.40	8	5.40		
Using medications regularly	No	48	19.00	12	8.10	9.559	.008
	Yes	18	7.10	16	10.80		
	Do not use	186	73.80	120	81.10		
Smoking status	No	200	79.40	104	70.30	4.393	.111
	Yes	43	17.10	35	23.60		
	Ex-smoker	9	3.60	9	6.10		

status ($p > .05$ for all). Approximately one-third of participants (32%) exhibit positive attitude scores, while around two-thirds (68%) of respondents demonstrate negative attitude scores (Figure 2).

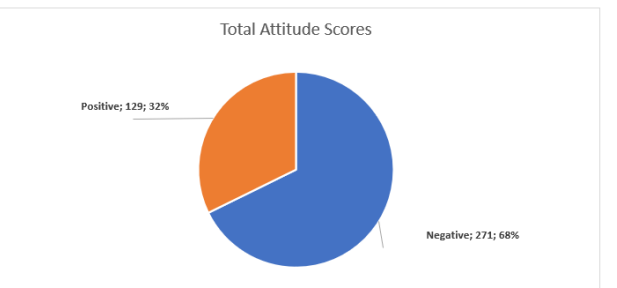

Figure 2. Total attitude score of participants.

Practice of participants towards occupational hazards and safety

Chi-square analysis identified significant associations between healthcare workers' practice levels and specific demographic variables Male participants demonstrated higher proportions of "good" practice scores (56.8%) compared to females (43.2%, n = 173; $\chi^2 = 3.979, p = .046$).. Additionally, healthcare workers not using medication reported better adherence to safety protocols (81.1%) than those using medication (χ^2 = 9.559, p = .008). In contrast, no significant associations were observed between practice scores and age, education level, years of service, or smoking status (p > .05 for all), (Table 3). Approximately one-third of participants (37%) demonstrate good practice scores, while around two-thirds (63%) of respondents exhibit poor practice scores (Figure 3).

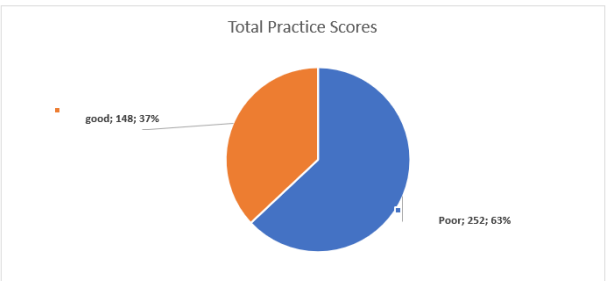

Figure 3. Total practice score of study participants.

Discussion

In this study, predominantly comprised adults aged below 35 years, with balanced gender representation (50% male, 50% female) and a majority holding bachelor's degrees or diplomas. Nurses constituted the largest professional group (30.8%), followed by medical technologists (22.8%), and most participants had 1–10 years of work experience. These findings diverged from a study in Niger assessing occupational risk awareness among healthcare providers, which reported a female predominance (70% vs. 30% male), a higher proportion of participants aged 31–40 years, and similar work experience (<10 years) (9). Conversely, the results aligned with Iraqi research by Faris et al, where nurses at Karbala teaching hospitals exhibited comparable gender disparities (70% female) and age distributions (<40 years), albeit with longer work experience (<14 years) (10).

The present study identified significant associations between healthcare workers' knowledge scores and gender, medication use, and smoking status. Male participants exhibited higher proportions of "good" knowledge scores compared to females (57.3% vs. 42.7%; p = .028). Similarly, non-smokers (68.7% vs. smokers) and healthcare workers not using medication (80.7% vs. medication users) demonstrated superior knowledge (p = .026 and p = .042, respectively). In contrast, no significant associations were observed between knowledge scores and age, educational level, profession, years of experience, or working unit (p > .05 for all). These findings partially align with prior research. For instance, Kumar et al., reported that significant links between education/occupation and knowledge, while in Palestine found no association with gender or age but noted significant ties to education, profession, and experience (3,11). Divergences may stem from contextual factors such as cultural norms, healthcare training quality, or occupational risk exposure. For example, the study conducted by Onowhakpor et al. They found age significantly predicted knowledge among sawmill workers in Nigeria, whereas no such association emerged in our study or in Pakistani textile workers (12,13). Similarly, while gender was insignificant here and in Malaysian laboratory staff, it was pivotal in other settings (10,14). Likewise, Rezaei et al. confirmed that further corroborated the lack of gender and age associations among Iranian hospital staff (15).

This study identified significant associations between healthcare workers' attitude scores and gender as well as medication use. Male participants exhibited a higher proportion of positive attitudes (58.9% vs. 41.1% female; p = .017), and those not using medication demonstrated more favorable attitudes (83.7% vs. medication users; p = .034). No significant associations were observed between attitude scores and age, educational level, profession, or years of experience (p > .05). These findings contrast with studies in other contexts. For example, the study conducted by Nasab et al., they reported significant associations between age, work duration,

and attitude scores among petrochemical workers in Iran, with older workers exhibiting higher scores (16). Conversely, research in Pakistani textile workers (Ahmad et al., 2012) and Malaysian laboratory staff found no age-related associations, aligning with our results (13,14). However, Paul et al. identified gender as a significant predictor of attitude, diverging from our findings (14). Similarly both, Kumar et al., and Aladini et al., reported conflicting associations: the former linked age and profession to attitudes, while the latter found age and profession significant but not gender or education (3,11).

The research identified significant associations between healthcare workers' practice scores and gender, working unit, and medication use, with males (56.8%, p = .046), laboratory staff (35.1%, p = .006), and non-medication users (81.1%, p = .008) demonstrating superior adherence to safety protocols, while no associations emerged with age, education, or experience (p > .05). The findings of present study were inconsistent with the study by Paul et al., while they were similar to the results of both Kumar and Aladini et al who emphasized education/occupation and profession/experience, respectively, as predictors (3,11,14). Discrepancies may stem from cultural-institutional factors (e.g., gender roles in compliance), occupational risks (e.g., laboratory biohazards), and methodological variance (e.g., self-report vs. observational tools). For instance, according to recent study carried out by Almutairi et al., they proposed standardized training in paramedical cohorts may homogenize practices, whereas fragmented systems amplify variability (17). Such variability underscores the need for tailored interventions—gender-neutral training in hierarchical settings, unit-specific protocols for high-risk departments, and investigations into medication use as a proxy for health-related practice barriers. Contextual factors like regional infrastructure and cultural attitudes toward authority must guide strategies to optimize occupational safety practices across diverse healthcare environments.

Based on our findings, it is recommended that the Iraqi Ministry of Health consider integrating occupational safety training into licensure renewal processes. Furthermore, hospital administrations are encouraged to adopt risk-adjusted shift rotations for staff on medication and develop inclusive training strategies to enhance female staff engagement. These measures may facilitate the transition of safety practices from individual initiative to a systemic institutional policy.

While the present study provides valuable insights into occupational hazards among healthcare workers in Iraq, several limitations should be acknowledged. First, the cross-sectional design precludes causal inferences, as it only captures associations at a single point in time. Second, reliance on self-reported data introduces the potential for social desirability bias, particularly in reporting safety practices, which may not reflect actual behaviors. Third, the study was conducted at a single hospital in Diyala Governorate, limiting the generalizability of findings to other regions or healthcare settings with differing resources, protocols, or cultural contexts. These limitations underscore the need for longitudinal, multi-center studies with mixed-method designs to better contextualize occupational hazards in Iraq's healthcare system.

As a result, the study revealed gaps in occupational hazard awareness: over one-third achieved good knowledge scores, yet nearly two-thirds had poor knowledge, and less than one-third demonstrated a positive attitude toward occupational health and safety. Notably, factors such as gender, medication use, and smoking status were significantly associated with knowledge scores, and similar associations were found with attitudes and practices. Based on these findings, it is recommended that healthcare institutions enhance occupational safety by ensuring a continuous supply of personal protective equipment (PPE) and providing mandatory, targeted training for healthcare workers. Regular health check-ups, tailored training programs, and consistent policy enforcement are crucial to improving occupational health outcomes.

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Peer-Review

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Conflict of Interest

The authors declare that they have no conflict of interest regarding content of this article.

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Ethical Declaration

The study was approved by the Ethics Committee for Non-invasive Clinical Research of Karabük University Medicine Faculty, under no: 2023/1461, date 08.11.2023.

Thesis?

This study was prepared by rearrangement of the master's thesis by Zainab Yousif Murad entitled as "Diyala ilçe sağlık çalışanlarının mesleki tehlikelere ilişkin bilgi, tutum ve uygulamalarının değerlendirilmesi".

Authorship Contributions

Concept: NS, Design: NS, Supervising: NS, Financing and equipment: ZM, Data collection and entry: ZM, Analysis and interpretation: EN, AA, Literature search: AA, EN, Writing: ZM, NS, Critical review: NS, Writing: ZM, NS, Critical review: NS

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