Determinants and motivational factors of smoking behavior among healthcare workers: A cross-sectional study

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ABSTRACT

INTRODUCTION Tobacco use among healthcare workers (HCWs) undermines their role as health advocates and presents a significant public health issue. Despite their professional knowledge, smoking remains prevalent among HCWs, especially in low- and middle-income countries. This study aimed to evaluate the prevalence, patterns, determinants, and motivational factors for smoking cessation among HCWs in Kirkuk, Iraq.

METHODS A cross-sectional study was conducted from January to August 2025 involving 1618 HCWs employed in hospitals and primary healthcare centers throughout Kirkuk Governorate, Iraq. Data were gathered using a structured, validated self-administered questionnaire that assessed sociodemographic characteristics, use of any tobacco product, smoking behaviors, perceptions, and motivations for quitting. A multistage cluster sampling method was employed, and the sample size was calculated with a design effect of 1.5. Descriptive statistics, chi-squared tests, and binary and ordinal logistic regression analyses were used to identify predictors of smoking behavior. Principal component analysis (PCA) with Varimax rotation was conducted to uncover underlying factors influencing cessation motivation.

RESULTS Among the 1618 participants, mean age of 35.7 ± 9.7 years, 54.8% were female. The overall smoking prevalence was 13.5%, while 2.9% were former smokers. Smoking was strongly associated with being male (AOR= 28.1; 95% CI: 15.9–49.6, p<0.001). Participants with family members who smoked had more than three times the odds of smoking themselves (AOR=3.22; 95% CI: 2.13–4.86, p<0.001). Those with longer work experience (>20 years) were less likely to smoke (AOR=0.27; 95% CI: 0.12–0.65, p=0.004). Opposing smoking in the workplace served as a protective factor (AOR=0.10; 95% CI: 0.03–0.25, p<0.001). PCA identified two main motivational factors for quitting: health-driven motivation (concerns about health and finances) and support-oriented motivation (education, medical advice, and pharmacological aids), which together explained 69.5% of the total variance.

CONCLUSIONS Smoking remains prevalent among HCWs in Kirkuk, particularly among males and those with smokers in their social environment. Both personal motivation and institutional support appear important for smoking cessation. Strengthening smoke-free workplace policies and providing targeted cessation support may help inform tobacco control strategies within healthcare settings.

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INTRODUCTION

Tobacco smoking continues to pose a major public health challenge globally, leading to millions of preventable deaths annually and playing a significant role in cardiovascular diseases, cancers, and chronic respiratory conditions. Although there have been worldwide efforts to control tobacco use, smoking remains a primary cause of illness and death, especially in low- and middle-income nations where prevention and cessation initiatives are frequently inadequate[1].

HCWs are essential in the fight against tobacco use, as they educate patients about health, demonstrate healthy behaviors, and offer support for quitting smoking. However, when healthcare professionals smoke themselves, it can damage their credibility and weaken their efforts to help others quit. Research indicates that smoking rates

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among HCWs remain alarmingly high in various countries, emphasizing the need for ongoing focus on this important issue[2].

Sociodemographic factors like gender, age, and professional specialty are consistently recognized as important influences on smoking behavior. Research indicates that male HCWs and those in certain roles, such as nursing and administrative positions, tend to have higher smoking rates[3]. The high-stress nature of healthcare, marked by long hours, emotional fatigue, and burnout, also plays a significant role, with many individuals turning to tobacco as a way to cope[4]. Additionally, the social environment, particularly the presence of family members or friends who smoke, is a well-known factor that predicts both the initiation and continuation of smoking[5]. A notable issue among HCWs is the gap between knowledge and action. Although they generally have a clear understanding of the serious health risks associated with smoking, this awareness often is not enough to prevent them from smoking or to help them quit[2,6].

A systematic review involving 63 countries revealed that smoking among HCWs is still a significant problem, particularly among men and younger professionals[7]. In Cyprus, similar trends were noted, with nearly one-third of HCWs identified as smokers. The study highlighted that factors such as being male, younger, single, and having family members who smoke were strongly linked to tobacco use[8]. In Jordan, another study found that around 25% of HCWs smoked, despite the presence of smoke-free policies in healthcare environments. Most participants reported that these policies were not effectively enforced and that many lacked proper training in providing smoking cessation support[9].

In Iraq, especially in northern regions like Kirkuk, there is limited information on smoking habits among HCWs. It is crucial to understand the prevalence of smoking and the factors related to it in this group in order to develop effective intervention strategies. HCWs in Iraq face unique challenges, such as job-related stress, heavy workloads, and the influence of community smoking norms, all of which can affect their smoking behaviors and motivation to quit.

To address this gap, the current study was conducted to assess the smoking prevalence among HCWs in Kirkuk and to investigate the factors associated with smoking behavior, including sociodemographic and occupational aspects. The research also examined motivational factors related to quitting smoking through multivariable regression and factor analysis.

METHODS

Study design and setting

A cross-sectional study was carried out among HCWs at public hospitals and primary healthcare centers in Kirkuk Governorate, located in northern Iraq. Data collection took place from January to August 2025. Kirkuk was chosen for this study because it reflects a diverse and rapidly evolving region, encompassing both urban and semi-urban populations, which offers a representative snapshot of healthcare personnel in northern Iraq.

Study population and sample size

The study aimed to include all types of HCWs, such as physicians, dentists, pharmacists, nurses, laboratory staff, medical technologists, and administrative or support personnel. Participants were eligible if they were currently employed at a healthcare facility in Kirkuk, were aged ≥20 years, and were willing to take part in the study. Those who were temporary or non-medical staff, as well as individuals who chose not to participate, were excluded.

The sample size was calculated *a priori* using a single population proportion formula based on an expected smoking prevalence of 20%, derived from previous studies among HCWs[10,11], with a 95% confidence level and a margin of error of 3%. After adjusting for a design effect of 1.5 and an anticipated non-response rate, the minimum required sample size was estimated to be 1067 participants. To enhance statistical power and precision, a total of 1618 HCWs were ultimately included in the study. The detailed sample size calculation is provided in the Supplementary file.

Sampling technique

A stratified multistage cluster sampling method was used for the study. In the first stage, healthcare institutions in Kirkuk were categorized by type into hospitals and primary healthcare centers. In the second stage, a random selection of facilities was made from each category. In the third stage, HCWs within each chosen facility were sampled in proportion to their professional roles, including physicians, nurses, pharmacists, technicians, and administrative staff. This approach ensured that all types of facilities and healthcare professions were adequately represented throughout the governorate.

Data collection tool

A structured, self-administered questionnaire was utilized, adapted from previously validated tools used in similar studies involving healthcare professionals[8-11]. The questionnaire consisted of four main sections. The first section collected sociodemographic and occupational information, including age, gender, education level, profession, and length of service. The second section assessed smoking behavior, covering smoking status, types of tobacco products used, duration and frequency of smoking, and previous quit attempts. The third section focused on perceptions and attitudes toward smoking in the workplace and awareness of smoking-related health risks. The fourth section explored motivational and support factors related to smoking and smoking cessation, including reasons for smoking or quitting and preferred cessation support.

The questionnaire was pretested with 30 HCWs who

were not part of the final sample to evaluate its clarity, consistency, and the time needed for completion. Minor adjustments were made based on this feedback. The internal reliability of the questionnaire was deemed acceptable, with Cronbach's alpha coefficients of 0.81 for attitude items and 0.84 for motivation items.

Data collection procedure

Data collection was conducted by trained public health researchers during official working hours. Participants were informed about the study's objectives, assured of confidentiality, and made aware that their participation was voluntary. Completed questionnaires were reviewed for completeness before data entry.

Ethical considerations

Ethical approval was granted by the Scientific Research Ethics Committee of the Kirkuk Health Directorate (IRB 2024). All participants provided written informed consent. Participation was entirely voluntary, and data were anonymized to ensure confidentiality throughout the study.

Operational definitions

Smoking status was classified based on the type of tobacco product used. Combustible tobacco products included cigarettes and hookah (shisha), while non-combustible or novel tobacco products included electronic cigarettes (vaping devices). A current smoker was defined as a participant who reported using any combustible or non-combustible tobacco product within the past 30 days. A former smoker was defined as an individual who had previously used tobacco products but had abstained from all forms of tobacco use for more than one month. A non-smoker was defined as a participant who had never used any tobacco product.

Reasons for smoking were assessed using predefined questionnaire items. Participants were asked to indicate their perceived reasons for smoking, including stress and psychological pressure, social influence (friends or family), and addiction. The term 'addiction' referred to self-perceived dependence on tobacco, as reported by the participants, and was not based on a clinical diagnosis or a validated nicotine dependence scale. Participants were allowed to select more than one reason, and overlap between categories was possible.

Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26 (IBM Corp., Armonk, NY, USA)[12]. The distribution of continuous variables was assessed for normality using visual inspection of histograms and the Shapiro–Wilk test. As the data showed no substantial deviation from normality, continuous variables are presented as mean ± standard deviation (SD). Descriptive statistics were employed to summarize the variables, presenting means ± standard deviations for continuous data, and frequencies and percentages for categorical data.

Bivariate associations between smoking status and independent variables were assessed using the chi-squared (x^2) test. Variables with $p<0.25$ in the bivariate analysis were entered into a multivariable binary logistic regression model using a forward stepwise (likelihood ratio) method to identify independent predictors of current smoking. The final adjusted model retained gender, age group, duration of work, family member or close friend who smokes, and perceptions of smoking in the workplace, and adjusted odds ratios (AORs) with 95% confidence intervals (CIs) are reported.

An ordinal logistic regression model was used to explore predictors of smoking status categorized as non-smoker, former smoker, or current smoker. The model's fit was evaluated using Nagelkerke R^2, the Hosmer–Lemeshow test, and the test of parallel lines to check for proportional odds assumptions.

Principal component analysis (PCA) with Varimax rotation was conducted on items related to motivations for quitting smoking to extract underlying factors. Components with eigenvalues >1.0 were retained, and factor loadings ≥0.40 were deemed significant.

RESULTS

A total of 1618 HCWs took part in the study, representing a range of professional categories from hospitals and primary healthcare centers in Kirkuk Governorate. The mean age of participants was 35.7 ± 9.7 years, indicating that most were in the early to mid-career stage.

Table 1 illustrates the demographic and occupational characteristics of the participants. Among the total participants, 54.8% were female, and 45.2% were male. The average age was around 35.7 years, with nearly half of the participants (47.6%) falling into the 20–30 age group, followed by 27.6% in the age of 31–40 years range and 15.6% in the age group of 41–50 years. Nurses made up the largest professional group at 25.0%, followed by assistant medical staff at 20.5% and laboratory staff at 15.8%, while physicians represented only 3.0%. Most participants (48.9%) held a technical diploma, with 38.7% having a Bachelor's degree and 4.2% possessing postgraduate education. Almost two-thirds (66.1%) had <10 years of work experience. In terms of smoking behavior, the majority of participants were non-smokers (83.6%), while 7.0% were current cigarette smokers, 4.2% smoked hookah (shisha), 2.3% used electronic cigarettes, and 2.9% were former smokers.

Table 2 presents the smoking-related characteristics of the participants. Current smokers made up 13.5% of the study population, while former smokers accounted for 2.9%. Among those who currently smoke, the duration of smoking varied: 32.0% had smoked for 1–5 years, 26.5% for 5–10 years, and 28.8% for >10 years. In terms of smoking intensity, half of the smokers (50%) reported smoking 10–20 cigarettes per day, while 28.1% smoked >20 cigarettes daily.

The primary reasons for smoking included stress and

psychological pressure (48.4%), followed by social influences (34.2%) and self-perceived addiction (17.4%). Despite these challenges, a considerable number of participants (69.2%) had tried to quit smoking at least once. Among those who attempted to quit, 74.5% were unsuccessful, while only 25.5% managed to quit successfully. The most common reasons for wanting to quit were health concerns (66.0%), family influence (21.3%), and financial considerations (12.8%). Most former smokers (59.6%) had quit within the past one to five years. Additionally, a majority (62.4%) reported having family members or close friends who smoke, which may normalize smoking behavior in their social circles.

While awareness of the health risks associated with smoking was high (92.9%), this knowledge did not prevent some individuals from smoking. Attitudes towards smoking in the workplace were largely negative, with 88.6% opposing or strongly opposing smoking at work. In terms of support for cessation, 56.9% preferred health education and awareness campaigns, while 23.4% favored pharmacological aids, and 19.7% sought medical consultation.

Table 1. Sociodemographic characteristics of HCWs in Kirkuk, Iraq, January–August 2025 (N=1618)

Variables	Categories	n	%
Gender	Female	886	54.8
	Male	732	45.2
Age (years), (mean ± SD)	35.66 ± 9.66		
	20–30	770	47.6
	31–40	447	27.6
	41–50	252	15.6
	>50	149	9.2
Occupation	Administrative Staff	196	12.1
	Dentist	125	7.7
	Assistant medical	331	20.5
	Laboratory staff	255	15.8
	Medical technologist	160	9.9
	Nursing staff	405	25.0
	Pharmacist	98	6.1
	Physician	48	3.0
Education level	Secondary/Preparatory school	133	8.2
	Technical diploma	791	48.9
	Bachelor's	626	38.7
	Master's or PhD	68	4.2
Duration of work	1–10	1070	66.1
	11–20	330	20.4
	>20	218	13.5
Smoking status	Non-smoker	1352	83.6
	Vape smoker	37	2.3
	Former smoker	47	2.9
	Hookah (shisha) smoker	68	4.2
	Current cigarette smoker	114	7.0

Table 3 illustrates the bivariate associations between smoking status and various characteristics. Gender was found to have a strong correlation with smoking (p<0.001), with 27.9% of males identified as smokers compared to just 1.7% of females. Although the age group did not show a significant relationship to smoking (p=0.073), there was a slightly higher prevalence among younger workers. Occupation demonstrated a significant association (p=0.002), with administrative staff and dentists exhibiting higher smoking rates than other professions. Education level also had a significant impact (p=0.032), as participants with lower education level reported higher smoking rates. The duration of work did not reveal a significant relationship (p=0.071).

A strong link was identified between smoking and having family members or close friends who smoke (p<0.001). Awareness of the health effects of smoking did not significantly influence smoking behavior (p=0.331). Lastly, attitudes towards smoking in the workplace were significantly associated with smoking status (p<0.001); those who opposed smoking at work were notably less likely to smoke themselves.

Table 4 displays the findings from the multivariable binary logistic regression model. After adjustment in the multivariable model, gender, years of service, family smoking history, and perceptions of smoking in the workplace were identified as significant predictors. Male HCWs were found to be significantly more likely to smoke than their female counterparts (AOR=28.1; 95% CI: 15.9–49.6, p<0.001). Participants with family members who smoke had more than three times the odds of being smokers themselves (AOR=3.22, p<0.001). In contrast, those with longer tenures (>20 years) were less likely to smoke (AOR=0.27, p=0.004), suggesting that smoking prevalence was lower among HCWs with longer work duration. Workers who strongly opposed smoking in their workplace were significantly less likely to smoke (AOR=0.10, p<0.001). The model showed strong predictive capability (Nagelkerke R^2=0.457) and demonstrated a good overall fit (Hosmer–Lemeshow p=0.930).

The results of the rotated component matrix obtained from the principal component analysis (PCA) are presented in Supplementary file Table S1. Two primary motivational factors for smoking cessation were identified. The first, termed health-driven motivation, included items such as health concerns (loading=0.77), financial reasons (0.79), and influence from family or friends (0.84). This factor reflects intrinsic motivations for quitting. The second factor, support-oriented motivation, comprised items like health education

Table 2. Smoking patterns, behaviors, and perceptions among HCWs in Kirkuk, Iraq, January–August 2025 (N=1618)

Variables	Categories	n	%	Total n
Smoking status	Non-smoker	1352	83.6	1618
	Smoker	219	13.5	
	Former smoker	47	2.9	
Duration of smoking (years)	1–5	70	32.0	219
	5–10	58	26.5	
	<1	28	12.8	
	>10	63	28.8	
Number of cigarettes smoked daily	10–20	57	50.0	114
	<10	25	21.9	
	>20	32	28.1	
Reason to smoke	Self-perceived addiction	38	17.4	219
	Social influence (friends or family)	75	34.2	
	Stress and psychological pressure	106	48.4	
Attempted to quit smoking	No	82	30.8	266
	Yes	184	69.2	
Result of attempting to quit smoking	Failed to quit smoking	137	74.5	184
	Succeeded in quitting smoking	47	25.5	
Smoking cessation period (years)	1–5	28	59.6	47
	6–10	7	14.9	
	>10	12	25.5	
Reason for quitting smoking	Family or friend influences	13	21.3	59
	Financial reasons	6	12.8	
	Health concerns	40	66.0	
Family member or close friend who smokes	No	609	37.6	1618
	Yes	1009	62.4	
Aware of the adverse health effects of smoking	No	115	7.1	1618
	Yes	1503	92.9	
Perceptions of smoking in healthy workplaces	Strongly support smoking in the workplace	30	1.9	1618
	I support smoking in the workplace	19	1.2	
	Neutral	136	8.4	
	I oppose smoking in the workplace	403	24.9	
	I strongly oppose smoking in the workplace	1030	63.7	
Support to quit smoking	Health education and increased awareness of smoking risk	1083	56.9	1618
	Medical consultation	304	19.7	
	Pharmacological aids (e.g. nicotine replacement therapy)	535	23.4	

Table 3. Association between smoking status and sociodemographic characteristics among HCWs in Kirkuk, Iraq, January–August 2025 (N=1618)

Variable	Non-smoker n (%)	Smoker n (%)	x^2 (df)	p
Total	1399 (86.5)	219 (13.5)		
Gender			234.673 (1)	<0.001
Female	871 (98.3)	15 (1.7)		
Male	528 (72.1)	204 (27.9)		
Age (years)			6.207 (3)	0.073
Mean ± SD	34.57 ± 10.12	33.65 ± 8.44		
20–30	665 (86.4)	105 (13.6)		
31–40	378 (84.6)	69 (15.4)		
41–50	218 (86.5)	34 (13.5)		
>50	138 (92.6)	11 (7.4)		
Occupation			22.947 (7)	0.002
Administrative staff	163 (83.2)	33 (16.8)		
Dentist	96 (76.8)	29 (23.2)		
Assistant medical	292 (88.2)	39 (11.8)		
Laboratory staff	228 (89.4)	27 (10.6)		
Medical technologist	139 (86.9)	21 (13.1)		
Nursing staff	360 (88.9)	45 (11.1)		
Pharmacist	77 (78.6)	21 (21.4)		
Physician	44 (91.7)	4 (8.3)		
Education level			8.775 (3)	0.032
Secondary/Preparatory school	111 (83.5)	22 (16.5)		
Technical diploma	702 (88.7)	89 (11.3)		
Bachelor's	525 (83.9)	101 (16.1)		
Master's or PhD	61 (89.7)	7 (10.3)		
Duration of work (years)			5.276 (2)	0.071
1–10	912 (85.2)	159 (14.8)		
11–20	289 (87.6)	41 (12.4)		
>20	199 (90.8)	20 (9.2)		
Family member or close friend who smokes			36.776 (1)	<0.001
No	567 (93.1)	42 (6.9)		
Yes	832 (82.5)	177 (17.5)		
Aware of the adverse health effects of smoking			0.943 (1)	0.331
No	96 (83.5)	19 (16.5)		
Yes	1303 (86.7)	200 (13.3)		
Perceptions of smoking in healthy workplaces			204.431 (4)	<0.001
Strongly support smoking in the workplace	7 (56.7)	13 (43.3)		
I support smoking in the workplace	10 (52.6)	9 (47.4)		
Neutral	76 (55.9)	60 (44.1)		
I oppose smoking in the workplace	330 (81.9)	73 (18.1)		
I strongly oppose smoking in the workplace	966 (93.8)	64 (6.6)		

Table 4. Binary logistic regression analysis of factors associated with smoking status among HCWs in Kirkuk, Iraq, January–August 2025 (N=1618)

Predictor variable	Smoking status				
	n	OR (95% CI)	p	AOR (95% CI)*	p
Gender					
Female (ref.)	886	1		1	
Male	732	22.45 (13.13–38.32)	0.001	28.10 (15.91–49.60)	0.001
Age (years)					
20–30 (ref.)	770	1		1	
31–40	447	1.15 (0.83–1.61)	0.387	1.97 (1.24–3.12)	0.004
41–50	252	0.98 (0.65–1.49)	0.954	2.02 (0.98–4.33)	0.057
>50	149	0.51 (0.26–0.97)	0.039	0.80 (0.29–2.21)	0.679
Occupation					
Administrative staff (ref.)	196	1			
Dentist	125	1.49 (0.85–2.61)	0.161	-	-
Assistant medical	331	0.66 (0.39–1.09)	0.104		
Laboratory staff	255	0.58 (0.34–1.01)	0.055		
Medical technologist	160	0.75 (0.41–1.35)	0.333		
Nursing staff	405	0.62 (0.38–1.01)	0.052		
Pharmacist	98	1.35 (0.73–2.48)	0.339		
Physician	48	0.45 (0.15–1.34)	0.150		
Education level					
Secondary/preparatory school (ref.)	133	1		-	-
Technical diploma	791	0.64 (0.38–1.06)	0.085		
Bachelor's	626	0.97 (0.58–1.61)	0.908		
Master's or PhD	68	0.58 (0.23–1.43)	0.237		
Duration of work (years)					
1–10 (ref.)	1070	1		1	
11–20	330	0.82 (0.57–1.18)	0.287	0.59 (0.32–1.07)	0.085
>20	218	0.58 (0.36–0.95)	0.031	0.27 (0.12–0.65)	0.004
Family member or close friend who smokes					
No (ref.)	609	1		1	
Yes	1009	2.87 (2.01–4.09)	0.001	3.22 (2.13–4.86)	0.001
Aware of the adverse health effects of smoking					
No (ref.)	115	1			
Yes	1503	0.78 (0.46–1.29)	0.333	-	-
Perceptions of smoking in healthy workplaces					
Strongly support smoking in the workplace (ref.)	30	1		1	
I support smoking in the workplace	19	1.18 (0.37–3.73)	0.782	1.49 (0.31–7.23)	0.619
Neutral	136	1.03 (3.93–12.39)	0.938	0.76 (0.28–2.09)	0.596
I oppose smoking in the workplace	43	0.29 (0.14–0.62)	0.001	0.30 (0.11–0.76)	0.013
I strongly oppose smoking in the workplace	1030	0.09 (0.04–0.19)	0.001	0.10 (0.03–0.25)	0.001
Constant					
Model χ^2 (df)	15.225 (8)				
Nagelkerke R^2	0.457				
Hosmer–Lemeshow p	0.930				

*AOR: adjusted odds ratio, from forward stepwise (likelihood ratio) method. Variables not retained in the final multivariable model using forward stepwise selection are indicated by '-'.

(0.81), medical consultation (0.74), and pharmacological aids (0.69), representing external supports that aid in the quitting process. All factor loadings were >0.40, indicating strong construct validity.

Two motivational components related to smoking cessation were identified through principal component analysis. Together, these components accounted for 69.5% of the total variance. The first factor, health-driven motivation, explained 40.2% of the variance and reflected concerns related to health and financial consequences. The second factor, support-oriented motivation, accounted for 29.3% of the variance and encompassed external support mechanisms such as health education, medical consultation, and pharmacological assistance. A summary of the extracted motivational factors and the variance explained is provided in Supplementary file Table S2.

DISCUSSION

This study investigated the prevalence of smoking, behaviors, and determinants among HCWs in the Kirkuk Governorate of Iraq, while also exploring motivational factors for quitting. The findings indicate a significant smoking prevalence among healthcare professionals, with strong connections identified between gender, social exposure to smokers, workplace attitudes, and smoking behavior.

The smoking prevalence we observed among HCWs in Kirkuk is consistent with global systematic review data, which indicate an overall prevalence of around 21% among healthcare professionals, with higher rates in males (approximately 31%) compared to females (around 17%)[7]. This finding highlights the ongoing issue of tobacco use, even among health professionals who are expected to serve as role models. With regard to novel tobacco products, the prevalence of electronic cigarette use in the present study was lower than that of traditional combustible tobacco products, a pattern that has also been reported in several Middle Eastern settings, whereas higher e-cigarette use has been observed among healthcare workers in some European and North American studies[13-15].

In regional studies, such as one conducted in northern Jordan, the prevalence of smoking among primary healthcare professionals was found to be around 25%, which coincided with weak enforcement of smoke-free policies[9]. Our findings highlight the potential relevance of workplace policies and attitudes, with opposition to smoking in the work environment being associated with a lower likelihood of smoking among HCWs. This association suggests that organizational culture and workplace policies may influence smoking behaviors, although causality cannot be established.

Multivariable and ordinal logistic regression analyses identified male gender, the presence of smoking family members or friends, shorter professional experience, and negative perceptions of workplace smoking policies as independent predictors of current smoking. The finding that male gender is a strong predictor aligns with numerous studies, as smoking prevalence among male physicians globally remains higher than among their female colleagues[3]. The influence of social exposure, where family and friends smoke, supports the concept of social modeling, indicating that HCWs are not immune to peer or familial influences, which correlate with increased smoking rates[16]. Shorter professional experience may point to a younger age, early-career stress, or weaker adherence to institutional norms[17].

The protective association of opposing workplace smoking suggests that a supportive institutional culture and clear norm-setting can effectively reduce smoking among HCWs[18,19]. Therefore, focusing solely on individual-level factors is insufficient; organizational and policy-level interventions are essential to promote smoking cessation.

The principal component analysis in this study identified two key motivational constructs: 1) Health-driven motivation, which includes concerns about personal and family health as well as financial reasons; and 2) Support-oriented motivation, which encompasses education, medical counseling, and pharmacotherapy. The variance explained by these constructs highlights that both intrinsic and extrinsic factors significantly influence smoking cessation among HCWs. This dual-mechanism finding aligns with existing literature on cessation, which suggests that the motivation to quit is multifaceted; health concerns alone are often insufficient without supportive structures in place. For instance, a study conducted in Cyprus revealed that while approximately 72% of HCWs expressed a strong desire to quit smoking, only about 5–7% utilized cessation aids, illustrating a significant gap between intention and action[8].

In addition, patterns such as dual or multiple tobacco product use deserve further attention, as some healthcare workers may concurrently use cigarettes, hookah, or electronic cigarettes, potentially increasing nicotine exposure and dependence[13,20]. The workplace environment may also contribute to nicotine dependence, particularly in settings characterized by high occupational stress, shift work, or social acceptance of smoking[21]. Furthermore, initiation of smoking during early employment in healthcare settings may be influenced by peer behaviors, workplace norms, and job-related stressors[2]. These considerations underscore the importance of preventive measures tailored to healthcare professionals, including early workplace-based education, stress management interventions, strict enforcement of smoke-free policies, and accessible cessation support services[22].

Strengths and limitations

The strengths of this study include its large sample size, representation from various healthcare professions, and the combined use of bivariate, multivariable, and factor analysis methods, which together offer a comprehensive understanding of the determinants and motivations related to smoking. Conducting the study in Kirkuk is particularly

valuable, as there are limited data available from this region. However, there are several limitations to consider. The cross-sectional design prevents the establishment of causal relationships; while associations can be identified, we cannot confirm the direction of these relationships. Additionally, smoking status was self-reported, which may lead to an underestimation of prevalence due to social desirability bias, especially among HCWs. Lastly, although motivational factors were examined through principal component analysis, qualitative data could provide deeper insights into the underlying psychosocial mechanisms. Furthermore, as the study was conducted in a single governorate, the findings may not be fully generalizable to healthcare workers in other regions of Iraq or in different national and healthcare system contexts. In addition, the reliance on questionnaire-based self-reported data introduces the possibility of information bias, including recall bias and social desirability bias, particularly given the professional role of healthcare workers. Moreover, smoking status was not validated using biochemical measures such as cotinine testing; therefore, some degree of misclassification of tobacco exposure cannot be excluded. Nevertheless, self-administered questionnaires remain a widely accepted and practical method for assessing smoking behavior in large epidemiological studies.

CONCLUSIONS

Smoking continues to be a significant issue among healthcare workers in Kirkuk, Iraq. The main factors associated with smoking include male gender, social exposure to smokers, shorter professional experience, and permissive workplace attitudes toward smoking. Motivations for quitting appear to be driven by concerns about personal health and financial costs, as well as the availability of external support. Addressing smoking among HCWs may benefit from a comprehensive approach that integrates individual-level cessation support, such as counseling and pharmacotherapy, alongside the reinforcement of smoke-free workplace policies. Targeted interventions focusing on younger healthcare professionals and those more vulnerable to social influences could help inform efforts to strengthen tobacco control within healthcare settings.

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CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval was obtained from the Iraqi Research Ethics Committee at the National Center for Training and Human Development, Kirkuk Health Directorate, Iraqi Ministry of Health (MOH) (Approval number: IRB 2024; Date: 19 December 2024). Participants provided informed consent.

DATA AVAILABILITY

The data supporting this research are available from the authors on reasonable request and with permission from the Kirkuk Health Directorate Ethics Committee.

PROVENANCE AND PEER REVIEW

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