



## Hesitancy towards Covid-19 vaccination among the healthcare workers in Iraqi Kurdistan

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### ABSTRACT

**Objective:** To investigate Covid-19 vaccine hesitancy among Iraqi healthcare workers-HCWs.

**Study design:** Cross-sectional survey.

**Methods:** In February 2021, an anonymous questionnaire on the willingness of receiving Covid-19 vaccination was submitted to a sample of HCWs in the Dohuk Governorate, Iraqi Kurdistan Region. Overall, 1704 questionnaires were analysed by means of univariate and multivariate statistics.

**Results:** The sample included 978 males and 726 females (Mean age:  $36.9 \pm 10.1$ ), working in Primary Health Centres (65.8%) or in Public Hospitals (34.2%). Professions ranged from being physician/paramedics (39.3%) to administrative/laboratory staff (31.7%); 17.0% had attended up to secondary school, the rest had a higher education. Considering health conditions, 1.8% reported a poor health status and 11.5% a chronic disease. Overall, 475 people (27.9%) reported Covid-19 vaccine hesitancy, with fear of side-effects (41.4%) and lack of confidence in using the vaccine (23.5%) being the most common perceived barriers. Midwives (61.1%) and assistant nurses (45.5%) were the most hesitant; physicians the less (12.3%). According to a binary logistic model, holding lower educational level (adjOR = 2.158; 95% CI:1.654–2.815), being female (adjOR = 1.622; 95% CI:1.289–2.040), having pre-existing chronic disease (adjOR = 1.954; 95% CI:1.280–2.983), and self-perceiving a poor health status (adjOR = 3.673; 95% CI:1.610–8.379) were independent predictors of higher odds of hesitancy.

**Conclusion:** Covid-19 vaccine hesitancy among HCWs represents an important public health concern, since they play a paramount role for a successful vaccination campaign within the community. Our results show the need in Iraq to implement educational interventions for strengthening the confidence of HCWs towards the Covid-19 vaccine, therefore positively influencing the general public's attitude.

## 1. Introduction

Several vaccines have been developed and authorized to prevent Covid-19 [1]. However, vaccine hesitancy in the general population and among the healthcare workers-HCWs is still a major concern [2]. Since health personnel is key in educating and driving health behaviours throughout the community, its reluctance to be vaccinated is particularly alarming. That is why this phenomenon is being widely studied [3], though little is known about COVID-19 vaccine hesitancy in Middle East countries. Therefore, more studies are needed to address the main reasons for hesitancy in this area [4], such as in Iraq, a country whose

health system is still recovering after years of protracted conflicts [5].

The aim of this study was thus to ascertain vaccine hesitancy among the Iraqi HCWs working in the public sector in the Duhok Governorate. Duhok is part of the Iraqi Kurdistan, an autonomous region inside Iraq.

## 2. Methodology

### 2.1. Setting and sample

This cross-sectional survey started in February 2021, shortly before Covid-19 vaccines became available in the region [6]. The health

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personnel, 10,103 individuals, working in public health facilities in the Duhok Governorate was invited to fill out a questionnaire on a voluntary basis. The questionnaire was sent to all 268 health facilities, i.e., 252 Primary Health Centres-PHCs and 16 Public Hospitals-PHs. The number of studies investigating HCWs hesitancy towards Covid-19 vaccination in the Region is limited; thus we have hypothesized a 20% hesitancy rate among higher educated staff and a 35% among the lower educated ones. Considering a power of 80% and 95% confidence level, the minimum sample size should have been at least 136 individuals per group. Sample size has been computed by means of the Sample Size Calculator of the Australian Bureau of Statistics [14]. The study sample was larger than that.

## 2.2. Tool

The survey was conducted using a KoBo Toolbox, a free open-source tool for easy data collection. The self-report questionnaire (Supplementary File 1), based on closed-ended items, included socio-demographic characteristics (age, gender, education, profession, type of health facility), health information (perceived health conditions, chronic diseases, SARS-CoV-2 previous infection), and willingness to take Covid-19 vaccine. Those who showed vaccine hesitancy, were asked to fill out supplementary items, focussing on possible reasons for reluctance. Informed consent was provided along with the questionnaire. Upon request, trained public health officers were available to clarify not understood items.

## 2.3. Statistical analysis

Descriptive statistics was used to describe the socio-demographic characteristics and the answers to the items of the participants. Comparisons between groups were examined by means of the Pearson's chi-squared test. Binary logistic regression models have been developed with hesitancy/non-hesitancy as outcome variable. Regression results have been presented as adjusted Odds Ratios (adjOR) and 95% Confidence Intervals (95%CI). For all statistical analyses, an alpha level of 0.05 was used. Analyses were performed using the SPSS software (version 26, Inc., Chicago, IL, USA).

## 3. Results

By the end of February 2021, 2,045 questionnaires, covering 17% of the health staff, had been returned. Overall, 341 questionnaires had to be excluded because of missing data or due to lack of basic demographic information. Out of the 1704 HCWs whose questionnaires were analysed, 978 were males (57.4%) and 726 females (42.6%). Mean age was 36.9 years  $\pm$  10.1 (median: 35). Overall, 48.5% were younger than 35 years, while 24.4% were older than 44 years. Considering workplace, 65.8% was working in PHCs and 34.2% in PHs.

With regard to profession, 17.2% were physicians, 22.1% nurses, 11.7% paramedics, 3.2% assistant nurses, 4.0% pharmacists, 5.4% dentists, 1.1% midwives, 31.7% administrative or laboratory staff, and 3.6% other personnel. In terms of education, 1.4% held a postgraduate degree, 24.6% a bachelor degree, 37.7% a graduation certificate, and 17.0% a secondary school diploma.

The perceived health status was reported as decent by 89.4% of the responders (35.9% "very good", 53.5% "good", 8.9% "fair"); only 1.8% reported a poor health status. However, 11.5% upheld being affected by chronic diseases. At the time of interview, 33.1% had already experienced a Covid-19 infection.

When considering willingness to be vaccinated, 475 HCWs (27.9%) reported hesitancy. Significant differences were observed between genders (33.2% among females vs. 23.9% among males;  $\chi^2 = 17.81$ ;  $p < 0.001$ ), educational level (33.1% in those with lower education vs. 18.6% in those with higher education;  $\chi^2 = 41.37$ ;  $p < 0.001$ ), and workplace (29.9% among PHC workers vs. 20.9% among PH workers;

$\chi^2 = 14.95$ ;  $p < 0.001$ ).

In terms of occupation, midwives and assistant nurses were more hesitant (61.1% and 45.5%, respectively), followed by nurses (34.6%), administrative/laboratory staff (31.9%), paramedics (28.5%), pharmacists (22.1%), dentists (17.4%), and physicians (12.3%).

People self-reporting poor health were more hesitant than those who reported good health (56.7% vs. 27.4%;  $\chi^2 = 12.58$ ;  $p = 0.001$ ). In addition, people having chronic diseases showed higher reluctance, however the difference was not statistically significant (28.5% vs. 21.9%;  $\chi^2 = 3.76$ ;  $p = 0.053$ ).

The main perceived barriers to Covid-19 vaccination (see [Supplementary Table 1](#)) included worry of side-effects (41.4% of responders), lack of confidence in vaccine use (23.5%), concern that vaccine could be a fake (17.3%), safety (16.9%) and efficacy concerns (16.7%). Overall, 14.7% of the responders stated that their concerns rose after consulting social media.

A binary logistic model was fitted to the data to test the hypothesis regarding the relationship between the likelihood of vaccine hesitancy and possible predictor variables (gender, presence of chronic diseases, workplace, education, and health status).

According to the model, having a lower educational level (adjOR = 2.158), being female (adjOR = 1.622), having a pre-existing chronic disease (adjOR = 1.954), and having a poor health status (adjOR = 3.673) were independent predictors of increased odds of hesitancy. Contrariwise, the increased risk of working in a PHC did not yield statistically significant results ([Table 1](#)).

## 4. Discussion

Vaccine hesitancy has been listed by the World Health Organization as one of top ten threats to global health. Covid-19 vaccine acceptance among HCWs plays a decisive role in the successful control of the pandemic throughout the community [7], particularly in the Middle East [2].

This survey showed an overall hesitancy rate of nearly 28%, slightly lower than findings in a Palestine's study (nearly 31%) [8]. When considering Iraq, a study by Qunaibi et al. estimated a 30% vaccine hesitancy; however, the survey considered a small sample than ours [9]. To our knowledge, at present, our study is the largest survey conducted in Iraq on Covid-19 vaccine hesitancy among health personnel.

In our survey, in line with other studies [10], women had a lower vaccine acceptance rate, independently from other factors such as educational level or health status. We observed also that midwives, assistant nurses and nurses were the three most vaccine-hesitant professions. In our study, the acceptance rates of both physicians and nurses appears to be between 10 and 20% higher than those registered by an Israeli [11] and a Palestine study [6]. In accordance with a published review [1], our study confirms that higher educational level increases vaccine acceptance. Being a lower educational level associated also with a lower health status, our findings highlight again the central role of health education, since people in poor health should be the first to be encouraged towards vaccination. Bearing in mind that by the time of this survey Covid-19 vaccines had not yet been deployed, social media might have played a role in enhancing concerns toward the COVID-19 vaccine hesitancy at that stage [12].

Hesitancy was higher in PHC workers; this result might be due to the Iraqi staff composition itself that includes also professionals with lower educational levels. This observation could add concerns in such settings where there are no physicians and which are run only by nurses and assistant nurses [13].

Some limitations must be considered. The study was conducted in a single province; therefore, the findings might not be representative of the entire country. Since the results of this analysis are based on the HCWs' responses, we could not precisely quantify the response bias. Due to lack of individual data, the investigation could not provide information about the non-responders, so it might not be completely

**Table 1**  
Predictor variables of vaccine hesitancy (binary logistic model).

	B	S.E.	W	Df	p	adjOR	95%CI	
							Lower	Upper
Gender (female)	.483	.117	17.059	1	<.001	1.622	1.289	2.040
Pre-existing chronic disease	.670	.216	9.646	1	.002	1.954	1.280	2.983
Working in PHCs (vs. working in PHs)	.231	.133	3.005	1	.083	1.260	.970	1.636
Low educational level	.769	.136	32.097	1	<.001	2.158	1.654	2.815
Poor health status	1.301	.421	9.560	1	.002	3.673	1.610	8.379
Costant	-5.996	.766	61.203	1	<.001	.002		

S.E.: Standard Error. W: Wald Test statistics. Df: Degrees of Freedom. adjOR: adjusted Odds ratio.

representative of the overall workforce. Additionally, an online survey is not as accurate as one conducted by an interviewer as it is more prone to selection biases. Moreover, the study depicts a specific moment of the campaign; temporal changes may have occurred on HCWs hesitancy, which might have affected future intention to be vaccinated.

In conclusion, this cross-sectional study outlines that the fight against vaccine hesitancy among HCWs in Iraq is a paramount public health issue, aimed to combat disinformation among HCWs and to bolster vaccination campaigns in the general population. Our findings, despite being preliminary, provide assessment of barriers to Covid-19 vaccination adoption in settings where no other exhaustive studies exist. Therefore, these results can be used to identify evidence-based strategies to increase COVID-19 vaccine uptake. Future studies analysing the impact of educational campaigns on vaccine acceptance (i.e. tailored trainings for different health staff categories that include scientific updates on vaccinations' benefits, efficacy and safety, reliable information and reassurances), will provide more detailed information about figures and features of behaviour modifications.

Policy and practice implications workflow:

- Prompt detection of hesitancy toward vaccines among HCWs
- Ad hoc scientific training for different health staff categories
- Investing in communication skills of HCWs, who are a key element for successful vaccine campaigns among the general population

#### Author contributions

ALH conceptualised and designed the study, obtained consent and maintained communication with health authorities, created the tool, collected the data, drafted and revised the manuscript. AHH contributed to data collection, maintained communication with health authorities, drafted the manuscript. BFB obtained consent and maintained communication with health authorities, drafted the manuscript. MS analysed data and substantially contributed in writing the manuscript. EGL conceptualised and designed the study, contributed to analyse data and critically revised the manuscript. All authors read and approved the final manuscript.

#### Ethical approval

All study procedures were in accordance with the Helsinki Declaration. This survey was conducted under a PhD research in Nursing Sciences and Public Health (University of Rome Tor Vergata - Italy) for which ethical approval was being granted by the Scientific Research Division of the Duhok Directorate of Health (Reference Number: 22062020-2). All the questionnaires were anonymous, and included informed consent section for participation to the survey.

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#### Competing interests

None declared.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhip.2021.100222>.

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