


# COVID-19 vaccine acceptance, hesitancy and refusal among Iraqi Kurdish population

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## ABSTRACT

**Objectives:** Vaccination is one of the most significant public health achievements of humanity. However, a significant portion of the population remains hesitant about vaccine safety, efficacy, and necessity. This study aimed to determine COVID-19 vaccination intention and factors affecting their decision among the general population in the Kurdistan region, Iraq.

**Methods:** A cross-sectional survey was conducted online during (April-May 2021), and a total of 1171 participants provided complete and valid answers were enrolled. Data collection was done through online questionnaire through Google Forms. We used binary regression analysis to identify factors associated with COVID-19 vaccination intention.

**Results:** The majority (53.6%) of the participants were female. Willingness to accept COVID-19 vaccine was low (33 %) of the participants. We found that vaccine hesitancy/resistance was high which was evident for (32%) and (34.9%) of surveyed populations, respectively. Vaccination intention may associate with age, education, and occupation. Furthermore, several factors were associated with hesitancy/resistance: Adverse effects of the vaccine and loss of family members during the pandemic.

**Conclusions:** More than half of the study participants refused or were hesitant to have the COVID-19 vaccine, so that Governments and health authorities should improve communication and increase trust.

**Keywords:** COVID-19 vaccines, Iraq, Kurdistan region, vaccination intention

## Introduction

In December 2019 from Wuhan city in China, the novel coronavirus infection outbreak known as Coronavirus disease (COVID)-19 has emerged.<sup>[1]</sup> The coronavirus has been spread steadily and within a period emerged in other countries, including the Iraqi Kurdistan region.<sup>[2]</sup> COVID-19 was declared a public health emergency of international concern by the World Health Organization on January 30, 2020, and a pandemic on March 11, 2020.<sup>[3]</sup> According to the World Health Organization, there were 264,815,815 confirmed COVID-19 cases and a total of 5,249,793 deaths worldwide by December 7, 2021.<sup>[4]</sup>

The first human case of SARS was reported in Guangdong province, South China, in 2002. In 2012, the MERS coronavirus was transmitted to humans by a camel in Saudi Arabia.<sup>[5]</sup> The SARS-CoV-2 virus is a new spherical virus with

mushroom-shaped proteins known as spikes that give it the look of a crown.<sup>[6]</sup> Fever, dry cough, shortness of breath, and pneumonia are all common symptoms. Headache, diarrhea, productive cough, runny nose, and hemoptysis are some of the less prevalent clinical symptoms.<sup>[7]</sup>

Preventive measures, such as lockdown and social distancing, are effective measures for controlling the COVID-19 spread in different nations.<sup>[8,9]</sup> Vaccination, on the other hand, is still the safest and most efficient technique of preventing infectious diseases and is often regarded as one of the greatest successes in global health.<sup>[10]</sup> Two COVID-19 vaccines with higher than 90% effectiveness in reducing the risk of symptomatic infection have been licensed in the EU as of January 6, 2021.<sup>[11]</sup> Its benefit depends on the acceptance of individuals to be vaccinated.<sup>[12]</sup> However, to achieve herd immunity COVID-19 vaccine hesitancy might represent the main barrier.<sup>[13]</sup> Understanding socio-demographic characteristics

that influence vaccine decision-making is critical to improving vaccine acceptance.<sup>[14]</sup>

In Kurdistan Regional Government (KRG), three COVID-19 vaccines have been approved recently namely, (Pfizer/BioNTech, Oxford-AstraZeneca, Sinopharm). As of 20 October, 13% of people received vaccines;<sup>[15]</sup> however, Kurdish health authorities aimed to get at least 20% fully vaccinated community by the end of the year.<sup>[16]</sup> Therefore, the objective of this study is to determine the COVID-19 vaccination acceptance, refusal, and hesitancy rates and factors behind vaccination intention in the Kurdistan region of Iraq.

## Methods

### Study design and survey questionnaire

A cross-sectional study design was conducted in Kurdistan Regional Government (KRG) of Iraq; the survey was performed around two weeks during April/May 2021. A total of 1171 samples were enrolled in the present study. Eligibility criteria included being age 18 or >55, currently living in the Kurdistan Region, and not getting the COVID-19 vaccine at the time of the study. Participation was voluntary, provided informed consent on the survey platform before they could proceed to the completion of the questionnaire. The survey questionnaire was composed of 18 questions and divided into three parts. The first section contained sociodemographic characteristics namely (age, gender, occupation, province, and education). While in the second section, participants responded to the structured questionnaire (Whether they accept, hesitant/rejecting to take COVID-19 vaccine, types of vaccines, previous infection, losing family, etc.). Respondents were asked to indicate how important a series of four factors were in their decision, as a third part of the questionnaire. Initially, the clarity and comprehensibility of questions and answers were verified by the pilot study on a group of individuals. The questionnaire was in English and translated to Kurdish Languages to be understandable by all and the survey took 5 minutes for each participant to complete questions.

### Study setting

Erbil, Sulaymaniyah, Halabja, and Duhok are the four governorates that made up Iraqi Kurdistan. Figure 1 showed the governorates of Iraqi Kurdistan on a map.<sup>[17]</sup> SARS-CoV-2 emerged in Iraqi Kurdistan on March 1, 2020, in the Sulaymaniyah Governorate, infecting a family and a woman who had recently returned from Iran. The confirmed cases were also confirmed in the governorates of Halabja and Erbil.<sup>[18]</sup> COVID-19 prevalence in the Kurdistan region was 1.9%, which is comparable to neighboring countries and the rest of the world from March 2020 to March 2021. The mortality rate was 59 per 100,000 populations.<sup>[19]</sup> As a result, travelers to the Iraqi Kurdistan Region must provide a PCR

certificate valid for at least 48 hours or proof of the second dose of vaccine.<sup>[20]</sup>

### Data collection

As a result of the COVID-19 pandemic, an online Google form was preferred, as it was thought to be a safer option for both participants and researchers to avoid face-to-face contact and limit the chance of infection. The structured questionnaire was used to enroll participants which consisted of two sections. In the first section, researchers asked about basic sociodemographic characteristics including (age, gender, occupation, level of education). While in the second section the questions concerning vaccination intentions and factors that affect their decision regarding vaccination were asked. Participants who did not complete the questions of the survey were excluded from the study. The online link was sent to the target population randomly using social media platforms such as Viber, Facebook, messenger, pages, and WhatsApp groups.

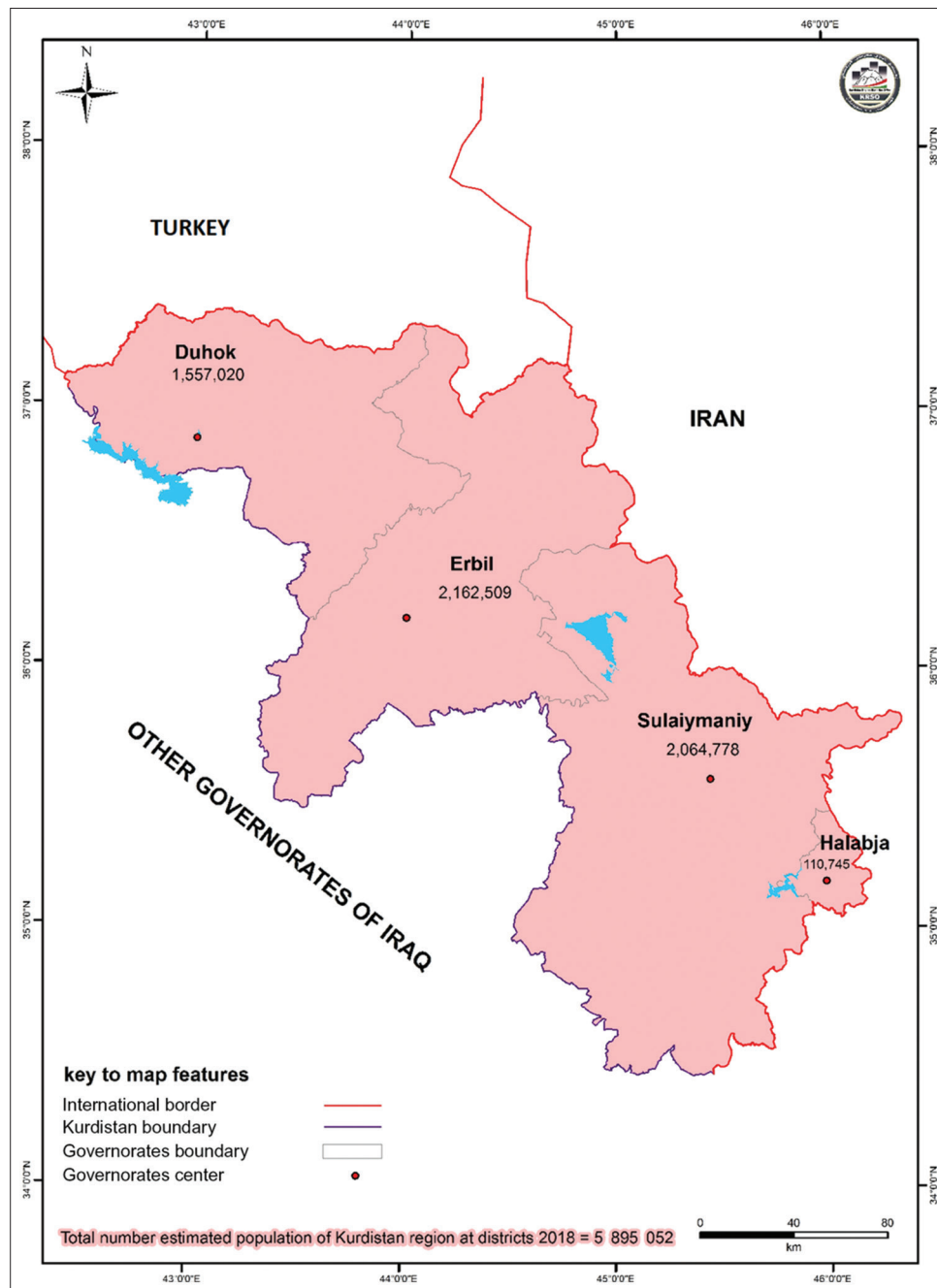
### Statistical analysis

Primarily, descriptive tests (frequency and percentage) were used for demographic characteristics (gender, age, occupation, education, and province), and a Chi-square test was used to indicate p-value. Variables associated with vaccine acceptance and refusal were assessed through Binary logistic regression analysis providing crude odds ratio (OR) and 95% confidence intervals (CI). In a subsequent step, we performed a graph to determine the intention to types of vaccine. Version 23 of IBM SPSS Statistics was used (IBM Corporation, Armonk, New York, USA).

## Results

Of the 1171 participants who participated in the current study, (46.3%) were males and (53.7%) were females. Regarding vaccination intention, there was no significant association between both genders. The majority of males and females were hesitant (31.8%) (32.4%) and rejected to be vaccinated (33.3%) (36.1%), respectively. While (34.8%) of males and (32.9) of females declared that they would accept the vaccine. A strong relationship ( $p < 0.01$ ) was found among age groups, the younger individuals 18-44 years were more hesitant and refused to have vaccines as compared to elder age groups. The study revealed a strong relationship ( $p < 0.03$ ) among education levels, Masters and Ph. D individuals had higher rates of accepting vaccines (40.7%) compared to those with high school and under. Furthermore, it is important to highlight that the vast majority (41%) of healthcare workers revealed that they would accept to take the vaccine and a lower percentage (27.9%) would reject to take the vaccine as compared to other occupations [Table 1].

Logistic regression analysis was used to assess independent variables to evaluate vaccine acceptance and rejection. The



**Figure 1:** Map of Kurdistan Region with its Estimated Population at Governorate Level, 2018

study revealed that there was no significant association between males and females (OR: 1.20% 95% CI 0.910-1.591) for accepting and rejecting vaccines. While middle-aged individuals (35-55) were strongly ( $p < 0.01$ ) associated with accepting or rejecting vaccines compared to younger age groups. The lower odds (OR: 0.47% 95% CI 0.28-0.79) were found among health care workers with significant association ( $P < 0.004$ ) as compared to other occupations with greater odds. The adjusted odds were greater among the participants with higher education with a highly significant association Master/Ph.D. degree (OR: 1.98% 95% CI 1.34–2.93) in contrast to less-educated participants.

Meanwhile, losing a family member due to the COVID-19 was significantly associated with vaccination intention ( $P < 0.001$ ; OR: 0.51% 95% CI 0.38–0.68). Furthermore, significant association ( $P < 0.001$ ,  $P < 0.004$ ) was found for available vaccines Pfizer, AstraZeneca, and Sinopharm, respectively. While other factors such as having a chronic disease and a history of vaccine refusal were not significantly associated with the COVID-19 vaccine [Table 2].

Regarding, reasons behind rejecting or being hesitant to get the COVID-19 vaccine, more than half percent (52%), and almost (48%) were hesitant or refused to get vaccinated. It

**Table 1:** Vaccine intention according to sociodemographic characteristics

Variables	Accepting		Hesitant		Rejecting		Total	
	n	%	n	%	n	%	n	%
Sex								
Male	189	34.8	173	31.8	181	33.3	543	46.3
Female	197	31.3	204	32.4	227	36.1	628	53.7
Total	386	32.9	377	32.1	408	34.8	1171	100
$P=0.419, \chi^2=1.740$								
Age								
18–24	123	30	118	28.8	168	41	409	34.9
25–34	128	32.5	125	31.8	140	35.6	393	33.6
35–44	84	33.6	96	38.4	70	28	250	21.3
45–54	33	44	21	28	21	28	75	6.4
>55	18	40.9	17	38.6	9	20.4	44	3.8
$P=0.01, \chi^2=21.980$								
Education								
Middle school	26	36.6	22	30.9	23	32.3	71	6
High school	24	30.3	28	35.4	27	2.3	79	6.8
Institute/College	254	30.9	258	31.4	308	37.5	820	70
Master/Ph. D	82	40.7	69	34.3	50	24.9	201	17.2
$P=0.03, \chi^2=13.486$								
Occupation								
Healthcare workers	106	41	80	31	72	27.9	258	22
Non-Healthcare workers	280	30.6	297	32.5	336	36.8	913	78
$P = 0.07, \chi^2 = 16.83$								

A significant outcome is indicated by a  $P < 0.05$ .  $\chi^2$  is a Chi-square. In Bold are significant values

is mentioned that the majority of hesitant participants (45%) and that rejected vaccination (50.1%) was due to adverse effects of the vaccine. And about (12.7), (15.6) did not accept to take the vaccine due to time of building vaccine were short as compared to other vaccines. Only about (7) and (8.7) their reasons for not being vaccinated were fear of vaccine needle or reinfection after vaccination, respectively [Table 3].

Figure 2 illustrates a strong relationship between types of vaccine and vaccination intention. The majority of participants (40%) would accept the Sinopharm vaccine, followed by Pfizer (36.34%), and AstraZeneca vaccine as the least acceptable (35%). Pfizer (33.02%) and AstraZeneca (32.47%) were also mentioned as the vaccine that people would refuse to get it. Only roughly a quarter of participants (28%) said they would refuse the Sinopharm vaccine. When it comes to vaccine hesitancy, practically all survey people were nearly equally hesitant, ranging from 30% to 32% for available vaccines offered in the Kurdistan region.

## Discussion

Vaccination is widely regarded as one of the most achievements of science; however, vaccine hesitancy continues to persist.<sup>[21]</sup>

**Table 2:** Binary regression analyses for Covid-19 vaccine admission

Variables	OR	SE	% 95 CI	P-value
Gender				
Female	1.203	0.142	0.910–1.591	0.194
Male (References)				
Age				
25–34	0.80	0.17	0.57–1.11	0.19
35–44	0.61	0.20	0.41–0.90	0.01
45–54	0.49	0.30	0.25–0.84	0.01
> 55	0.39	0.45	0.16–0.95	0.03
18–24 (References)				
Occupation				
Healthcare workers	0.47	0.26	0.28–0.79	0.004
Government employee	0.71	0.25	0.43–1.16	0.17
Students	0.86	0.25	0.52–1.42	0.56
Others (References)				
Education				
High school	1.45	0.33	0.74–2.81	0.27
Institute/College	1.84	0.33	0.96–3.54	0.06
Master/Ph. D	1.98	0.98	1.34–2.93	0.001
Middle school (References)				
Chronic disease				
Yes	1.045	0.1	0.858–1.27	0.66
No (Reference)				
Lost family member				
Yes	0.51	0.147	0.38–0.68	0.001
No (References)				
Vaccine refusal				
Yes	1.043	0.135	0.800–1.358	0.757
No (References)				
Types of vaccine				
Pfizer	0.42	0.20	0.28–0.63	0.001
AstraZeneca	0.42	0.20	0.28–0.64	0.001
Sinopharm	0.32	0.38	0.15–0.70	0.004
Does not differ (References)				

OR: Odds ratio; SE: Standard error. CI: Confidence interval; A significant outcome is indicated by a  $P < 0.05$ . The bolded values are significant. Hesitant people were excluded from this analysis.

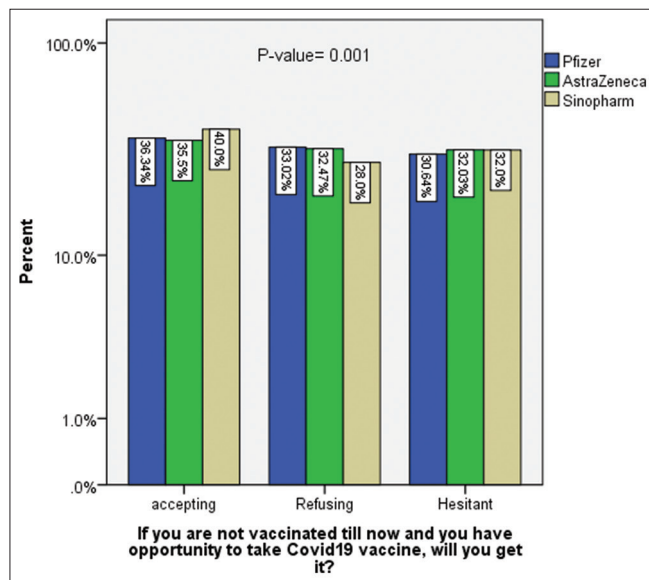
As of December 2020, two approved vaccines have been demonstrated to be highly effective and safe for the vast majority of people.<sup>[22]</sup> The COVID-19 pandemic has reached alarming proportions in Iraq, with thousands of new cases reported daily and hundreds of deaths reported weekly.<sup>[23]</sup> Iraqi government employed partial curfew in case of increasing COVID-19 cases, improved personal protective measures and announced for vaccines campaign.<sup>[24]</sup> In this situation, vaccines are the most effective way to combat COVID-19. Therefore, this study was conducted to investigate COVID-19 vaccine acceptance, hesitancy, and refusal, and associated factors among the Kurdish population.



**Table 3:** Reasons behind refusing or being hesitant toward COVID-19 vaccination ( $n=785$ )

Variables	Hesitant (%)	Refusing (%)	Total (%)
The time of building vaccine was short	52 (12.7)	59 (15.6)	111 (14.14)
Fear of vaccination needle	27 (6.6)	28 (7.4)	55 (7)
Vaccine adverse effects	184 (45)	189 (50.1)	373 (47.5)
Reinfection after vaccination	33 (8)	35 (9.3)	68 (8.7)
Others	81 (19.8)	97 (25.7)	178 (22.7)

$n$  (785) indicates sources of information for hesitant and refusing participants

**Figure 2:** Types of vaccine and COVID-19 vaccination intention

Our data demonstrate that of 1171 respondents, (33%) accepted the vaccine while the majority (32.7%) was hesitant and (34.8%) rejected the COVID-19 vaccines. The available research indicated that COVID-19 vaccinations have been accepted at varying rates in other parts of the world. For instance, the acceptance rate was 90% in China,<sup>[25]</sup> 76.5% in Canada,<sup>[26]</sup> (58%) to (69%) in the USA, and (55%) in Russia.<sup>[25,27,28]</sup> Furthermore, recent researches were following our findings, in a study conducted among the Middle Eastern population, a substantial percentage of people were hesitant (26.4%) or refused the COVID-19 vaccine (36.7%), according to our findings.<sup>[29]</sup> Furthermore, in neighboring countries including, Iraq.<sup>[30,31]</sup> As a general low COVID-19 coverage was reported in the Middle East countries during this study. This variation between countries could be attributed to several factors, namely COVID-19 prevalence and mortality rates in the local community, the economies of the countries, social and political conditions, education and public awareness, and the people's trust in their government and national health organizations.<sup>[26,32]</sup>

In terms of age and education level, there was a significant relationship ( $P < 0.01$ ) and ( $P < 0.03$ ) respectively, when compared to other variables such as gender and occupation. This was in line with other studies done in Iraq<sup>[33]</sup> and in Saudi Arabia,<sup>[34]</sup> while these findings were quite different from a study done in Canada.<sup>[35]</sup> In our results of binary regression analysis for accepting and rejecting vaccines, we found that there was no difference ( $P < 0.19$ ) between genders. Meta-analysis research found that men (58.3%) were more likely to get vaccinated.<sup>[36,37]</sup>

However, a strong relationship was revealed with middle-aged adults (ages 35–55 years) and health care workers compared to other occupations. Participants with higher educational levels, such as a Master's, Ph. D holders, showed strong relation ( $P < 0.001$ ). These results were following other studies in Iraq.<sup>[33]</sup> In Saudi Arabia<sup>[34]</sup> and Greek,<sup>[38]</sup> as evidenced by being a health care worker increases the willingness to get vaccinated.<sup>[39]</sup> On the other hand, other studies done in different parts of the world declared different findings.<sup>[30,40]</sup>

Importantly, we found that having chronic diseases and a history of vaccine refusal was not associated with COVID-19 vaccination intention in our study. Besides, losing a family member due to the COVID-19 was strongly associated with the COVID-19 vaccination. In contrast to the present study in a study done in Scotland, there was a higher intention to take the COVID-19 vaccine among those underlying medical conditions.<sup>[41]</sup> One reason could be due to that the majority of the participants were young and they lack chronic conditions in the present research. A study done in Saudi Arabia revealed that Participants were less likely to have an intention to be vaccinated if they had a history of vaccine refusal.<sup>[42]</sup> This contradicts the current result. Moreover, many studies during the COVID-19 pandemic observed a connection between COVID-19 and losing family members.<sup>[43,44]</sup> Concerning the main reasons for refusing or being hesitant about the COVID-19 vaccine were adverse effects of vaccines this is consistent with accumulating evidence that the main reason for not accepting COVID-19 vaccinations were adverse effects of vaccine.<sup>[38,44]</sup>

The present study found that participants' desire to receive or reject COVID-19 vaccination was closely similar to available vaccines (AstraZeneca, Pfizer, Sinopharm). One factor could be that the majority of people were hesitant or refused vaccination regardless of the type of vaccine. Another reason could be that social media plays a significant influence on vaccination intention. However, the Oxford-AstraZeneca COVID-19 vaccine, on the other hand, was perceived to be far less safe than the Pfizer-BioNTech vaccine, a distinction that was especially obvious among vaccine-hesitant people.<sup>[45]</sup> In research conducted in Egypt, the mRNA-based vaccine was found to be the most trusted.<sup>[31]</sup> The mechanism of action of mRNA vaccines was given more consideration by expert groups, resulting in a higher level of understanding and acceptance.<sup>[46]</sup>

## Strength and limitations

One of the study's strengths is the large sample size, which decreases the influence of existing bias. Another strong aspect of the present study is that at the time of the study three types of vaccine were available so that their intention for vaccination would be more accurate. This research has various limitations that should be mentioned. Firstly, because our research is cross-sectional, we can only provide you a snapshot of vaccination intentions at a certain point in time. Furthermore, because this is an online questionnaire survey, the samples are prone to recall and selection bias. As a result of the internet-based nature of the survey, the vast majority of respondents were young adults, with the elderly having less opportunity to participate than younger adults. The previous study has proven, however, that web-based research is a cost-effective approach for generating a sample that is representative of the entire population for a fraction of the expense.<sup>[47]</sup> Moreover, it has been suggested that as the worldwide number of Internet users grows, the sociodemographic features of web-based survey participants will resemble the broader population.<sup>[48]</sup>

## Conclusions

In the present study, more than half of the participants were hesitancy/resistance to take the COVID-19 vaccine. The vaccine's adverse effects and losing family members are the primary reason for the unwillingness to the vaccine. Following the conclusions of the study, a more comprehensive approach must be exhibited by all stakeholders to enhance trust in COVID-19 vaccines uptake as well as educational programs concerning health problems and how communities should respond to a health crisis.

## Authors' Declaration Statements

### Ethics approval and consent to participate

The ethical approval of the present study was obtained from the University of Duhok, College of Nursing. The author asked participants whether they agree to participate in this online survey at the beginning of the questionnaire. All participants' rights to privacy and secrecy were maintained.

### Availability of data and material

The data used in this study are available and will be provided by the corresponding author on a reasonable request.

### Competing interests

None.

### Funding

None.

## Authors Contributions

According to the corresponding author, all authors whose names were mentioned in the study contributed sufficiently to the data collection, design, review, and analysis. The final paper was approved by all authors.

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