



**Original Article**

# Coronavirus Disease 2019 Vaccine Hesitancy in the Kurdistan Region: A Cross-Sectional National Survey

Ahmad Khidir, K<sup>1</sup>\*

1. Animal Resource Department, College of Agricultural Engineering Sciences, University of Raparin, 46016 Qaladze, Kurdistan Region, Iraq

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Corresponding Author: kamal.ahmed@uor.edu.krd

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## Abstract

It has been a few months since the first batch of Coronavirus Disease 2019 (COVID-19) vaccines arrived in the Kurdistan region, and the priority was given to health workers at the forefront of the treatment of COVID-19 patients. The rollout is slow, and there is little evidence to suggest that the whole Kurdistan region is vaccinated anytime soon. This comprehensive and national survey was conducted to investigate the perception of the people of the Kurdistan region towards COVID-19 vaccine hesitancy. An adjusted valid and dependable questionnaire was deployed via social media platforms (Facebook and Viber) to invite participants aged 18 and over from the residents of the four provinces of the Kurdistan region. A total of 450 individuals participated in this study. The majority of the participants were male (54.4%) who were aged 26-40 years with bachelor's degrees (44.3%). Moreover, they were full-time employees (37.8%) with a household income of 0-\$5,000 (53.3%). They were the residence of urban regions (81.9%) and Sulaymaniyah province (87.7%). On the probability of getting a COVID-19 vaccine shot, the responses were very likely (26.7%), somewhat likely (24.9%), not likely (20%), and definitely not (28.4%). The vaccine hesitancy prevalence was high among individuals aged 26-40, students with low incomes, unemployed, and those from the suburban areas, while respondents with the least perceived threat to get infected with the COVID-19 in the next year had the highest level of vaccine hesitancy. It is evident that vaccine hesitancy is high, and multiple strategies across the Kurdistan region needed to be implemented to encourage people to get vaccinated; therefore, scientific communication is necessary with the help of mass media.

**Keywords:** COVID-19 vaccine, Vaccine hesitancy, Kurdistan region, Nationwide assessment

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## 1. Introduction

Coronavirus disease 2019 (COVID-19) first appeared in Wuhan China in December 2019. The disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spread globally to almost all countries of the world. By April 27, 2021, the virus has infected over 162 million people across the globe and has caused more than 3,374,052 deaths (1). Subsequently, the world health organization (WHO) in March 2020 declared that COVID-19 was a pandemic disease, and many countries worldwide implemented a

variety of precautionary measures to curb the spread of the virus, such as lockdowns, social distancing, mandating wearing masks, and quarantines (2). Despite implementing various measures to prevent the spread of the disease, in the autumn of 2020, the second wave of the coronavirus hit the European countries, which required restoring the measures eased earlier in the summer of 2020 (2). The Kurdistan region implemented the same preventative measures to tackle the virus. However, it was hit by the second wave of the coronavirus in March 2021, which made the

government and ministry of health order curfews and other previous preventive measures. It is expected that these strategies continue until herd immunity is achieved either by vaccination or the SARS-CoV-2 infection since COVID-19 transmission can be reduced to a minimum level by social distancing; accordingly, herd immunity can only be achieved by mass vaccination (2). To achieve this and eradicate the disease, many countries have begun to develop vaccines for the COVID-19, and several vaccines have been given emergency use by the WHO, such as the Pfizer/BioNTech, the SII/Covishield and AstraZeneca/AZD1222, the Janssen./Ad26.COV 2.S, the Moderna COVID-19 vaccine (mRNA 1273), and most recently Sinopharm COVID-19 (1). Two of the COVID-19 vaccines, namely Moderna (mRNA-1273) and Pfizer (BNT162b2), developed by American pharmaceutical companies have shown 90%-95% effectiveness (3, 4).

In the Kurdistan region, the ministry of health launched a campaign for COVID-19 vaccination via a website and an application named "KURDVAC" on March 4, 2021 (5). The ministry of health aims to vaccinate all citizens and has categorized the target population into three groups. The first group who received the vaccine included health practitioners, people aged 65 and over, essential workers, obese people, those with body mass index over 40, and individuals with immunodeficiencies. The second phase of the rollout target group was people aged over 50 and individuals with chronic diseases, and the third target group will be the public (6).

There have been several studies to know the public's view towards COVID-19 vaccination, as well as vaccine hesitancy (7). Vaccine hesitancy concerns are growing worldwide (8), and it can be defined as the refusal of vaccination or reluctance to get vaccinated against a disease, regardless of the safety and effectiveness of the vaccine (9). A global survey was conducted in 19 countries to assess the acceptance of the COVID-19 vaccine. The results showed that 71.5% of the participants would be either very likely or

somewhat likely to get the vaccine, while 48.1% of the cases responded that they would receive the vaccine if their employer asked them to do so (8). In other nationwide studies, vaccine hesitancy has shown different outcomes. Indonesia has shown high levels of acceptance for free vaccinations (10), and in China, the majority of participants intended to accept the COVID-19 vaccine (11); however, in France and Russia, there has been a high rate of vaccine hesitancy. The vaccine efficacy and safety were cited as the top reasons for the hesitancy, followed by the lack of information regarding eligibility, possible side effects, inconvenience, and lack of time (7).

There is no data about COVID-19 vaccine hesitancy in the Kurdistan region, and since the rollout of the vaccine, adverse effects experienced by few people who received the COVID-19 vaccines; moreover, misinformation is spread on social media, and conspiracy theories globally have drawn the attention of the people (12), including Kurdistan people. In addition, rapid vaccine development further heightened vaccine hesitancy (13), and other factors can determine vaccine hesitancy, such as socioeconomic status, gender, cultural factors, and religion (14). Considering all of these factors, to address vaccine hesitancy in the Kurdistan region, the government, public health practitioners, and the media must work and encourage vaccination. Accordingly, this study aimed to assess the national COVID-19 vaccine hesitancy in the Kurdistan region, Iraq.

## **2. Material and Methods**

### **2.1. Study Design**

This cross-sectional study was conducted in the Kurdistan region, Iraq, and the data collection took place from May 9 to May 16 to investigate the Kurdish peoples' perception towards COVID-19 vaccinations and their reasons for the vaccine hesitancy.

### **2.2. Sample Size and Sampling Procedure**

The sample was taken from social media users aged  $\geq 18$  years residing in the Kurdistan region, Iraq. The

sample size was calculated using the Cochran sampling technique for finite populations (15). Based on the total population ( $n \approx 6$  million), a margin error of 5%, and a confidence interval of 95%, minimum sample size was set to be 385; however, the data were collected from 465 respondents.

### 2.3. Questionnaire

A multi-item questionnaire was adapted and used via Google forms, and the survey was deployed via social media applications, such as Facebook and Viber. The link to the questionnaire was distributed to some community groups. The invitation letter that was sent to the participants explained the purpose of the study, and a total of 465 participants were recruited.

The questionnaire consisted of two sections. The first part included questions regarding vaccine hesitancy. The first question asked about the likelihood of getting a vaccine if it were available: "If COVID-19 vaccine was available, how likely is that you get the vaccine shot?" (very likely, somewhat likely, not likely, and definitely not). This question regarding vaccine hesitancy was the key dependent variable and outcome of the survey. The next two questions assessed the threat posed by COVID-19 in case of not getting vaccinated. These questions were: "If you do not get vaccinated by COVID-19 vaccine, how concerned are you that you could be infected with coronavirus in the next one year?" (very concerned, concerned, slightly concerned, and not concerned at all), and "If you decided to get the COVID-19 vaccine shot, which one would you prefer?" (Pfizer, AstraZeneca, Sinopharm, and whichever available). The final set of questions covered such demographic characteristics as gender, age group, level of education, current employment status, annual household income, area of residence, and province. The questionnaire was prepared in English, and it was then translated into Kurdish (Sorani). It is worth mentioning that the questionnaire was distributed in English and Kurdish.

### 2.4. Data Analysis

The collected data were analyzed in SPSS software (version 26; IBM Corp). Descriptive statistics were utilized to describe the participants' demographic characteristics. Furthermore, the Chi-square test was employed to compute the proportions of vaccine hesitancy and make comparisons across the groups. Responses were compared for various demographic characteristics by dichotomizing the variable as positive (very likely and somewhat likely) or negative attitudes (not likely and definitely not) toward a COVID-19 vaccine indicating the extent of vaccine hesitancy. A p-value less than 0.05 was considered statistically significant.

## 3. Results

### 3.1. Descriptive Statistics Analysis

Table 1 summarizes the demographic characteristics of the participants, as well as the likelihood of getting the vaccine, concern over getting COVID-19, and favorite COVID-19 vaccine. The majority of the respondents were male (54.4%) and were aged 26-40 years (49.4%). Moreover, they held bachelor's degrees (44.3%) and were full-time employees (37.8%). In addition, the participants had an annual household income of 0-\$5,000 (53.3%), and they were from the urban area of the Kurdistan region (81.9%) and Sulaymaniyah province (87.7%).

Regarding the question: "if the COVID-19 vaccine was available, how likely was that you got the vaccine shot", the responses were very likely (26.7%), somewhat likely (29.4%), not likely (20%), and definitely not (28.4). However, concerning the fears of getting infected with the COVID-19 in the next year in case of vaccine resistance, they responded very concerned (11.2%), concerned (18.3%), slightly concerned (27.5), and not concerned at all (43%). Considering the question of vaccine preference, for those who decided to get the vaccine, the responses were: Pfizer (51%), AstraZeneca (22.6%), Sinopharm (10.5), and whichever available (15.9%) (Table 2).

Table 1. Demographic characteristics

Variables	Number	Percent (%)
<b>Gender</b>		
Male	253	54.4
Female	212	45.6
<b>Age group</b>		
18-25 years	149	32.0
26-40 years	229	49.2
41-60 years	82	17.6
≥61 years	5	1.1
<b>Level of education</b>		
≤High school	40	8.6
Diploma	55	11.8
Bachelor's degree	206	44.3
Master's degree	112	24.1
PhD	51	11
Illiterate	1	0.2
<b>Current employment status</b>		
Full-time	176	37.8
Part-time	127	27.3
Not-employed	37	8
Student	125	26.9
<b>Annual household income</b>		
0-\$5,000	248	53.3
\$5,001-10,000	131	28.2
\$10,001-15,000	58	12.5
\$15,001-19,999	4	0.9
≥\$20,000	23	4.9
<b>Area of residence</b>		
Rural	14	3
Urban	381	81.9
Suburban	70	15.1
<b>Province</b>		
Duhok	8	1.7
Erbil	46	9.9
Sulaymaniyah	408	87.7
Halabja	3	0.6

**Table 2.** Univariate analysis, sociodemographic characteristics, COVID-19 threat, and vaccine hesitancy

Variable	Total sample n (%)	Likely of getting COVID-19 vaccine		P-value
		Very likely/somewhat likely n (%)	Not likely/definitely not n (%)	
All participants	465	240 (51.6)	225 (48.4)	
<b>Gender</b>				0.582
Male	253 (54.4)	132 (52.2)	121 (47.8)	
Female	212 (45.6)	108 (50.9)	104 (49.1)	
<b>Age group</b>				0.000
18-25 years	149 (32)	56 (37.6)	93 (62.4)	
26-40 years	229 (49.2)	130 (56.8)	99 (43.2)	
41-60 years	82 (17.6)	49 (59.8)	33 (40.2)	
≥61 years	5 (1.1)	5 (100)	0 (0.)	
<b>Level of education</b>				0.001
≤High school	40 (8.6)	17 (42.5)	23 (57.5)	
Diploma	55 (11.8)	28 (50.9)	27 (49.1)	
Bachelor's degree	206 (44.3)	97 (47.1)	109 (52.9)	
Master's degree	112 (24.1)	63 (56.25)	49 (43.75)	
PhD	51 (11)	34 (66.67)	17 (33.33)	
Illiterate	1 (0.2)	1 (100)	0 (0.00)	
<b>Current employment status</b>				0.000
Full-time	176 (37.8)	105 (59.66)	71 (40.34)	
Part-time	127 (27.3)	70 (55.1)	57 (44.9)	
Not-employed	37 (8)	17 (45.9)	20 (54.1)	
Student	125 (26.9)	48 (38.4)	77 (61.6)	
<b>Annual household income</b>				0.779
0-\$5000	248 (53.3)	128 (51.6)	120 (48.4)	
\$5,001-10,000	131 (28.2)	66 (50.4)	65 (49.6)	
\$10,001-15,000	58 (12.5)	34 (58.6)	24 (41.4)	
\$15,001-19,999	4 (0.9)	2 (50)	2 (50)	
≥\$20,000	23 (4.9)	10 (43.5)	13 (56.5)	
<b>Area of residence</b>				0.020
Rural	14 (3)	9 (64.3)	5 (35.7)	
Urban	381 (81.9)	208 (54.6)	173 (45.4)	
Suburban	70 (15.1)	23 (32.9)	47 (67.1)	
<b>Province</b>				0.317
Duhok	8 (1.7)	6 (75)	2 (25)	
Erbil	46 (9.9)	26 (56.5)	20 (43.5)	
Sulaymaniyah	408 (87.7)	207 (50.7)	201 (49.3)	
Halabja	3 (0.6)	1 (33.3)	2 (66.7)	
<b>If you do not get vaccinated by COVID-19 vaccine, how concerned are you that you could get infected with coronavirus in the next one year?</b>				0.000
Very concerned	52 (11.2)	51 (98)	1 (2)	
Concerned	85 (18.3)	75 (88.2)	10 (11.8)	
Slightly concerned	128 (27.5)	72 (56.25)	56 (43.75)	
Not concerned at all	200 (43)	42 (21)	158 (79)	
<b>If you decided to get the COVID-19 vaccine shot, which one would you prefer?</b>				0.218
Pfizer	237 (51)	116 (50)	121 (51)	
AstraZeneca	105 (22.5)	63 (60)	42 (40)	
Sinopharm	49 (10.5)	26 (53)	23 (47)	
Whichever available	74 (16)	35 (47.3)	39 (52.7)	

### 3.2. Univariate Analysis

Univariate analysis was performed to compare demographic characteristics with the vaccine hesitancy variable to find out the relationships between the groups and vaccine hesitancy. Regarding the sociodemographic characteristics, it was found that vaccine hesitancy towards the COVID-19 vaccine was highly prevalent among participants aged 26-40 years, individuals with lower education, unemployed, students, and people from suburban areas. Moreover, people who were least concerned about the likelihood of getting infected with COVID-19 in the next year had the highest rate of vaccine hesitancy (Table 2).

### 4. Discussion

This comprehensive cross-sectional national study found out that vaccine hesitancy in the Kurdistan region is high (48.4%). Since March 4, a vaccination campaign has been launched by the ministry of health; however, recently, in a news conference, the minister of health of the Kurdistan region said that the number of vaccinated people until May 24, 2021, was 100,000 people (2.2% of the population) (16). This figure is lower than that required to end COVID-19 across the country by vaccinating most of the people to achieve herd immunity. As a result, this survey was conducted to assess the Kurdistan region people's perception towards COVID-19 vaccines.

Since there is no available data about the previous vaccine hesitancy rate, this study is the first of its kind to assess COVID-19 vaccine hesitancy in the Kurdistan region, Iraq. However, vaccine hesitancy is different from country to country, and in a global survey conducted in June 2020, it was revealed that 80% of the participants from three different countries (China, Korea, and Singapore) were likely to get the COVID-19 vaccine (8).

Vaccine resistance in the United Kingdom and Ireland have been reported to be 31%, and 35%, respectively (17). In the US, 50% of the citizens showed a desire to receive the COVID-19 vaccine; moreover, 20% and 30% of the residents showed

resistance to the vaccine and were not certain, respectively. Another study in the US has shown different outcomes. Accordingly, 52%, 27%, 15%, and 7% of the respondents were very likely, somewhat likely, not likely, and definitely not likely to receive the vaccine (18). On the other hand, a study in Japan reported a high willingness to receive the vaccine (65%) (19), and Indonesia reported even a very high vaccine acceptance at 93.3% (10).

In the present study, higher vaccine hesitancy was found among the younger participants aged 18-25 (62.4%). This could be explained by the young people's belief that they think they are less vulnerable to COVID-19, compared to old people, while elderly people aged  $\geq 61$  years showed very high vaccine willingness (100%). Overall, gender was non-significant to vaccine hesitancy; however, female resistance to vaccination was higher, and 49.1% of the female respondents reported that they were not likely/definitely not likely to receive the vaccine, compared to male participants (47.8%). Our findings are in line with the results of a study conducted in Japan where women stated very high vaccine hesitancy, compared to men (19). In addition, vaccine willingness was lower among American women (20). However, a global survey revealed that vaccine acceptance was lower among the male participants (8), and another study in Bangladesh showed a lower vaccine hesitancy among the women participants (21).

Unemployed people and individuals with high school education or lower showed vaccine hesitancy towards COVID-19 vaccination in the Kurdistan region. In agreement with our study, a global survey postulated that people with lower education and low income were less likely to receive the COVID-19 vaccine (8). In addition, unemployed and individuals with lower education levels in both the US and Saudi Arabia reported higher levels of vaccine hesitancy (20-22). In contrast to our findings, in another study, unemployed people were more likely to receive the COVID-19 vaccine (23). Lockdowns and COVID-19 restrictions inflicted damage on the economy of all countries;

therefore, unemployed people may try to receive the vaccine and return to work since vaccination facilitates return to employment. However, our study found that people with a higher income  $\geq$  \$20,000 were not likely/definitely not to receive the COVID-19 vaccine. This result is not consistent with the findings of another study (8).

People who lived in the suburban area of the Kurdistan region reported a very high vaccine hesitancy (67.1%). There are many hypotheses to explain the reasons, including the lack of health centers in these suburban areas that leads to an unwillingness to go to the town center to receive the vaccine, mistrust in the government health system, less interaction with health professionals, the efficacy of the vaccine, and misinformation on social media platforms.

It is reported that vaccine effectiveness change from one country to another and race to race (24). Since there have not been any COVID-19 vaccine clinical trials in the Kurdistan region to find out the efficacy and safety of the vaccines available (Pfizer, AstraZeneca, Sinopharm, or whichever available), participants in this study were asked which vaccine they would choose. In total, 52.7% of the participants reported that they would receive whichever vaccine available; however, participants chose the Pfizer vaccine (51%) over AstraZeneca (40%) due to the more efficacy and safety. Reports of blood clotting related to the AstraZeneca vaccine have made people choose the American Pfizer. In another study, people reported that the hesitancy was due to the vaccine efficacy (25), and others were skeptical of the safety and lasting immunity of the Pfizer vaccine (26).

Finally, reluctance to vaccination was another finding in this study, and 43% of the respondents were not concerned at all if they could get infected with the COVID-19 virus or not in the next year. In support of this finding, a systemic review study has found out that the perceived risk of getting the SARS-CoV-2 is one of the strongest predictors of COVID-19 vaccine hesitancy and/or acceptance (27).

This study was subjected to several limitations, including the complex nature of the vaccine hesitancy and its changes over time from one location to another. Another limitation is the community's perceived behavioral nature (28, 29). In addition, social media and traditional media influence on people's perception can be one of the major predictors of vaccine hesitancy or vaccine acceptance (30). Finally, the sample was limited in nature as only digitally literate and those with the knowledge of the questionnaire participated in the survey. Despite all of these, this study is a piece of baseline evidence for vaccine hesitancy in the Kurdistan region, Iraq.

## 5. Conclusion

In this community-based assessment survey on COVID-19 vaccine hesitancy in the Kurdistan region, Iraq, it was found out that nearly half of the participants were hesitant to receive the vaccine. Vaccine hesitancy was varied based on sociodemographic characteristics, such as age (26-45 years), unemployment, lower education, suburban residency, and current employment status (being a student). The factors contributing to vaccine hesitancy include mistrust in the health system and the lack of awareness. Further research is needed to understand vaccine hesitancy. Furthermore, multiple policies and educational interventions are required to be implemented to solve these issues and promote vaccination.

## Authors' Contribution

Study concept and design: K. A. K

Acquisition of data: K. A. K

Analysis and interpretation of data: K. A. K

Drafting of the manuscript: K. A. K

Critical revision of the manuscript for important intellectual content: K. A. K

Statistical analysis: K. A. K

Administrative, technical, and material support: K. A. K.

### Conflict of Interest

The authors declare that they have no conflict of interest.

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### Data Availability Statement

The data presented in this study are available upon request.

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