Al-Nahrain Journal of Science
ANJS, Vol.28(2), June, 2025, pp. 92-99

Associations between COVID-19 Vaccination Hesitancy, Related Barriers and Some Sociodemographic Factors in Duhok City, Iraq

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Article's Information

Received: 04.08.2024
Accepted: 08.09.2024
Published: 15.06.2025

Keywords:
COVID-19 Vaccination
Hesitancy
Barriers
Sociodemographic factors
Duhok Province
Iraq

Abstract

The most crucial public health achievement of humanity is vaccination. Conversely, a significant portion of the population remains hesitant regarding vaccines. The purpose of the study is to determine the prevalence and the reasons that affect the rate of vaccination against COVID-19, which is caused by virus named SARS-CoV-2, in Duhok City. A cross-sectional survey was conducted online from (November to January 2022), about 2015 participants were enrolled. The data were collected through a designated online questionnaire using Google Forms. The study results showed that females were more accessible to the vaccine (50.8%) than males (44.5%). More than half of the participants (n= 1147, 56.9%) were aged between 20–29 years. The majority of participants were from Duhok (n= 799, 39.7%), followed by Zakho (n= 691, 34.3%), and fewer from Bardarash (n= 30, 1.5%). Moreover, the study revealed that the acceptance of the vaccine was more associated with young people, female gender, those with high educational levels, healthcare workers, and residents of Batifa district. To conclude, more than half of enrolled research individuals rejected to have the vaccine for COVID-19, Thus, we recommend integrating health and psychological care into vaccination plans to help increase the uptake rate during potential subsequent pandemics. Also, Psychologists can provide awareness messages, counselling seminars, online mentoring, or telemental health outreach. Furthermore, Governments must progress announcements also raising confidence concerning to health problems through the dispersion of scientific culture and improve educational programs in society.

http://doi.org/10.22401/ANJS.28.2.08

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1. Introduction

The (COVID-19) coronavirus disease 2019 pandemic had a significant influence on most fundamentals of the population's daily life globally [1]. In December 2019, in Hubei province of Wuhan, the initial case regarding COVID-19 illness from an indefinite source was recognized, and then quickly spread throughout China. The pathogen coronavirus SARS 2 abbreviated as (SARS-CoV-2) was identified as a severe acute respiratory syndrome, which was not formerly realized in humans [2]. This virus was belonging to the ß group of coronaviruses. This novel virus named by the researchers of Chinese as 2019 novel coronavirus (2019-nCov) or Wuhan coronavirus. Moreover, the International Committee on Taxonomy of Viruses (ICTV) called the virus as SARS-CoV-2 and the name of illness as COVID-19 [3]. The World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) a public health emergency of international concern. The signs and symptoms of this virus including fatigue, pain in the chest, high body temperature, nausea, and others. Also, during chronic infection, other severe symptoms may occur such as arrhythmia, acute respiratory stress syndrome, and shock. Furthermore, transmissions are occurred among individuals by sneezing, touching, coughing, etc. [4]. Nevertheless, other great events generally occurred among patients of COVID-19 such as arterial and venous thromboembolism, neurologic diseases,

increased blood pressure, diabetes mellitus and kidney disorders [4,5]. The most remarkable achievement during the 1990s of public health are vaccinations [6]. Vaccination programs can lead to herd immunity (population immunity) without requiring a considerable proportion of the population to be infected [7]. In addition, the efficacy of the (COVID-19) vaccination to overcome the pandemic is contingent on controlling vaccination among the population. Proper uptake of the COVID-19 vaccine guarantees protection for the vaccinated individuals and generates herd immunity to stop the pandemic, thereby protecting all individuals [8]. Thus, high vaccination coverage is the key to controlling the COVID-19 pandemic. In a while, the most notable and effective way to overcome and reduce the rate of infectious diseases by the medical community and healthcare authorities is vaccination, also, the impact and effects of the vaccine depend on the individual's desire to be vaccinated. This desire may have been negatively affected by worries and doubts that exist in the community regarding the appropriateness and safety of vaccines. That is why this condition is occasionally identified as vaccine hesitancy [8]. It has been revealed that prompt competition to generate COVID-19 vaccines will not stop the pandemic infection unless there is overall acceptance by public to get hold of the vaccine. Consequently, the hesitancy of COVID-19 vaccination has been researched densely since and before the availability of early-stage vaccines, with a high desire to be vaccinated among various communities [9]. In Iraq, vaccination started on May 10, 2021, concerning COVID-19. Three types of COVID-19 vaccines have been accepted, called (Sinopharm, Pfizer/BioNTech, and Oxford-AstraZeneca) [10].

The main purposes of this research are to investigate the prevalence rate of accepting and rejecting/hesitancy of COVID-19 vaccination, targeting the individuals living in different areas around Duhok province, subsequent administration and availability of the vaccine. Alongside, explore the factors and different barriers affecting any hesitancy in receiving these vaccines. The results of this study will help us in spreading scientific and health awareness among our society, and developing educational programs to provide vaccine recommendations, thus increasing the vaccination rate and reducing the number of infected people from infectious diseases.

2. Materials and Methods

2.1. Study design

A randomized cross-sectional study design was conducted in Duhok province/Iraq. An online special questionnaire sheet was designed using Google Forms tools, this cross-sectional survey was conducted among the general population in Duhok province of both genders who are aged below and more than 16 years old. It was performed during the period from 2 November to 2 January 2022. Individuals from Duhok province and their districts were requested through an online questionnaire to enroll in this study. To obtain a large number of participants, the survey was shared and posted on various social media sites, pages, and communication groups (e.g., Instagram, Facebook, Snapchat, Telegram and WhatsApp). Before participating in the survey, individuals were allowed to decline participation in the questionnaire. To prevent missing entries, the program permitted enrolled participants to move through the screens only when responses were given.

2.2. Data collection setting

To connect with the intended audience, the individuals were invited from all 8 districts of Duhok province: (Duhok, Zakho, Semel, Akre, Amedi, Shekhan, Bardarash, Batifa) (Figure 1).

Figure 1. Duhok Province Map [11]

2.3. Data analysis

The data were collected using Google Forms and then exported into a Microsoft Excel sheet, which was imported into (SPSS) software program (version 25) for evaluation. The crossing between different variables related to hesitancy were calculated by using percentages and a table of frequencies.

3. Results

The total number of respondents was (2015), Female members predominated in the study sample (n= 1120, 55.6%), and males (n= 895, 44.4%). More than half of the participants (n= 1147, 56.9%) were aged between 20–29 years, and (n= 754, 37.4%) were aged between 16–19 years, which means: Most of the participants were young people. 195 participants (9.7%) reported chronic diseases. Most of the participants (n= 1389, 68.9%) who started filling out the questionnaire did not receive the COVID-19 vaccines. Those who received the vaccination (the first dose or both) were among those who did not develop any side effects after vaccination (n= 289, 39%), 345 of the participants (46.6%) had mild side effects, and 107 of the participants (14.4%) had severe side effects. Being a healthcare worker (HCW) was reported by 295 participants (14.6%). 1074 participants (53.3%) had scientific information about COVID-19 virus and vaccines. The majority of the participants in the study had an academic degree, and between them most of the enrolled individuals had a diploma and a bachelor's degree or were non graduates (n= 1209, 60%), high school (n= 465, 23.1%), middle school (n= 250, 12.4%), no educational levels (n= 76, 3.8%), and participants who had Master and PhD degrees were the least participating in this study (n= 15, 0.7%). The majority of participants were from Duhok (n= 799, 39.7%), followed by Zakho (n= 691, 34.3%), and fewer from Bardarash (n= 30, 1.5%). The study found that 609 participants (30.2%) were infected with the COVID-19 virus. 617 of the participants (30.6%) were not sure if they had reduced the disease. Among the 600 participants who reported testing for COVID-19, nearly half of the participants (n= 301, 50.2%) with positive test results. The full characteristics of the participants are revealed in (Table 1,2). Participants from Batifa district displayed the highest desire for vaccination (59.3%), and those who showed the highest hesitancy rate are individuals from the Shekhan district (34.4%), while Bardarash district's residents showed the highest rejection rate (33.3%) to receive COVID-19 vaccines. Also, there are clear differences between accepting and rejecting/ hesitation of vaccinations between males and females. Males were more resistant to the vaccine (44.5%), whereas females were more receptive to the vaccine (50.8%). Besides, people under the age 16, those who had chronic disease, those not sure to have COVID-19, not HCW, Female gender, Lower level of education, and people who do not have scientific information were more hesitant regarding the vaccine than others. Alternatively, the study revealed that the acceptance of the vaccine was more associated with young people, the female gender, those with high academic and educational level, healthcare workers, and residents of Batifa district (Tables 3 and 4). Participants provided 16 reasons in response to the questions relating barriers that make them hesitant to get vaccinated. They included 474 participants who accepted the vaccine but chose one or more barriers to hesitation. The first and most common reason that made the participants hesitant to take the vaccine was their lack of confidence in the vaccine due to the propaganda and the spread of allegations and rumors among people (n= 384, 19.1%), which made them uninformed of whether they were receiving the vaccine or not, and whether it was safe or harmful. This result indicates that there are a lot of people who suffer from tales and unscientific facts in society. The other most common barriers: "Vaccines were produced quickly" - (n= 377, 18.7%), "I'm afraid of unknown serious side effects" - (n= 298, 14.8%), "Vaccines were produced to serve medical companies" - (n= 282, 14%), "I have heard about vaccine-related deaths" - (n= 254, 12.6%), and "vaccine is a conspiracy like COVID-19" - (n= 214, 10.6%). While the least common barrier to acceptance "I have a chronic disease" – (n= 52, 2.6%). All 16 hesitancy barriers and the percentage of each are shown in (Figure 2). Alternatively, half of the participants (n= 1047, 52%) believed that there is a need for vaccination for all members of society, and some other participants believed that some society members need to be vaccinated (n= 684, 33.9%), the rest stated that no one needed to be vaccinated (n= 284, 14.1%). Furthermore, regarding the government's policy towards vaccination in society, half of the participants (n= 1023, 50.8%) believed that all members of society are free to receive the vaccine, and several participants declared that "It should be mandatory for everyone" - (n= 594, 29.5%), and some of them declared "It should be mandatory for specific group in society who are at risk, such as healthcare workers or merchants" - (n= 291, 14.4%), and others believed "No one should receive the vaccine" - (n= 107, 5.3%) (Table 5).

Table 1. List of surveyed participants of COVID-19 vaccination choices in different locations in Duhok Province (n=2015)

Locations	No	Not sure	Will wait for others	Depending on type	Yes
	N (%)	N (%)	N (%)	N (%)	N (%)
Duhok	189 (23.6)	95 (12)	121 (15.1)	64 (8)	330 (41.3)
Zakho	176 (25.5)	78 (11.3)	125 (18.1)	58 (8.4)	254 (36.7)
Semel	32 (20.2)	20 (12.7)	28 (17.7)	11 (7)	67 (42.4)
Akre	36 (29.5)	14 (11.5)	20 (16.4)	6 (4.9)	46 (37.7)
Amedi	25 (27.2)	3 (3.3)	13 (14.1)	3 (3.3)	48 (52.1)
Shekhan	11 (17.2)	13 (20.3)	9 (14.1)	2 (3.1)	29 (45.3)
Bardarash	10 (33.3)	1 (3.3)	3 (10)	2 (6.7)	14 (46.7)
Batifa	10 (17)	6 (10.2)	8 (13.5)	4 (6.8)	31 (52.5)

Table 2. Vaccine intentions according to sociodemographic characteristics

Variables	Levels	No	Not sure	Will wait for others	Depending on the type	Yes
		N (%)	N (%)	N (%)	N (%)	N (%)
Age	Below 16	12 (26.1)	6 (13)	11 (23.9)	3 (6.5)	14 (30.4)
	16-19	197 (26.1)	87 (11.5)	133 (17.6)	58 (7.7)	279 (37)
	20-29	260 (22.7)	129 (11.2)	173 (15.1)	86 (7.5)	499 (43.5)
	30-39	16 (27.6)	7 (12.1)	9 (15.5)	1 (1.7)	25 (43.1)
	40-49	2 (50)	0 (0)	0 (0)	1 (25)	1 (25)
	over 50	2 (33.3)	1 (16.7)	1 (16.7)	1 (16.7)	1 (16.7)
Chronic diseases	No	430 (23.6)	215 (12)	285 (15.6)	136 (7.4)	754 (41.4)
	Yes	59 (31)	14 (7.4)	42 (22.1)	14 (7.4)	61 (32.1)
Had COVID	No	212 (26.9)	75 (9.5)	107 (13.6)	61 (7.7)	334 (42.3)
	Not sure	138 (22.4)	91 (14.7)	126 (20.4)	41 (6.7)	221 (35.8)
	Yes	139 (22.8)	64 (10.5)	94 (15.4)	48 (8)	264 (43.3)
Job	HCW	58 (19.7)	25 (8.5)	48 (16.3)	27 (9.1)	137 (46.4)
	Not HCW	431 (25.1)	205 (11.9)	279 (16.2)	123 (7.1)	682 (39.7)
Gender	Male	262 (29.3)	86 (9.7)	148 (16.5)	54 (6)	345 (38.5)
	Female	227 (20.3)	144 (12.9)	179 (16)	96 (8.5)	474 (42.3)
Academic Education	Higher education	251 (20.5)	142 (11.6)	188 (15.4)	98 (8)	545 (44.5)
	No and Lower education	238 (30.1)	88 (11.1)	139 (17.6)	52 (6.6)	274 (34.6)
Scientific Information	No	255 (27.1)	128 (13.6)	154 (16.3)	54 (5.8)	350 (37.2)
	Yes	234 (21.8)	102 (9.5)	173 (16.1)	96 (8.9)	469 (43.7)

Table 3. Vaccine acceptance, hesitancy/rejection percentage, according to geographical area in Duhok province (n=2015)

Geographical area	Rejecting N (%)	Hesitancy N (%)	Acceptance N (%)
Duhok	189 (23.6)	216 (27.1)	394 (49.3)
Zakho	176 (25.5)	203 (29.4)	312 (45.2)
Semel	32 (20.2)	48 (30.4)	78 (49.4)
Akre	36 (29.5)	34 (27.9)	52 (42.6)
Amedi	25 (27.2)	16 (17.4)	51 (55.4)
Shekhan	11 (17.2)	22 (34.4)	31 (48.4)
Bardarash	10 (33.3)	4 (13.3)	16 (53.3)
Batifa	10 (17)	14 (23.7)	35 (59.3)

Table 4. Vaccine acceptance, hesitancy/ rejection percentage, according to sociodemographic characteristics.

Variables	Levels	Rejecting N (%)	Hesitancy N (%)	Acceptance N (%)
Age	Below 16	12 (26.1)	17 (37)	17 (36.9)
	16-19	197 (26.1)	220 (29.1)	337 (44.7)
	20-29	260 (22.7)	302 (26.3)	585 (51)
	30-39	16 (27.6)	16 (27.6)	26 (44.8)
	40-49	2 (50)	0 (0)	2 (50)
	over 50	2 (33.3)	2 (33.4)	2 (33.4)
Chronic diseases	No	430 (23.6)	500 (27.6)	890 (48.8)
	Yes	59 (31)	56 (29.5)	75 (39.5)
Had COVID	No	212 (26.9)	182 (23.1)	395 (50)
	Not sure	138 (22.4)	217 (35.1)	262 (42.5)
	Yes	139 (22.8)	158 (25.9)	312 (51.3)
Job	HCW	58 (19.7)	73 (24.8)	164 (55.5)
	Not HCW	431 (25.1)	484 (28.1)	805 (46.8)
Gender	Male	262 (29.3)	234 (26.2)	399 (44.5)
	Female	227 (20.3)	323 (28.9)	570 (50.8)
Academic Education	Higher education	251 (20.5)	330 (27)	643 (52.5)
	No and Lower education	238 (30.1)	227 (28.7)	326 (41.2)
Scientific Information	No	255 (27.1)	282 (29.9)	404 (43)
	Yes	234 (21.8)	275 (25.6)	565 (52.6)

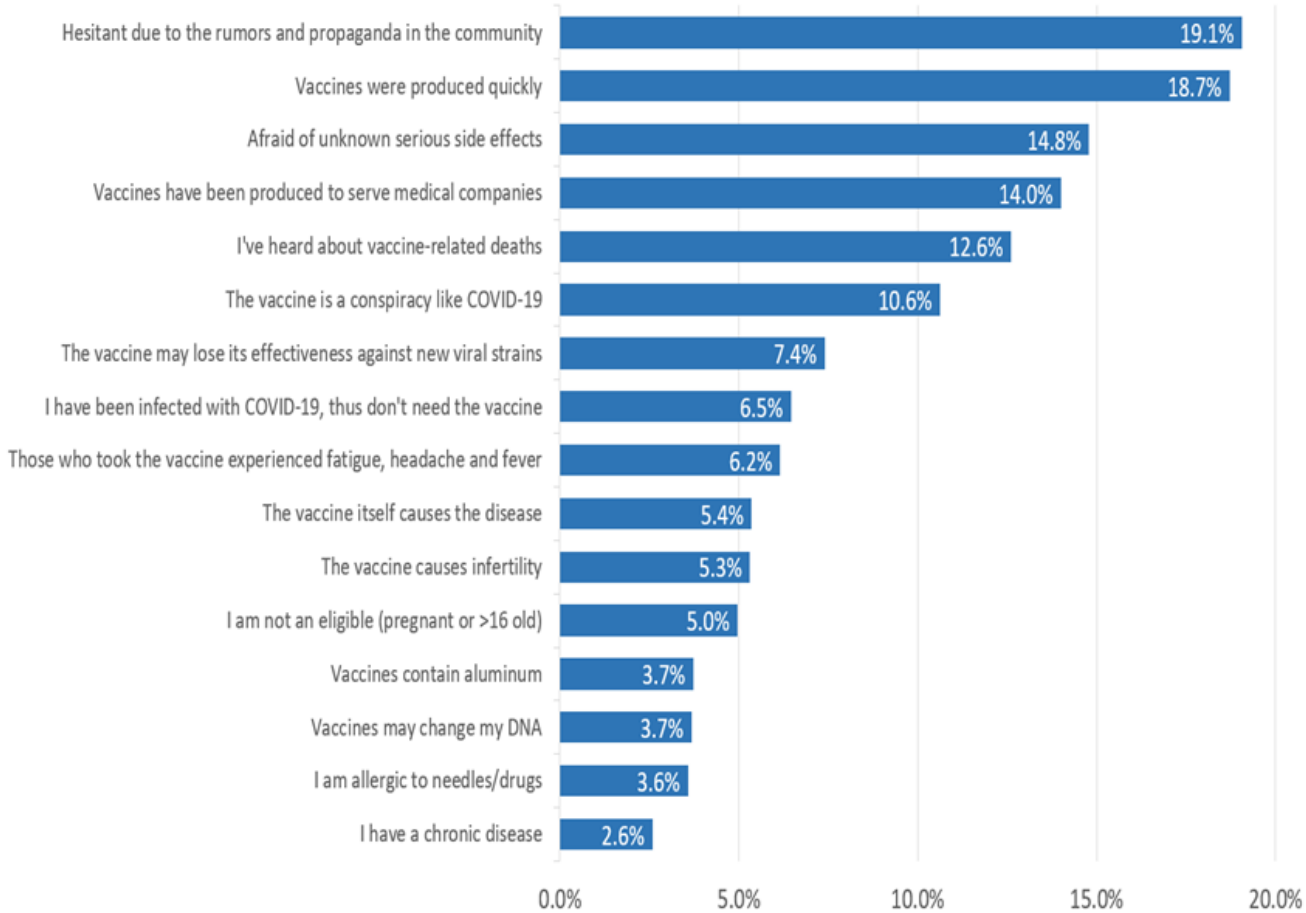

Figure 2. Sixteen different barriers to accepting COVID-19 vaccines among participants (n= 2015), and percentage of each barrier

Table 5. Participants' opinions on vaccination-related policies and needs (n=2015)

Questions	Answers	N (%)
Who needs to be vaccinated?	Everyone	1047 (52)
	Some society members	684 (33.9)
	No one	284 (14.1)
Government's policy towards vaccination	All members of society are free to receive the vaccine	1023 (50.8)
	It should be mandatory for everyone	594 (29.5)
	It should be mandatory for specific group in society who are at risk	291 (14.4)
	No one should receive the vaccine	107 (5.3)

4. Discussion

The World Health Organization (WHO) considers reluctance or refusal to vaccinate despite the availability of vaccines as one of the ten most common threats to global health [12]. Most societies suffer from this problem. For this reason, the World Health Organization, during the pandemic of COVID-19, suggested that all nations must attempt to protect the population by immunization [13]. Throughout the study, 2015 participants responded to the survey, almost half of them agreed to be vaccinated (n= 969, 48%), while 489 participants (24.3%) completely refused vaccination, and more than a quarter of the participants (n= 557, 27.7%) hesitated to get vaccinated. This may be due to the misunderstanding of the SARS Covid-19 and their different vaccine types [14]. The study presented a high rate of vaccination acceptance, and the hesitancy and rejection rates decreased significantly compared to previous studies in the Kurdistan Regional Government (KRG) and Iraq. Tahir *et al.* [14] stated a (32.7%) hesitancy rate and (34.8%) rejection rate for COVID-19 vaccines, as is the case with most other studies [15,16]. Regarding educational level, age, and gender, there was a clear correlation between age, gender, and academic background with vaccine hesitancy. The study exhibited a higher vaccine hesitancy among participants under the age of 16 (63.1%), and there was no clear differentiation among other ages. Furthermore, females are more hesitant to get the vaccine (28.9%) than males (26.2%), this result is agreed with the study achieved by (Qunaibi, *et al.*; Tahir, *et al.*; Ahmad Khidir) [9],[14],[17], however, Tahir *et al.*; Shareef *et al.* [18],[19] states the equal rate among both genders. The present consequences indicated that individuals with higher education degrees had higher acceptance (52.2%) than those with low education degrees (41.2%). This is important to consider because university and college programs often educate students, in at least some capacity, on ways to assess the validity of sources and identify fake news [20]. Additionally, the outcomes are reaching agreement with the study of Shareef *et al.* 19 who reported a high acceptance rate (56.2%) among the Iraqi general population. As in many other studies implemented by (Ahmad Khidir; Malik, *et al.*) [17], [21]. In contrast, there is a study that reported higher rates of vaccine acceptance among individuals with a lower level of education [22]. Conversely, the acceptance rate was most common in a young category, and healthcare workers. During the study (44%) of healthcare workers who participated in the study had received the COVID-19 vaccine, and (44.5%) were hesitant to receive a vaccine for COVID-19. Among 295 healthcare workers 103 of them chose no reason for hesitation to COVID-19 vaccines, and of the 192 healthcare workers who chose at least one reason for hesitation, most of them (33.3%) said: "Vaccine production was rushed". Whereas there is a study conducted in Duhok Governorate among 1704 healthcare workers, the study showed that the most common reason for hesitation among them was: "concern about possible side effects" (41.4% of responders) [23]. While, in another study conducted on Arabic speakers' healthcare workers in Arabic and non-Arab countries, it indicated that only (26.7%) healthcare workers accepted vaccination. Most of them (58%) said: "(I am afraid of the side effects of the vaccine will develop, other than what has been disclosed)" [24]. Respondents with no scientific knowledge about vaccinations and viruses showed increased hesitancy. Furthermore, participants with a chronic disease had a lower acceptance rate (39.5%), compared to those without a chronic disease (48.8%). In compare, there are some studies showing that people with chronic diseases are more interested to vaccination [24,25]. The most common reason among participants for vaccine hesitancy was the spread of gossips, propaganda, and misinformation in the society

about COVID-19 virus and vaccines. The problem of misinformation is common to many other societies and is a serious problem [15]. While Qunaibi and their colleague showed in their study that the most common reason for hesitation among all Arab countries is: "their fear of unknown side effects" [24].

4.1. Strength and limitation

One of the most important strengths of this study is that the sample size which may have an effect in reducing selection bias in the study. Moreover, at the time of published survey, coronavirus vaccines were available and identified in the area, and some people had already begun receiving vaccines. Correspondingly, this study approaches with some limitations. Initially, the questionnaire was conducted online through social media. Since it is an online questionnaire; there was no direct confrontation with the participants, which affected decreasing the number of elderly and inactive participants on social media. Afterward, most of the participants were academics and students or holders of higher degrees, this may impact the generalizability of the sample. After that, the questionnaire published at a time when misinformation about coronavirus vaccines were dispersal on social media, and when the government imposed the vaccine on a specific group in society, which led to hesitation by many people when filling out the questionnaire.

5. Conclusion

This study explored that nearly half of the participants from Duhok province were hesitant regarding to be vaccinated against COVID-19. The most common reason among them for hesitation was the spread of deceptive news in society, which indicates that the society suffers from the spread of unscientific and untruthful information among individuals. Essential health facilities and routine vaccination programs are only enhanced by vaccination activities or national operations of vaccination. This indicates the importance of spreading scientific culture and improve educational programs in the society concerning health problems. As well, it is the responsibility of the government and the Ministry of Health. Besides, the authorities should prohibit people who spread unscientific and artificial information in the society on social media. Furthermore, multiple educational strategies and programs are necessary to reduce vaccine hesitancy and encourage vaccination. Finally, more studies are needed to understand vaccine hesitancy in general, because it could be possible that people's opinions about vaccination may have changed.

Acknowledgments

We truly value the participation of all those who taking the time spent answer our online survey.

Conflict of interest: "There is no conflict of interest for this paper."

Funding: No fund is received for this research.

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