

ORIGINAL ARTICLE

Acceptability of Covid-19 Vaccines and the Associated Factors That Influence the Decisions of Healthcare Workers in Jordan

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ABSTRACT

Introduction: This study examined the factors that influence healthcare workers' decisions regarding COVID-19 vaccines' acceptability in Jordan. It also examined the impact of perceived risks of the vaccine on healthcare workers' decisions toward accepting it. **Methods:** Jordanian healthcare workers in governmental and private hospitals completed a cross-sectional online questionnaire. **Results:** A total of 904 respondents (age, 35.04 ± 9.07 years) completed the survey. The results indicate that most participants (88.9%) were at risk of contracting COVID-19, and many (51.4%) were afraid of contracting it. Moreover, 48.3% of healthcare professionals stated they would get vaccinated against COVID-19. Furthermore, most of the healthcare workers in this study perceived the vaccine as neither safe nor effective and that it could have serious side effects. At last, in terms of afraid of contracting COVID-19, the gender of the healthcare worker and his/her profession was identified to be the most influential factors in the decision to accept the vaccine. **Conclusion:** Our findings emphasize the ongoing need for government agencies to provide accurate and consistent information that is essential in developing trust in the vaccination program. Nurses can lead campaigns to inform the healthcare workers about the efficacy, safety, and the impact of COVID-19 vaccine in limiting the spread of this pandemic among them. We recommend that nursing council lead these efforts to improve knowledge about the vaccine and its impact on the safety of the healthcare workers and the public.

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INTRODUCTION

The COVID-19 pandemic has rapidly developed into a significant worldwide threat to public health, affecting, and causing death to millions worldwide (1). This pandemic has impeded individual's daily activities around the world and is anticipated to remain an imposing burden on public health services (2). Besides successful public health interventions such as physical distancing and the use of face masks, vaccination has been considered an efficient method for controlling the spread of COVID-19 (3). Although current public health measures have limited its spread, the pandemic is still spreading, even among healthcare workers (HCWs) (4). It has been stipulated that long-term control of the spread of COVID-19 will rely primarily on a successful vaccination process that reaches large segments of the population (5). However, accepting the vaccine has not

been widely addressed in many countries, including Jordan (6). Hesitancy to receive the vaccine could make a significant contribution to ample disease outbreaks (7). Therefore, it was necessary to examine vaccination intentions among HCWs and other societal segments. The increase in vaccine hesitancy, including delay or avoidance, might cause threats to the progress of the fight against outbreaks of infections and is an obstacle to the effectiveness of the vaccination program (8, 9).

In 2019, the World Health Organization (WHO) classified vaccination hesitancy as one of the top 10 challenges to global health. (10). Vaccine hesitancy is defined as a delay in accepting or refusing vaccines despite the existence of vaccination facilities (9). Many factors can lead to hesitancy when a new vaccine has been produced and introduced for the public (9, 11-13). Such factors tend to involve vaccine safety and efficacy, side effects, misconceptions regarding the need for vaccination, as well as a lack of confidence in healthcare providers, insufficient knowledge concerning vaccine-preventable diseases, misleading information on the internet, as well as other sources of vaccine hesitancy (3,

11-13). Other studies (14, 15) have noticed that decision to use obtainable vaccines is influenced by perceptions and beliefs. HCWs are a valuable source of vaccination details and help mitigate misinformation about the vaccine, and thus promote higher compliance among the public (3,16-18). Additionally, the content and quality of HCW education on vaccines helps directly informed vaccination decisions, improve acceptance, and reducing hesitation to vaccination among the public (19).

It is essential for HCWs not only to inform the public but also to lead the vaccination process themselves, especially as they are highly exposed to COVID-19; the published numbers indicate that nearly 10% of all cases were among the HCWs (20). Protecting HCWs from the consequences of COVID-19 is essential for the maintenance of the healthcare system (20). HCWs are classified as a high-risk category who requires early vaccination (2, 21).

The Ministry of Health (MOH) in Jordan identified HCWs among the first groups to receive COVID-19 vaccination. The main concern seems to be whether HCWs are ready to receive the vaccine. HCW's readiness to take and to recommend taking the vaccine to other individuals depends on how they perceive and what they know about the vaccine (22). As a result, to effectively address vaccine barriers, it is necessary to evaluate HCW attitudes against COVID-19 vaccination (3). One study conducted in China on healthcare professionals found higher rates of acceptance to COVID-19 vaccination in comparison with the total population (4). A study conducted in the United States concluded that 36% of respondents were willing to get the vaccination once it was made available to them. The same study found that 56% were not sure or preferred to wait until more information was available for them (3). As HCWs' attitudes toward receiving the vaccine are important and influence public opinion, it is crucial to evaluate COVID-19 vaccination uptake among Jordanian healthcare workers. Findings could help healthcare institutes and decision-makers target resources to improve rates of uptake among the public. This research examined the factors that influence HCW decisions pertaining to the acceptability of COVID-19 vaccines in Jordan. It also examined the impact of the perceived risks of the vaccine on HCW decisions in terms of accepting it.

MATERIALS AND METHODS

Study design and participants

The study was carried out in a cross-sectional approach, with data collected using an online survey between January and February 2021. The target population was HCWs in Jordan. Inclusion criteria include HCW currently working in a facility the delivers healthcare services, such as hospitals, healthcare centers and clinics, and who has been working in the current workplace

for more than a year. In addition, the HCW should be exposed to caring for a patient with COVID-19. The survey questionnaire was designed using an electronic platform and participants were recruited using a list of names from healthcare institutes and convenience sampling. Healthcare workers were invited through WhatsApp and Facebook. The webpage explained all necessary information concerning the study's purposes and methods. HCWs were then invited to complete the study questionnaire through a link.

Study instrument

The questionnaire was developed by the researchers based on the findings of a literature review concerning different aspects of the acceptance of the COVID-19 vaccine (2-4, 23). The sections of the online survey questionnaire were as follows: Demographic information included age, gender, profession, marital status, and academic degree. Clinical information included the presence of existing chronic diseases, taking any medications prescribed for any chronic diseases, and type of workplace (public, private, and university hospital). Questions were used to assess COVID-19 exposure. "Have you, your family members, colleagues, friends, or neighbors you know been infected with COVID-19?". Self-perceived risk of contracting COVID-19 and self-perceived fear of COVID-19 were assessed by the questions "Do you think you are at risk of contracting COVID-19 and are you afraid of contracting COVID-19", respectively. The intention to accept the COVID-19 vaccine was evaluated by the question "Are you willing to take the COVID-19 vaccine?" Participants could choose between the available responses, which included Yes/No/Not sure. Participants were asked about where they learned about the COVID-19 vaccination, whether it was from the media, social media, or electronic platforms. Participants were surveyed on their trust in media outlets and the reliability of these sources' information regarding COVID-19 vaccine. The final section contained 21 statements rated on a four-point scale ranging from "strongly disagree" to "strongly agree". The score range between 21 and 84 with no clear cut-off point as this is a newly developed instrument. However, we used the midpoint as a cut-off point to determine levels of measurement. This section was composed of four domains that addressed "the intent to receive the COVID-19 vaccine": "attitudes and perceptions about the COVID-19 vaccine", "trust in the healthcare system and the government", "knowledge about COVID-19 and its vaccine", and "intention to receive the COVID-19 vaccine". The survey was estimated to take 10 minutes to complete.

Face and content validity were measured by analyzing responses from sending the items to four experts in the field of vaccination with scale face validity index (S-FVI) of 96% on the items' clarity, appropriateness, and comprehension, and the scale content validity index (S-CVI) more than 97% in both essentiality and

relevancy. The study questionnaire as piloted on 27 participants and the internal consistency value was 0.857. Results for the pilot sample were not included in the final study report.

Study sample

$N = Z_{\alpha/2}P(1 - P)/d^2$, in which $\alpha = 0.05$ and $Z_{\alpha} = 1.96$. For proportion d , the estimated margin of error was acceptable at level 0.1. Based on this; we estimated that an 800 would give us 80% power and a 95% level of confidence. Estimating non-responding and the subgroup analyses led to the final number of completed questionnaires from participants were 904. We decided to end the survey when we reached this number of completed questionnaires (24).

Ethical statement

Ethical permission was obtained by the Ethics Research Committee of the Faculty of Nursing-Alzaytoonah University (03/146-166/2020-2021).

Data analysis

SPSS version 25 (SPSS@IBM) was used to analyze the data. To describe the sample characteristics, a descriptive statistical analysis such as the means and standard deviation was computed. In addition, descriptive statistics were used to measure sample responses on the questionnaire items, which were presented as items and themes. Normality tests for the responses on the items showed that the total scores did not significantly depart from the normal distribution and can be considered within the statistically acceptable limits of normal distribution. No missing data were observed. Parametric tests, including one-way ANOVA and one-sample t-tests, were used to measure the impact of sample characteristics on the total mean score.

RESULTS

Sample demographic profile

The total sample was 904 participants, who completed the online study questionnaire. The mean age was 35.04 years ($SD = 9.07$) and the number of female participants was 489 (53.8%). Nurses ($n=634$, 70.1%) were the main group of participants, followed by medical doctors ($n=166$, 18.4%), as shown in Table I.

COVID-19 perceived risk and intent to receive the vaccine

This part of the study comprised five questions that addressed the perceived risk, the actual infection and willingness of the HCW to receive the vaccine (Table I). Participants were nearly split into two halves when it comes to fear of contracting the infection, but this percentage was as high as 89.0% ($n=805$) when they were asked about the possibility of becoming infected with COVID-19. The HCWs, who reported being infected with COVID-19, were 28.2% ($n=255$). However, the

Table I: Characteristics of the sample and responses to questions about the COVID-19 vaccine (n=904)

Factors	N(%)
Age (Years)	Mean 35.04 (SD 9.07), Range 19-67
20-30	366 (40.5)
31-40	300 (33.2)
41-50	197 (21.8)
51-60	39 (4.3)
>60	2 (.2)
Gender	
Male	418 (46.2%)
Female	489 (53.8%)
Profession	
Nurse	634 (70.1%)
Medical doctor	166 (18.4%)
Other healthcare workers ^a	104 (11.5%)
Marital status	
Single	292 (32.3%)
Married	583 (64.5%)
Divorced	16 (1.8%)
Widowed	13 (1.4%)
Academic degree	
Diploma	121 (13.4%)
Baccalaureate	586 (64.8%)
Graduate degree	197 (21.8%)
Workplace	
Public sector	688 (76.1%)
Private sector	166 (18.4%)
University hospital	50 (5.5%)
Do have any chronic disease?	
Yes	158 (17.5%)
No	746 (82.5%)
Are you taking any prescribed medication for chronic disease?	
Yes	138 (16.3%)
No	707 (83.7%)
Are you afraid of contracting COVID-19?	
Yes	469 (51.9%)
No	435 (48.1%)
Do you think you are at risk of contracting COVID-19?	
Yes	805 (89.0%)
No	99 (11.0%)
Have you been infected with COVID-19?	
Yes	255 (28.2%)
No	649 (71.8%)
Did any of your family members, colleagues, friends, or neighbors get infected with COVID-19?	
Yes	676 (74.8%)
No	228 (25.2%)
Are you willing to take the COVID-19 vaccine?	
Yes	158 (17.5%)
No	467 (51.7%)
The main source(s) of information about COVID-19 vaccine ^b	
Social Media (e.g., Facebook, Twitter)	473
Radio, TV, and Newspaper	262
Family and friends	155
Doctors	306
Research and academic websites	182
The World Health Organization	211
Ministry of Health/official websites	159
The source(s) you trust most for COVID-19 vaccine information? ^c	
Social Media	293
Radio, TV, and Newspaper	135
Family and friends	113
Doctors	89
Research and academic websites	84
The World Health Organization	76
Ministry of Health/official websites	69

^a Pharmacists, respiratory therapists, lab technicians, and nutritionist/dietitians.

^b Participants could choose more than one resource.

^c There are missing data (less than 5% of the total).

rate went as high as 74.8% (n=676) when asked whether a family member, colleague, friend, or a close neighbor was infected. When asked about the intent to receive the vaccine, the number was nearly even between those who were willing (48.3%, n=437) and those who were unwilling to receive the COVID-19 vaccine.

Sources of information about the COVID-19 vaccination Participants in the study were asked where they learned about COVID-19 vaccination. (Table I). Social media was reported as the primary source of information, which was indicated by the majority of HCWs (n=473), followed by the news media sources (n= 262) like newspapers and television, and official sites, like that of the Ministry of Health, represented the least frequently sought COVID-19 vaccination information source (n=159). Similarly, when the HCWs were asked about the best sites they believed contain trusted information about the COVID-19 vaccine, social media first come with 293 HCWs reporting it as the most trusted, followed by media sources. The least trusted sources were official and governmental sites (n=69).

Factors associated with COVID vaccine intent

Four main domains addressed the “intent to receive the COVID-19 vaccine”: “attitudes and perceptions about the COVID-19 vaccine”, “trust in the healthcare system and the government”, “knowledge about COVID-19 and its vaccine”, and “intention to receive the COVID-19 vaccine”. The last domain asked about the conditions that could influence when and where to take the vaccine. For easier reading and to avoid over-reporting of digits, the numbers below in many cases reflect the sum of the

“strongly agree” and “agree” responses.

Many HCWs perceived that the vaccine could be a serious threat to health, totaling 76.1% (n=688). Approximately half of the participants (55.6%, n=503) reported that the vaccine is not the only solution to control the spread of COVID-19, and a total of 53.1% (n=480) reported that it was neither safe nor effective (Table II). Many HCWs in this study also reported that the vaccine was rushed and that it should not be mandatory. Although some participants believed that the vaccine is part of a global conspiracy (25.2%, n=228), others believed that taking the vaccine could be even more harmful than COVID-19 infection. Another issue in the findings is that many participants thought that taking the vaccine could be harmful (53.5%, n=464) and that the side effects are the main source of concern (70.7%, n=639). In addition, 55.8% (n=504) of the HCWs reported that government sources are trustworthy and 45.4% (n=411) said that the government provides transparent and COVID-19 vaccination up-to-date information. Participants were approximately split into two halves when asked about the importance of knowing the source of COVID-19 vaccine manufacture and development in developing a sense of comfort to the vaccine’s efficacy and safety, the trustworthiness of the information they receive from governmental authorities, and knowledge about whether they need the vaccine if they fail to follow personal safety precautions effectively.

The final domain was about the intention and circumstances influencing the decision to take the vaccine. Earlier questions broadly asked whether the

Table II: Responses on the COVID-19 vaccination questionnaire items (n=904)

	Item	Strongly disagree	Disagree	Agree	Strongly agree
Attitudes and perception about the COVID-19 vaccine	I think COVID-19 is dangerous to my health.	47 (5.2%)	169 (18.7%)	538 (59.5%)	150 (16.6%)
	The importance of vaccines is negligible in the prevention of serious diseases.	21 (2.3%)	288 (31.9%)	502 (55.5%)	93 (10.3%)
	There are other solutions than the vaccine to stop COVID-19 pandemic.	71 (7.9%)	330 (36.5%)	397 (43.9%)	106 (11.7%)
	COVID-19 vaccine poses serious health issues.	32 (3.5%)	392 (43.4%)	404 (44.7%)	76 (8.4%)
	COVID-19 vaccines are being rushed without testing potential long term side effects or dangers	49 (5.4%)	286 (31.6%)	386 (40.8%)	200 (22.1%)
	I believe that COVID 19 vaccine should not be mandatory to all HCWs*	127 (14.0%)	344 (38.1%)	361 (39.9%)	72 (8.0%)
	COVID-19 vaccination is not important because I feel worried about catching COVID-19 or its complications	50 (5.5%)	453 (50.1%)	327 (36.2%)	74 (8.2%)
	COVID-19 vaccination is a conspiracy	247 (27.3%)	429 (47.5%)	190 (21.0%)	38 (4.2%)
	The vaccine is more dangerous than the virus	179 (19.8%)	453 (50.1%)	233 (25.8%)	39 (4.3%)
	I think that taking COVID-19 vaccine could be unsafe and harmful to me	57 (6.3%)	363 (40.2%)	424 (46.9%)	60 (6.6%)
Trust in health-care system and the government	I am concerned about the potential side effects of the vaccine	42 (4.6%)	223 (24.7%)	473 (52.3%)	166 (18.4%)
	My government is handling the COVID-19 crisis effectively	98 (10.8%)	302 (33.4%)	471 (52.1%)	33 (3.7%)
	My government provides transparent and up-to-date information on COVID-19 vaccine development and its introduction to Jordan	157 (17.4%)	336 (37.2%)	380 (42.0%)	31 (3.4%)
knowledge about COVID-19 and its vaccine	Knowing the source of COVID-19 vaccine manufacture and development makes me feel more comfortable about its safety and effectiveness	77 (8.5%)	389 (43.0%)	389 (43.0%)	49 (5.4%)
	The information I receive about the vaccines from public health authorities is reliable and trustworthy	70 (7.7%)	334 (36.9%)	464 (51.3%)	36 (4.0%)
	I do not need the vaccine because I do all the right things, like washing my hands and wearing a mask and gloves.	97 (10.7%)	340 (36.7%)	368 (40.6%)	99 (11.0%)
Intention to receive COVID-19 vaccine	Getting vaccinated is important for my health and the health of others in my community	59 (6.5%)	390 (43.2%)	414 (45.8%)	41 (4.5%)
	I will take the vaccine if there is adequate information about it	38 (4.2%)	106 (11.7%)	583 (64.5%)	177 (19.6%)
	I would be more likely to get the vaccine if required to travel internationally	111 (12.3%)	451 (49.9%)	288 (34.0%)	35 (3.8%)
	I would be more likely to get the vaccine if there are more scientific studies showing that the vaccine is safe and effective	30 (3.3%)	93 (10.3%)	585 (64.7%)	196 (21.7%)
	I would be more likely to get the vaccine if it is mandatory	121 (13.4%)	376 (41.6%)	361 (39.9%)	46 (5.1%)

HCW was going to take the vaccine, and this domain asked about more specific issues concerning that decision. For instance, they were asked whether they were willing to take the vaccine because it was important for their health and the community. The rate was 84.1% (n=760) when asked about their willingness to take the vaccine once enough information is available or if more scientific studies were conducted testing the vaccine's efficacy and safety (86.4%, n=781).

Normality tests values indicated that data obtained from the HCWs did not violate assumptions of normality (Table III). Therefore, parametric tests can be used in the analysis, including t-test and ANOVA. When testing the impact of the personal characteristics of the HCWs in this study on the responses to the vaccine, fear of contracting COVID-19, perceived risk, and willingness to take the vaccine, we found that being afraid of contracting COVID-19 and the gender of the HCWs influenced their decision to take the vaccine (Table IV). Although a relatively high number of HCWs (n=469, 51.9%) reported being afraid of contracting COVID-19, fewer (48.3%, n=437) reported willingness to receive the vaccine.

Table IV shows that there was a statistical difference between genders when asked regarding their willingness to receive the COVID-19 vaccine; $t(902): -4.302, p > .001$. The male participants had higher levels of willingness to take the vaccine, as 25.9% (n=234)

Table III: Factors influencing COVID-19 vaccination acceptance among HCWs (N=904)

Factor	Minim-Maxim	Mean (SD)	Skewness		Kurtosis	
			Statistic	SE	Statistic	SE
Attitudes and perceptions of COVID-19 and its vaccines	14.00-43.00	28.02 (5.49)	-.036	.081	-.308	.162
Trust in healthcare system and government	2.00-8.00	4.80 (1.37)	-.371	.081	-.463	.162
Knowledge about COVID-19 and its vaccine	3.00-12.00	7.45 (1.63)	-.143	.081	-.144	.162
Intentions to receive COVID-19 vaccine	5.00-20.00	13.19 (2.08)	-.703	.081	2.195	.162

Table IV: The impact of gender and fear of contracting COVID-19 on the perceived risk of COVID-19 and willingness to the vaccine among HCWs* (n=904)

Question	Gender				Are you willing to take the COVID-19 vaccine?			
	t	df	Mean Difference	P	t	df	Mean Difference	P
Are you afraid of contracting COVID-19?	.92	902	.031	.360	91.20	903	1.52	.000
Do you think that you are at risk of contracting COVID-19?	-1.02	902	-.0211	.308				
Are you willing to take the COVID-19 vaccine?	-4.30	902	-.1421	.000				

*Healthcare workers

reported their willingness to receive the vaccine compared to 20.4% (n=184) who said no (Table V). Fewer female participants (22.5%, n=203) reported that they were willing to receive the vaccine.

As illustrated in Table VI, there was also a significant difference among the different professions regarding willingness to receive the vaccine ($p = .005$). Nurses, who reported willingness to receive the vaccine, represented 29.1% (n=263) compared with 12.5% (n=113) of medical doctors and 6.7% (n=61) of other health professionals, such as pharmacists, respiratory therapists, and nutritionists (Table VI). The HCWs working in the public sector represented 35.3% (319), while those who said no represented 40.9% (n=369). The comparison among the raw numbers indicates that greater numbers of HCWs working in public and university hospitals were not willing to receive the vaccine.

Participants, who had a graduate degree, were more willing to receive the vaccine (13.9%, n= 126) than those who did not (7.9%, n= 71). Although 36.1% (n=326) of the baccalaureate degree holders reported being afraid of contracting the COVID-19 and 59.6% said that they were at risk of contracting the disease, only 29.3% (n=265) reported their willingness to receive the vaccine. Interestingly, participants with a diploma, who reported that they were at risk of contracting COVID-19, were nearly double those willing to receive the vaccine (11.1%, n=100). However, the number of diploma degree holders afraid of contracting COVID-19 (6.2%, n=56) and those willing to receive the vaccine (5.1%, n=46) were relatively similar (Table V).

Based on the findings of this study, HCWs reported different attitudes toward the vaccine that precluded a clear direction or understanding of the COVID-19 vaccine.

DISCUSSION

During a pandemic, it is critical to understand the factors that may influence an individual's ability to make a crucial decision about whether to accept or refuse the COVID-19 vaccination. The current study aimed at assessing the acceptability of the COVID-19 vaccine and correlates intending to be vaccinated against COVID-19 in Jordanian healthcare workers. In this study, most participants (88.9%) perceived

Table V: Differences among HCW on the perceived fear of COVID-19, perceived risk of contracting COVID-19, and willingness to the vaccine (n=904)

Question	Factor	Category	Response	
			Yes (%)	No (%)
Are you willing to take the COVID-19 vaccine?	Gender	Male	234 (25.9%)	184 (20.4%)
		Female	203 (22.4%)	283 (31.3%)
	Professions	Nurses	263 (29.1%)	371 (41.0%)
		Medical doctor	113 (12.5%)	53 (5.9%)
		Other healthcare workers	61 (6.7%)	43 (4.8%)
	Academic degree	Diploma	46 (5.1%)	75 (8.3%)
		Baccalaureate	265 (29.3%)	321 (35.5%)
	Are you afraid of contracting COVID-19?	Graduate degree	126 (13.9%)	71 (7.9%)
		Yes	246 (27.2%)	191 (21.1%)
		No	223 (24.7%)	244 (27.0%)
Are you afraid of contracting COVID-19?	Academic degree	Diploma	56 (6.2%)	65 (7.2%)
		Baccalaureate	326 (36.1%)	260 (28.8%)
		Graduate degree	87(9.6%)	110 (12.1%)
	Workplace	Public sector	319 (35.3%)	369 (40.9%)
		Private sector	95 (10.5%)	71 (7.8%)
		University hospital	23 (2.5%)	27 (3.0%)
		Diploma	100 (11.1%)	21 (2.3%)
Do you think that you are at risk of contracting COVID-19?	Academic degree	Baccalaureate	539 (59.6%)	47 (5.2%)
		Graduate degree	166 (18.4%)	31 (3.4%)

Table VI: The impact of personal characteristics on HCWs perceived fear and risk of contracting COVID-19 and willingness to the vaccine (904)

Factor	Question	df	Mean Square	F	P
Age	Are you afraid of contracting COVID-19?	4	.421	1.810	.125
	Do you think that you are at risk of contracting COVID-19?	4	.138	1.429	.222
	Are you willing to take the COVID-19 vaccine?	4	.062	.279	.892
Profession	Are you afraid of contracting COVID-19?	2	.291	1.251	.287
	Do you think that you are at risk of contracting COVID-19?	2	.057	.593	.553
	Are you willing to take the COVID-19 vaccine?	2	1.177	5.287	.005
Workplace	Are you afraid of contracting COVID-19?	2	1.402	6.033	.003
	Do you think that you are at risk of contracting COVID-19?	2	.124	1.277	.279
	Are you willing to take the COVID-19 vaccine?	2	.283	1.269	.282
Marital status	Are you afraid of contracting COVID-19?	3	.311	1.339	.260
	Do you think that you are at risk of contracting COVID-19?	3	.069	.709	.547
	Are you willing to take the COVID-19 vaccine?	3	.245	1.100	.348
Academic degree	Are you afraid of contracting COVID-19?	2	1.189	4.796	.008
	Do you think that you are at risk of contracting COVID-19?	2	.725	7.537	.001
	Are you willing to take the COVID-19 vaccine?	2	3.333	13.706	.000

themselves at risk of contracting COVID-19 and many (51.4%) were afraid of contracting it. Similar results are reported in the literature (23). Healthcare workers are front liners, and they provide direct care to patients with COVID-19. Therefore, it is expected that they would either sense the risk or believe that they could contract the infection at any time. It is interesting to note that 28.2% of HCWs in this study reported contracting COVID-19, and this percentage is higher than 12.8% reported in the literature (24). On the other hand, the majority of HCWs reported that they had an individual close to them infected with COVID-19. Similarly, 693

HCWs were in contact with family members who had a COVID-19 infection (25). These results may imply that Jordanian HCWs who are involved daily in delivering holistic care to confirmed positive COVID-19 patients may not take their precautions and not use preventive measures as required, which may reflect the high number of positive COVID-19 cases among them. These are alarming findings that healthcare authorities should be aware of and act upon.

Approximately half of the participants in our study reported they would obtain a COVID-19 vaccination.

Jordanian HCWs' willingness to receive the COVID-19 vaccination is low when compared to similar research conducted in France, where 76.9% of participants agreed to be vaccinated against COVID-19 (20). Another study conducted in China found that 76.4% of HCWs showed their readiness to receive vaccination (4). However, this is high compared with a study done in the Democratic Republic of the Congo, which found that only 27.7% of HCWs reported willingness to receive the COVID-19 vaccine (22). A study conducted in the USA reported that 36% of participants said that they were willing to get vaccinated when it has become available (3). Our study's low acceptance rate might be associated with the spread of vaccination misinformation on social media or perhaps certain mass media (22, 26).

It is noteworthy to mention that the HCWs used sources of information about COVID-19 and its vaccine primarily from social media, followed by news media sources, which do not represent official sources. Moreover, many HCWs in this study reported that social media was the most trusted source of information. Contrary to this, the Saudi HCWs indicated that hospital announcements and official statements from the Ministry of Health were more frequently searched for information about the COVID-19 and its vaccination (27). Perhaps official sites failed to report information about the vaccination as they needed confirmed content from the WHO, which usually takes a longer time than social media when reporting health-related data. The literature reported controversial findings depending on the type of information and the country. For instance, nearly half of HCWs in the United States did not trust government information about COVID-19 and its vaccine. (3). In Croatia and Romania, HCWs declared that they trusted the official health authorities when providing information about the vaccination (28). Therefore, the Jordanian healthcare authorities must communicate with HCWs and provide them with adequate information.

Most of the HCWs in this study perceived the vaccine as neither safe nor effective, and it could have serious side effects. This result is in line with previous research findings. In the USA, (3) found that 70% perceived that the COVID-19 vaccine was not safe, ineffective, and has serious side effects. In contrast, the findings of research by Barry et al (25) indicating that many Saudi HCWs believed that the COVID-19 vaccine was safe, effective, and the most possible approach to stopping the pandemic. Additionally, nearly half of the participants in this study believed that the vaccine should not be mandatory for HCWs. Another study (29) found that many respondents from 19 European countries might be less willing to accept a COVID-19 vaccine if it was mandatory. In the current study, just over half of the HCWs reported that government sources were trustworthy and reported that the government provides transparent and up-to-date information on the COVID-19 vaccine. Similar results were reported in France, (28) but opposite to what was

reported in the literature (3).

A possible cause of the positive thoughts about official healthcare authorities reported in Jordan could be related to the transparency of HCWs in reporting all information related to COVID-19 and the vaccine. This might suggest the importance of disseminating information through official health authorities to increase vaccine acceptance among HCWs.

The source and manufacturer of the COVID-19 vaccine were important information reported by almost half of the participants. This result agrees with previous study which was conducted in China and declared that half of HCWs (52.5 %) assumed that the source was important and that a domestically developed vaccine might be better compared to those products from abroad (4). Approximately half of the Jordanian HCWs indicated that the COVID-19 vaccine was a very important factor to control the spread of COVID-19. In addition, 86.4% (n=781) of the participants reported that they were willing to receive the vaccine if more scientific studies were conducted to test the safety and effectiveness of the vaccine. This result agrees with previously published research that found the majority of American HCWs were more likely to base their decisions about accepting or refusing the COVID-19 vaccine on published research literature on safety and efficacy, which were scarce at the time of the study (30).

The Jordanian HCWs likely have worries and concerns regarding the rapid development of the COVID-19 vaccine and the lack of scientifically based information about the safety and efficacy of the COVID-19 vaccine. HCWs delayed receiving a COVID-19 vaccine because of concerns about the speed of preparing and developing the vaccine, limited trial period, lack of transparency on how the vaccine was prepared and limited information on the vaccine (21). Many factors might have influenced HCW responses in this study. We found that being afraid of contracting COVID-19, the gender of the HCW, and his/her profession affected their intention to take the vaccination.

The male participants in this study had higher levels of vaccine acceptance than the female participants. Similar results were reported by other studies (5, 31) but opposite to others (29). A possible explanation as to why the male HCWs in the current study responded positively regarding accepting the vaccine more than the female HCWs might be because male HCWs had an increased risk perception of the disease as compared to female HCWs. As discussed earlier, the perception of risk was associated with the decision regarding accepting or refusing the vaccine (22).

Nurses were the majority of those who reported willingness to receive the vaccine compared with the other HCWs. This result is inconsistent with a previous

showing that physicians and medical students were more likely than other professions to accept COVID-19 vaccination (32). A possible explanation for these differences in the current study might be related to the variations of the profession of the respondents in this study, as the highest percentage of respondents (70.1%) were nurses involved in direct patient care and had prolonged patient contact, which could have influenced the sense of requiring vaccination.

A notable strength of this study is the large sample of HCWs surveyed. Our sample population was also diversified, with participants representing various age groups and roles in the health system. The current study, however, has several limitations. Firstly, it was a cross-sectional study, where HCWs chose to participate. Secondly, participants were enrolled and surveyed online rather than face-to-face, which may have contributed to bias in reporting respondents' responses. Thirdly, although the responses were anonymized, social desirability bias may have an impact on the interpretation of our research findings. Fourthly, we did not discriminate between doctors and nurses in hospitals, community health workers, and those at the Centers for Disease Control and Prevention, who may have varying degrees of information guiding their decisions. Additionally, the sample in the current study may not represent all Jordanian HCW. As a result, it is impossible to generalize it to the entire community. Finally, this research was carried out at a time when information on COVID-19 vaccines was scarce and clinical trial findings were made public. As a result, now that this knowledge is widely known, it is conceivable that vaccination acceptance and attitudes about COVID-19 vaccines have evolved. Therefore, we recommend replicating the study in the future as more results appear on the efficacy of the vaccine in controlling the pandemic. As well, we recommend conducting further research on the educational component about vaccinology in the undergraduate study of the HCWs to emphasize the impact of vaccine on controlling diseases in human history.

Notwithstanding such limitations, the study emphasized the need of tackling HCW attitudes and perceptions concerning possible COVID-19 vaccinations and assuring the provision of accurate information from reliable sources, that will help in vaccine acceptance among HCWs.

CONCLUSION

Healthcare workers seem to be concerned regarding vaccine safety, efficiency, and side effects, which may be useful targets for educational programs and campaigns aimed at increasing vaccination acceptance rates. This implies a need for healthcare authorities to raise awareness of the vaccine among HCWs, who might become a public source of information about

the vaccine that is urgently needed to help stop the pandemic.

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