

Willingness and Hesitancy Factors Toward COVID-19 Vaccination

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ABSTRACT

Background: Vaccination and other measures have helped controlling the effects of COVID-19 in many countries. However, public resistance to these measures – especially vaccination – remains an obstacle to mitigate the pandemic's effects.

Aim: To assess the reasons for acceptance and hesitancy toward COVID-19 vaccination among the Saudi population with its sociodemographic correlates.

Methods: A correlational cross-sectional study was conducted among a sample of people across Saudi Arabia. The data collection sheet included socioeconomic–demographic information and factors related to willingness and hesitancy toward COVID-19 vaccination. The study sample was fully randomized by selecting random mobile phone numbers.

Results: 621 participants were enrolled in the study's final analysis. The mean age for all participants was 26.8 years; 57.1% were males. The study showed that most participants had received at least one dose of the COVID-19 vaccine (91.8%). Of those who had received the first dose, two thirds planned to receive the second dose. Only 8.2% of participants were reluctant to receive the vaccine. The main reasons for willingness to be vaccinated were returning to life before the COVID-19 pandemic (76.3%), followed by avoidance of official restrictions (65.8%). Significant relationships are found between vaccination and the following factors: male gender, being student or an employee, and self or families ($P<0.05$).

Conclusion: This study showed high levels of vaccine willingness in the sample; this is mostly attributed to participants' longing to return to normal life before the pandemic. In addition, it strongly indicated the effectiveness of official government restrictions to encourage vaccination.

Keywords: Covid, Pandemic, Hesitancy, Vaccination, Willingness, Saudi Arabia, Perception, Attitude

INTRODUCTION

The COVID-19 pandemic is likely to shape the history of the 21st century; indeed, it may noticeably affect the direction and development of human civilization. Like every crisis, the COVID-19 pandemic is both a challenge and an opportunity. As a challenge, it causes disruption, suffering, short and long-term adjustments, economic losses and, tragically, human casualties, with more than 5.5 million deaths worldwide, according to World Health Organization statistics (WHO, 2022). As an opportunity, it allows us to think about how to find new solutions, especially in the medical field. However, many questions have been raised, mainly related to the exceptional licensing in a relatively short period of time compared to the conventional procedure for clinical trials. Despite the reported success of vaccines, concerns about vaccines remain, and vaccine hesitancy poses a potential threat to global public health. Despite efforts by the official media to emphasize the importance of the vaccination, misinformation spread in the public by unverified sources of information could have a considerable effect on the acceptance of a COVID-19 vaccine¹.

Public vaccine hesitancy may undermine efforts to combat the pandemic, leading to a delay in achieving herd immunity and thereby prolonging the pandemic. Multivariable logistic regression showed that lack of confidence, health complacency, vaccination risk, and frequency of attention were the main factors influencing intent to receive the COVID-19 vaccine². A previous study has suggested that the factors of vaccine hesitancy are classified into three categories: the risk–benefit of vaccines; knowledge and awareness issues; and religious, cultural, gender or socio-economic factors. Many more studies have identified several factors that reduce acceptance of the COVID-19 vaccine, such as fear of side effects, doubts about the effectiveness of vaccination, and lack of information about vaccination³. The key to rapid and successful COVID-19 vaccination is to reduce the vaccine hesitancy ratio⁴. A cross-sectional survey was conducted using an online questionnaire in China. Of the 3195 eligible participants, 83.8% were willing to receive a COVID-19 vaccine, and 76.6% considered the vaccine to be beneficial; however, 74.9% expressed concerns or an attitude of neutrality about its potential adverse effects⁵. There was a paucity of studies addressing

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the factors driving willingness and hesitation towards COVID-19 vaccination in Saudi Arabia; furthermore, all studies conducted in Saudi Arabia were using snowball sampling, raising concerns about their reliability in the medical practice. This study aims primarily to measure the willingness and hesitancy toward receiving COVID-19 vaccination and its related factors in a fully randomized sample of people solicited from various regions of Saudi Arabia. It is hoped that its findings will serve as a reliable source for health policymakers in dealing with any future pandemics and developing efficient strategic planning.

METHODS

Patient and Public Involvement: Sample size was calculated using an online sample size calculator (<https://www.calculator.net/sample-size-calculator.html>), with a confidence interval of 5%, a confidence level of 95%, and a population of 30 million. Data were collected after receiving ethical approval from the Research Ethics Committee at King Khalid University, Abha, Saudi Arabia on 26 August 2021, Approval No, ECM#2021-5637.

Study Design and Setting: This study adopts a cross-sectional model with complete randomization of participants nationwide, conducted by trained medical students from August 2021 to October 2021. The inclusion criteria are: all adult citizens who have mobile phones. The research team made the randomization using an Excel program that generated the required mobile phone lists to eliminate any selection bias and forwarded them to the data collectors. Medical students filled out the answers of the callers in online questionnaires. Two of the authors were responsible for tracking the data collectors and the participants' responses to assure full compliance with the study methodology.

The data collection sheet consisted of three parts. The first part included demographic and medical information. The second set of questions focuses on participants' acceptance of the vaccine. Finally, a third set attempts to gauge hesitancy toward the COVID-19 vaccine. The data were collected by research assistants who had a workshop in the datasheet of this study. The research project was explained to the participants during the phone call, and signed consent was sent by email or other means. All persons aged 18 years or above who consented to participate in the study were enrolled in the study's final analysis. Persons who declined to consent, were aged below 18 years, or spoke a language other than Arabic were excluded from the study.

Data Analysis: After the data were extracted, they were processed, coded, and fed into IBM SPSS Version 22 statistical software (SPSS, Inc. Chicago, IL). All statistical analyses were performed using two-tailed tests. P-value less than 0.05 was statistically significant. The frequency and percentage distribution of the descriptive study was done for all variables, including participants' sociodemographic data, medical history, COVID-19 infection, and COVID-19 vaccination status recording the number of doses received. Also, participants' reasons for receiving the vaccine and causes of hesitancy among those who were not vaccinated were shown in frequency tables. Crosstabs were used to assess the distribution of study population's vaccination status and their related bio-demographic data. The relationships were tested using the Pearson chi-square test and exact probability test for small frequency distributions.

RESULTS

Six hundred twenty-one participants who met the inclusion criteria completed the study questionnaire. The participants' ages ranged from 18 to 61 years with a mean age of 26.8 ± 12.4 years. Exactly

352 (57.1%) participants were male, and 356 (57.3%) had a college degree or higher, while 198 (31.9%) had a secondary degree. In terms of profession, 385 (62%) were non-healthcare workers, 38 (6.1%) were healthcare workers, and 175 (28.2%) were inactive. Looking at income, 149 (24%) had a monthly income of 10,000-15,000 Saudi Riyals (SR), 133 (21.4%) had a monthly income of SR 5,000-10,000 and 147 (23.7%) had an income of less than SR 5,000. About half of the participants were married (53%), and 253 (40.7%) were single. A total of 436 (70.2%) participants lived with their families, 95 (15.3%) with their parents, and 90 (14.5%) alone.

Table 1 shows the demographics for all participants. Regarding vaccination coverage and geographical distribution, the study in Table 2 showed that all regions in Saudi Arabia have high first-dose vaccination coverage, the lowest percentage is seen in the Aljouf region, were 80% of them received the vaccine, followed by Najran region at 80.8%. Meanwhile, the highest two-dose vaccination rates were observed in the Hail, Tabuk, and Eastern regions. Participants with chronic health problems made up 17.1% of the sample. Regarding the history of COVID-19 infection, 178 (28.7%) of the study participants reported having been infected at least once. The COVID-19 vaccine was received by 570 (91.8%) of the study respondents, of whom 130 (22.8%) received only one dose, and 440 (77.2%) received the two recommended doses. Among those who received only one dose, 102 (78.5%) planned to have the second dose. 351 (56.5%) reported that they were concerned about COVID-19 for their own self or family, 436 (70.2%) had family or relatives who had been infected by COVID-19, and 114 (26.1%) had lost a family member or relative due to COVID-19 infection.

Table 1: Socio-demographic data of Saudi population, Saudi Arabia

Socio-demographic data	No	%
Age in years		
18-25	208	33.5%
26-35	186	30.0%
36-40	67	10.8%
40-45	62	10.0%
45-50	46	7.4%
> 50	52	8.4%
Gender		
Male	352	57.1%
Female	265	42.9%
Education		
Below secondary	67	10.8%
Secondary	198	31.9%
University / above	356	57.3%
Work		
Health care worker	38	6.1%
Non-health care worker	385	62.0%
Not working	175	28.2%
Student	23	3.7%
Income		
< 5000 SR	147	23.7%
5000-10000 SR	133	21.4%
10000-15000 SR	149	24.0%
15000-20000 SR	98	15.8%
> 20000 SR	94	15.1%
Marital status		
Single	253	40.7%
Married	329	53.0%

Divorced / widow	39	6.3%
Live with		
My family	436	70.2%
Parents	95	15.3%
Alone	90	14.5%

Table 2: Vaccination rate among participants according to the region and number of doses

Region	Received covid-19 vaccine		Received vaccine doses			
			1 dose		2 doses	
	No	%	No	%	No	%
Mecca region	94	89.5%	21	22.3%	73	77.7%
Riyadh region	151	92.1%	36	23.8%	115	76.2%
Eastern region	56	93.3%	10	17.9%	46	82.1%
Madinah region	29	93.5%	7	24.1%	22	75.9%
Northern border region	12	92.3%	3	25.0%	9	75.0%
Baha region	13	81.3%	4	30.8%	9	69.2%
Jouf region	8	80.0%	3	37.5%	5	62.5%
Qassim region	19	100.0%	6	31.6%	13	68.4%
Tabuk region	21	100.0%	3	14.3%	18	85.7%
Hael region	11	100.0%	0	0.0%	11	100.0%
Aseer region	111	94.9%	25	22.5%	86	77.5%
Jazan region	24	85.7%	5	20.8%	19	79.2%
Najran region	21	80.8%	7	33.3%	14	66.7%

Table 3 shows COVID-19 infection and vaccination data among study participants. Table 4 show Reasons for hesitating to get vaccinated among non-vaccinated study population, around half of the non-vaccinated participants (54.9%) hesitated to receive the vaccine because they had been infected already with COVID-19, (47.1%) agreed that their reluctance was due to their need for additional information, and (35.3%) were hesitant to take the vaccine because of their beliefs that they can prevent COVID-19 with precautions other than a vaccine. Around one third of the hesitant participants refused the vaccine because it is new, and they do not wish to be the first to be vaccinated. Approximately (27.5%) of those who refused the vaccine had medical conditions, so they preferred to wait before getting the vaccine, while (27.5%) opted to wait for more alternatives regarding the type of the vaccine. Of those who refused the vaccine, 15.7% reported that someone had advised them not to get the vaccine.

Table 3: Covid-19 infection and vaccination data among study participants, Saudi Arabia

Infection and vaccine data	No	%
Have chronic health problems		
Yes	106	17.1%
No	515	82.9%
Had covid-19 infection		
Yes	178	28.7%
No	443	71.3%
Received covid-19 vaccine		
Yes	570	91.8%
No	51	8.2%
Received vaccine doses (n=570)		
1 dose	130	22.8%
2 doses	440	77.2%
Plan to have the second dose (n=130)		
Yes	102	78.5%

No	28	21.5%
If an optional third poster dose is approved, what is your decision? (n=570)		
I will not have it	255	44.7%
I will have it	315	55.3%
Concerns about COVID-19 disease for own self or family		
Yes	351	56.5%
No	270	43.5%
Any of your family or relatives had the covid-19 infection		
Yes	436	70.2%
No	185	29.8%
Lost family member or relative due to covid-19 infection (n=436)		
Yes	114	26.1%
No	322	73.9%

Table 4: Reasons for hesitating to get vaccinated among non-vaccinated study population, Saudi Arabia

Hesitancy to get vaccinated	Disagree		Neutral		Agree	
	No	%	No	%	No	%
I can prevent COVID-19 with precautions other than a vaccine	22	43.1%	11	21.6%	18	35.3%
I am against vaccination in general	35	68.6%	6	11.8%	10	19.6%
Someone recommends me not to get the vaccine	38	74.5%	5	9.8%	8	15.7%
Newness, won't be the first to get the vaccine	26	51.0%	7	13.7%	18	35.3%
Need additional information	19	37.3%	8	15.7%	24	47.1%
I have been infected with COVID-19 fear of adverse effects	22	43.1%	1	2.0%	28	54.9%
I have medical condition so I should wait before getting vaccine	36	70.6%	1	2.0%	14	27.5%
Waiting for more options regarding the type of the vaccine	29	56.9%	8	15.7%	14	27.5%

Table 5 Reasons for wanting to get vaccinated among vaccinated study population, Saudi Arabia. The most commonly reported reasons for participants to receive the vaccine were to return to 'normal' life before the COVID-19 pandemic (76.3%), the desire to avoid running afoul of official restrictions (65.8%), having a high risk of being infected with COVID-19 at work (63.9%), the belief that vaccination can prevent COVID-19 (62.3%), desire to travel (56.1%), a recommendation from a trusted acquaintance (55.4%) and, finally, no other preventive measures (49.6%).

Table 5: Reasons for wanting to get vaccinated among vaccinated study population, Saudi Arabia

Reasons for wanting vaccine	Disagree		Neutral		Agree	
	No	%	No	%	No	%
vaccination can prevent COVID-19	120	21.1%	95	16.7%	355	62.3%
vaccine can prevent me from being a spreader	139	24.4%	189	33.2%	242	42.5%

Return to the life before the COVID-19 pandemic	44	7.7%	91	16.0%	435	76.3%
Stop doing preventive actions	200	35.1%	87	15.3%	283	49.6%
Have a high risk of getting infected with COVID-19 in my work	115	20.2%	91	16.0%	364	63.9%
I want to travel	192	33.7%	58	10.2%	320	56.1%
Someone I trust recommend it	184	32.3%	70	12.3%	316	55.4%
To avoid official restriction	123	21.7%	71	12.5%	373	65.8%

Table 6 displays the distribution of vaccination among study participants according to their biodemographic data. Precisely 94.9% of male participants had received the vaccine, compared to 87.5% of female participants with statistical significance recorded (P=0.001). Also, 97.4% of healthcare workers had received the vaccine, compared to 83.4% of those unemployed (P=0.001). Regarding marital status, 95.3% of the single participants received vaccination versus 84.6% of the divorced group (P=0.017). Also, 93.4% of participants who were concerned about contracting COVID-19 themselves or spreading it to their family had received the vaccine, compared to 89.6% of those who were not so concerned (P=0.049).

Table 6: Distribution of vaccine intake among study participants by their bio-demographic data

Factors	Received covid-19 vaccine				p-value	
	Yes		No			
	No	%	No	%		
Age in years	18-25	192	92.3%	16	7.7%	.694
	26-35	166	89.2%	20	10.8%	
	36-40	64	95.5%	3	4.5%	
	40-45	57	91.9%	5	8.1%	
	45-50	42	91.3%	4	8.7%	
	> 50	49	94.2%	3	5.8%	
Gender	Male	334	94.9%	18	5.1%	.001*
	Female	232	87.5%	33	12.5%	
Education	Below secondary	62	92.5%	5	7.5%	.502
	Secondary	178	89.9%	20	10.1%	
	University / above	330	92.7%	26	7.3%	
Work	Health care worker	37	97.4%	1	2.6%	.001*s
	Non-health care worker	364	94.5%	21	5.5%	
	Not working	146	83.4%	29	16.6%	
	Student	23	100.0%	0	0.0%	
		23	100.0%	0	0.0%	
Income	< 5000 SR	128	87.1%	19	12.9%	.116
	5000-10000 SR	121	91.0%	12	9.0%	
	10000-15000 SR	139	93.3%	10	6.7%	
	15000-20000 SR	92	93.9%	6	6.1%	
	> 20000 SR	90	95.7%	4	4.3%	
Marital status	Single	241	95.3%	12	4.7%	.017*
	Married	296	90.0%	33	10.0%	
	Divorced / widow	33	84.6%	6	15.4%	

Live with	My family	399	91.5%	37	8.5%	.467
	Parents	90	94.7%	5	5.3%	
	Alone	81	90.0%	9	10.0%	
Have chronic health problems	Yes	97	91.5%	9	8.5%	.909
	No	473	91.8%	42	8.2%	
Had covid-19 infection	Yes	164	92.1%	14	7.9%	.842
	No	406	91.6%	37	8.4%	
Concerns about COVID-19 disease for own self or family	Yes	328	93.4%	23	6.6%	.049*
	No	242	89.6%	28	10.4%	
	Any of your family or relatives had the covid-19 infection	Yes	401	92.0%	35	
Lost family member or relative due to covid-19 infection	No	169	91.4%	16	8.6%	.797
	Yes	106	93.0%	8	7.0%	
Concerns about COVID-19 disease for own self or family	Yes	106	93.0%	8	7.0%	.644
	No	295	91.6%	27	8.4%	

P: Pearson X² test \$: Exact probability test * P < 0.05 (significant)

DISCUSSION

The study showed that most participants in Saudi Arabia had received at least one dose of the COVID-19 vaccine (91.8%). Of those who had received the first dose, two-thirds planned to receive the second dose. Only 8.2% of participants reported being reluctant to receive the vaccine. This finding for reluctance is significantly lower than that reported in several prior studies measuring willingness to accept the COVID-19 vaccine (this is due to the time factor, which gives preference to raising awareness about the effectiveness and safety of vaccination^{5,7}. Mohaithef et al (2020) screened 992 people in Saudi Arabia for their willingness to accept the COVID-19 vaccine; they found that around 35% of the participants were unwilling to receive the vaccine⁶. Studies from Australia and China showed higher vaccine hesitancy comparing to the current finding (14.4% and 16.3%, respectively)^{5,7}. Regarding the link between vaccination coverage and geographical distribution, the results are varied. On the one hand, the smaller administrative regions (Qassim, Tabuk and Hail) showed a higher percentage of first-dose vaccinations than the country's most populous regions of the country namely (Riyadh, Mecca and Eastern). On the other hand, first- and second-dose vaccination rates are lowest in the less populous administrative regions (Aljouf and Najran regions), which are considered peripheral, had the lowest percentage of two-dose vaccination. One potential explanation for these findings is the low educational level among the population in these more peripheral areas such as Najran and Aljouf. This geographical distribution difference may warrant additional studies to assess other potential reasons for these variations.

The most commonly reported reasons for hesitancy in accepting the COVID-19 vaccine in this study were 'already infected' and 'fear of being ill after the vaccine', followed by 'lack of adequate information regarding the vaccine'. This could be attributed to the influence of social media and other sources of information that lack evidence, relying on personal experiences and anecdotal cases. This study is not the first to articulate such concerns; a longitudinal study conducted in the United Kingdom identified 'fear of becoming ill after the vaccine' as the main reason for reluctance to accept vaccination⁸. Such fears appear to be

common even among people working in the medical field, who can easily access the up-to-date information regarding the safety of the vaccine. Said et al. (2021) conducted a cross-sectional study including 2133 medical students and found factors related to the vaccine's safety to be among the main reasons for reluctance to be vaccinated⁹. Another study from Turkey showed that 35% of healthcare professionals are reluctant to be vaccinated; the most commonly reported reason for this hesitancy was concern about side effects¹⁰. Many of these studies attributed this sceptical attitude toward the vaccine to the influence of social media and other unreliable information sources that promote misconceptions about the vaccine. These untrustworthy sources of information had a significant influence on people's attitudes toward acceptance of the vaccine¹¹. These questionable sources of information may be even more influential than trusted and evidence-based sources, even among people working in the medical field. 57% of the participants in this study reported receiving inaccurate information about the vaccine from social media. The main reason participants in the present study were willing to accept the vaccine was to accelerate the return to pre-pandemic conditions. For example, as a result of the strict regulations enacted by the Saudi government to combat the spread of the virus, all mosques in Saudi Arabia were closed. This and other measures – such as social distancing, prohibiting social gatherings, implementing long hours' curfews and wearing face masks – may be perceived as arduous by the population. On the other hand, in the United States, doctors' recommendations and avoiding the negative health consequences of COVID-19 were cited as the main reasons for accepting the vaccine¹².

Even though the vaccine was made available to all citizens and residents of Saudi Arabia, regardless of gender, male participants received the vaccine more often than females. This finding may not be attributed solely to the nature of the community, in which working males – such as soldiers – are required to be vaccinated but may also be due to gender differences in attitudes toward the COVID-19 vaccine. A study from Malaysia by Wong et al. (2020) found that being male is the main predictor for intention to be vaccinated against COVID-19; accordingly, the authors recommended gender-based interventions to improve females' attitudes toward the vaccine.¹³ Interestingly, male healthcare workers are more likely to accept the vaccine than female healthcare workers¹⁰. Further studies are needed to find the reason for this difference in attitudes towards the vaccine. Regarding the association between income and vaccination, the study showed that those with a higher income (more than SR 20,000 per month) were more likely to receive the vaccine, although this finding did not show statistical significance ($P=0.116$). Parallel to many previous studies, this study showed that concern about the health consequences of COVID-19 for oneself or one's family is associated with a higher willingness to accept the vaccine⁶. This finding should be used in health education about COVID-19 to encourage people to be vaccinated. Additionally, unmarried participants are more likely to accept the vaccine than married participants. One study conducted in Egypt which share the same cultural background with Saudi Arabia came to the same conclusion, although these findings contrast with a cross-sectional study from China^{14,15}.

LIMITATIONS

As the study progressed, the following obstacles emerged: First, about 350 responses were dropped from the study after it was determined that these results did not correspond to the complete randomization of the study as they follow snowball sampling Technique, the respondents is selected. Thus, the data collectors responsible, as well as their answers, were excluded. The second obstacle is related to the nature of the study; the Saudi community is unfamiliar with such research methods (i.e. phone surveys). Repeated feedback from the data collectors emphasised

this problem. Fortunately, most participants understood the meaning and importance of such projects and filled out the questionnaire with the help of experienced data collectors who were able to address the population's concerns.

CONCLUSION

The study concluded that most of the Saudi population are receptive to the vaccine – and have in fact received it. Being male, studying or working, and having concerns about the consequences of COVID-19 infections for oneself or one's families emerge as statistically significant predictors of vaccination. Most vaccinated respondents attributed their willingness to be vaccinated to a strong desire to resume their pre-COVID pattern of living, rather than fear of infection. The study has demonstrated the effectiveness of the government's official policy on compulsory vaccination, as the highest percentage of the vaccinated population, compared to non-working people, are either students or employees, and avoiding restrictions was more critical for the population than for the than Protection against COVID-19 as a reason for vaccination. Finally, it is essential for public health authorities to recognize the main reasons for vaccination reluctance aside from previous infection – namely lack of knowledge about the vaccine, and self-avoidance of infection through measures other than vaccination. These reasons may be changed by introducing awareness programs throughout the country (especially in the outlying areas) and answering all questions related to vaccination – in particular, concerns about the rapid and extraordinary path of approval by international food and drug authorities for the COVID-19 vaccine or Possibly arising complications in the future.

Authorship Contribution: WMAA and MHA conceived and designed the study, and data analysis; RMA supervised and reviewed the data analysis; NAA mentored in the elaboration of the manuscript. All authors contributed to the writing of the final manuscript. All authors read and approved the final manuscript.

Potential Conflict of Interest: None

Competing Interest: None

Ethics Approval: Ethical approval from the Research Ethics Committee at King Khalid University, Abha, Saudi Arabia on 26 August 2021, Approval No, ECM#2021-5637.

Data Availability Statement: The datasets used and/or analysed during the current study are available from the corresponding author and study investigators on reasonable request.

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