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Public acceptance of COVID-19 vaccination among residents of Saudi Arabia: a cross-sectional online study

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ABSTRACT

Objectives The acceptance of the COVID-19 vaccine is essential for protecting the world population and stopping the COVID-19 pandemic. This paper aimed to measure public acceptance of the COVID-19 vaccination and the factors that may play an important role in increasing the acceptance of vaccinations in future pandemics.

Design A cross-sectional, observational study was conducted through a survey designed using the Google Forms platform. In this study, a logistic regression analysis was used to study and detect the variables linked to the acceptance of COVID-19 vaccination. To meet inclusion criteria, participants had to be 18 years or older at the time of collecting the data, reside in Saudi Arabia at the time of the survey, agree to the consent form and be able to complete the survey in Arabic.

Setting Randomly selected residents of Saudi Arabia.

Number of participants 1658.

Results In general, the population of Saudi Arabia is supportive of the COVID-19 vaccine (72.0%) and has one of the highest acceptance rates, according to global studies. We found that men (OR 0.73; 95% CI: 0.55 to 0.97) were less likely to hesitate with regard to taking the vaccine, whereas previously infected individuals were more likely to hesitate (OR 1.77; 95% CI: 1.25 to 2.50). Those with a lower monthly income (<3000 Saudi riyal) were more likely to refuse the vaccine (OR 3.54; 95% CI: 1.81 to 6.91), while those living in cities (OR 0.62; 95% CI: 0.39 to 0.99) and the unemployed (OR 0.52; 95% CI: 0.33 to 0.83) were less likely to refuse it. Participants' history of viral infection and trust in the healthcare system were found to be important factors in the public's acceptance of the vaccine.

Conclusion In general, acceptance of the COVID-19 vaccination is high in Saudi Arabia. Several factors have shown a method for predicting those who might reject the vaccine or hesitate to take it; thus, the healthcare system should target those residents throughout the campaign. Based on the conclusions of the current research, the acceptance of vaccinations could be increased.

INTRODUCTION

The rapid spread of COVID-19 throughout the world, causing alarmingly high death rates, triggered the need for effective vaccination. In late 2020, Saudi Arabia approved the use of two vaccines: Pfizer and AstraZeneca.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This cross-sectional study's participants were recruited using an online survey, which has the advantage of convenience but may introduce some bias.

⇒ Although the study had different parameters pertaining to the acceptance of vaccinations, we cannot specifically identify the incentive behind the acceptance, hesitation or refusal to receive the vaccination.

⇒ Using a web-based survey did not allow for calculating the response rate due to difficulties in tracking the number of subjects who received the questionnaire link.

⇒ The strategy of sampling technique (convenient) may introduce bias, although the age and gender of the population were similar to recent data published by the General Authority of Statistics in Saudi Arabia.

Given that rumours were circulating about vaccinations in general, COVID-19 vaccines were especially attacked by conspiracy theories.

In 2015, the Strategic Advisory Group of Experts on immunisation concluded that vaccine hesitancy refers to 'delay in acceptance or refusal of vaccination despite availability of vaccination services'.[1] The WHO declared vaccine hesitancy to be one of the top 10 global threats to public health in 2019.[2] The acceptance of COVID-19 vaccine is essential for protecting the world population and stopping the COVID-19 pandemic. With conspiracy theories and anti-vaccination advocates spreading false information, vaccine hesitancy presents substantial obstacles to achieving coverage for population immunity in many countries.

Examining the influence of vaccination hesitancy worldwide, including, but not specific to, COVID-19 vaccination, would be governed by the complicated type of this pandemic.[1] Different factors affect vaccine hesitancy, such as psychological, cognitive, sociodemographic and background.[3–5]

Further, the ability to manage such pandemics is linked to the analysis and assessment of previously mentioned factors in order to tackle the vaccine hesitancy of COVID-19.[3 6 7]

Previous studies that examined vaccine reviews resulted in different interpretations, depending on the method of delivering safety and the effectiveness of information about vaccines.[8] In higher-income locations, people were the least convinced of the safety of the vaccine. About 73% of North America and Northern Europe agreed with the safety of vaccinations. In Western and Eastern Europe, the rates were 59% and 50%, respectively. Conversely, in lower-income regions, the majority of the population agreed that vaccines are safe. South Asia and Eastern Africa were the highest, with 95% and 92%, respectively.[9] Further, with regard to vaccine effectiveness, the same pattern was recognised in different regions; people in Eastern Europe were less likely to agree with the effectiveness of vaccines in contrast to people living in South Asia and Eastern Africa.[3 9] Two different studies conducted in Saudi Arabia to examine the willingness of the population to accept COVID-19 vaccination concluded that 44.7% of participants in the first study would accept the vaccine, whereas the second study determined that 64.7% of participants were willing to get the vaccination.[10 11] The evaluation of such factors as regional differences can be a key method in combating the public health risks presented by vaccine hesitancy.[12]

This research aimed to study the level of public acceptance of COVID-19 vaccination in the Kingdom of Saudi Arabia (KSA). Subsequently, the acceptance of vaccination is domain specific and changes with background, psychological and sociodemographic factors; we intended to comprehend the public willingness of COVID-19 vaccination in Saudi Arabia.

METHODS AND MATERIALS
Study design and setting

A cross-sectional, observational study was conducted to evaluate the acceptability of COVID-19 vaccination among the Saudi population. The survey was designed using the Google Forms platform, and the study participants were recruited across the KSA. The survey was written in Arabic, as this is considered the mother tongue of Saudi Arabia. To improve the responses to the questionnaire, the link was shared throughout social media programmes (WhatsApp, Twitter and Snapchat).

Since this study focused on the general population of Saudi Arabia, all Saudi residents were considered optional participants when the inclusion criteria were met. The link to the questionnaire was widely distributed through social media to the population in all regions of the kingdom, and those who were willing to participate filled out the questionnaire. The current study is a cross-sectional study with a convenient sampling technique.

Inclusion criteria were age 18 years or older at the time of collecting the data, residence in Saudi Arabia

at the time of the survey, agreeing to the consent form and being able to complete the survey in Arabic. Based on COVID-19 prevention strategies and to minimise face-to-face research during the current active COVID-19 outbreak in Saudi Arabia, participants were contacted through social media programmes (WhatsApp, Snapchat, Instagram, Facebook) during April 2021.

The introductory part of the survey included the objectives and purpose of the study and the consent form to ensure that the participants knew the purpose of the study and that participation was voluntary. The names of the participants were not collected as part of the anonymity and confidentiality of the survey, which was divided into three sections. The first section consisted of questions associated with the sociodemographic information of the participants (age, gender, marital status, education level, work status, monthly income, geographical region of residence and other questions). The second part addressed the main question about the participants' hesitancy and resistance to receiving the COVID-19 vaccination by using the following question: Are you willing to receive the COVID-19 vaccination? There were three possible answers: yes, no or hesitant. Moreover, two subsections were created to ask about the causes that may have led to the hesitation or encourage the participants to take the COVID-19 vaccination. The final part included four questions, the first and second to understand individual opinions about compulsory COVID-19 vaccinations and if individuals had changed their mind about vaccination. The third question was to understand whether the participants had an opinion about which country provided the best COVID-19 vaccine. The fourth question was to understand if restricting travel to those who have received a COVID-19 vaccination will encourage individuals to take the vaccination. The main aim of the study was to measure public acceptance of the COVID-19 vaccine in the KSA.

The questionnaire was designed based on the relevant literature and previous research regarding the hesitation concerning the COVID-19 vaccine as well as the vaccine's acceptance. After reading the literature, four multidisciplinary individuals participated in selecting and creating the questionnaire, created through Google Forms, which covered the aim of the study. To ensure that the outcome was designed to meet the objective of the study, all questions were validated and authenticated by five multidisciplinary experts. Each of the experts was given a link to the online questionnaire and objectives of the study, and was asked to read the questionnaire and answer the following questions: Does the questionnaire cover the aims of the study? If not, please clarify. Do you think we need to add any questions? If yes, please specify. Do you think we need to change the language? If not, please specify. Are all the questions clear? If not, please specify. Finally, do you have any recommendations for the questionnaire? All the comments were collected, and another meeting was conducted with the same four individuals to discuss the comments and address what was needed, if appropriate.

Patient and public involvement

As a pilot study, we presented 10 participants with the questionnaire to optimise coverage and assure clarity of questions. Feedback received from the pilot study has led to the final version of the questionnaire (the study version) with concise, clear and simple-to-understand questions that address current study objectives.

Study population and sample size

The minimum required sample for multinomial logistic regression was 10 participants for each variable.[13] We had 44 possible independent variables; therefore, to be more accurate, we used 30 since 10 was the minimum, which gave us 1320 participants. We added 330 cases (22%) to the sample to account for any cases that might be eliminated for missing data, which resulted in a total of 1650 participants.

Statistical analysis

After collecting the data through Google Forms, they were downloaded as Excel sheets. The data were then fed into SPSS V.23 to conduct the analysis. Descriptive statistics were applied to show the counts and percentages. A X^2 test was conducted to investigate the differences between those willing to receive the vaccination for COVID-19 and those who were hesitant or refused but not based on demographic characteristics. Demographic characteristics that were significantly different in the X^2 test were used in the regression model to predict who was unwilling to receive the vaccination or was hesitant. The regression model used was multinomial logistic regression. The statistically significant level was 0.5.

RESULTS

This study was conducted on 1658 randomly selected residents of Saudi Arabia, of whom 217 (13.1%) were previously infected with COVID-19. Women represented 51.4% of all participants in the study, and 35.3% of the entire study group earned less than 3000 Saudi riyal (SR) per month. Approximately one-third of the respondents (30%) were between 25 and 34 years old, and more than half of the sample population (58%) had a bachelor's degree. Residents of the western part of Saudi Arabia made up 35.5% of the respondents (table 1).

Seventy-two per cent of respondents showed willingness towards receiving the vaccine, 17.9% were hesitant and 10.2% indicated refusal of the vaccine (table 2). Of the 1658 respondents, more than half (53.9%) agreed that vaccination should be mandatory. Of the participants, 32.4 changed their view from disagreeing with receiving the vaccination to being willing to receive the vaccination. In contrast, only 4.2% of the participants changed their opinions from agreeing to receive the vaccination to not being willing to receive the vaccination. The majority of the sample (63.4%) did not change their views towards COVID-19 vaccination (table 3).

Table 1 Demographic characteristics of the sample with the number (percentage) of respondents

Demographic characteristics		Count	Column N (%)
Gender	Male	806	48.6
	Female	852	51.4
Age group	18–24 years	370	22.3
	25–34 years	497	30.0
	35–44 years	484	29.2
	45–54 years	185	11.2
	55 and above	122	7.4
Marital status	Single	609	36.7
	Married	1049	63.3
Educational level	Secondary and lower	300	18.1
	Diploma	115	6.9
	Bachelor's	962	58.0
	Master's	184	11.1
	PhD	97	5.9
Monthly income	Less than 3000 SR	585	35.3
	Between 3000 and 9999 SR	380	22.9
	Between 10 000 and 19 999 SR	451	27.2
	20 000 SR and above	242	14.6
Job	Unemployed (student, retired, others)	820	49.5
	Employed (government, private, entrepreneur)	837	50.5
Saudi Arabian geographical origin	Middle	480	29.0
	East	143	8.6
	North	300	18.1
	South	147	8.9
	West	588	35.5
Do you live in:	City	1483	89.4
	Village	175	10.6
Do you have or have you had any psychological health issues?	Yes	154	9.3
	No	1504	90.7
Do you suffer from any chronic or serious diseases?	No	1337	80.6
	Yes (heart disease, diabetes, hypertension, others)	321	19.4
Have you been infected with COVID-19 confirmed by a test result?	Yes	217	13.1
	No	1441	86.9
Do you have any relative(s) who has/have been infected with COVID-19 confirmed by a test result?	Yes	1202	72.5
	No	456	27.5

SR, Saudi riyal.

X^2 showed that there is significant difference in the percentage of participants willing, refusing and hesitating to take the vaccination between the gender, monthly income, job and do you live in city/village categories and individuals previously infected with COVID-19.

Male respondents provided the highest positive responses towards willingness to receive the vaccine

Table 2 Willingness to receive COVID-19 vaccination

Are you willing to receive a vaccination for COVID-19?	Yes	1193	72.0%
	No	169	10.2%
	Hesitated	296	17.9%

(74.4%), while female respondents were more reluctant to receive the vaccination (21.2%). People aged 55 years and older had the highest percentage of positive responses (83.6%) towards willingness to take the vaccination; also, singles showed a high positive response towards willingness to take the vaccine (73.1%). Individuals with low incomes were least willing to take the vaccination (66.7%) among the monthly income categories. In contrast, those employed and those living in cities had the highest percentage of positive responses for being willing to take the vaccination (74% and 72.9%, respectively). In the education category, people with a PhD degree showed the highest positive responses (81.4%) to being willing to take the vaccination. Furthermore, people suffering from diseases such as heart disease, diabetes, hypertension and others had the highest positive response towards

Table 3 Attitudes toward COVID-19 vaccination

Variables	Answer	Count	Column N (%)
Do you agree that the vaccination should be compulsory?	Yes	894	53.9
	No	764	46.1
Have you ever changed your opinion about the COVID-19 vaccination?	Yes, I disagreed with having the vaccination, but now I agree	537	32.4
	No	1051	63.4
	Yes, I agreed with getting the vaccination, but now I disagree	70	4.2
Do you think restricting travel to those who have received a COVID-19 vaccination will encourage individuals to take it?	Yes	1364	82.3
	No	294	17.7
Which of the following countries do you think made the best COVID-19 vaccine?	USA	627	37.8
	UK	163	9.8
	China	33	2.0
	Russia	22	1.3
	India	25	1.5
	Germany	123	7.4
	Kazakhstan	1	0.1
	No differences between the countries	664	40.0

the vaccine (75.7%). People who had been previously infected with COVID-19 had a lower positive response in willingness to receive the vaccination compared with those not previously infected (table 4).

Multinomial logistic regression was conducted to investigate which variables could predict those who refused the vaccination or hesitated. The model was significant, with a p value of <0.01. Table 5 presents logistic regression analysis for the sociodemographic prediction of intent to uptake the COVID-19 vaccine among respondents. In the model, those with a monthly income of less than 3000 were 3.54 times more likely to refuse the vaccination (OR 3.54; 95% CI: 1.8 to 6.91), while those living in a city (0.62; 95% CI: 0.39 to 0.99) and unemployed (0.52; 95% CI: 0.33 to 0.83) were less likely to refuse vaccination.

Moreover, men (OR 0.73; 95% CI: 0.56 to 0.97) were less likely to hesitate, while those who were previously infected with COVID-19 were (OR 1.77; 95% CI: 1.25 to 2.50) more likely to hesitate to take the vaccination.

Table 6 presents the reasons for hesitation among the participants. Distress about future side effects was the highest cause of hesitation to receive the vaccine among the participants (1012 of 1658, 61.0%). On the other hand, the need for distant travel to get the vaccination was the least chosen reason that caused participants to hesitate (19.3%).

Table 7 presents the factors that encourage people to accept the vaccine. Performing more research on the vaccine was the most encouraging factor to receiving the vaccination; 84.6% of participants accepted the vaccine upon performing more research. Also, 80.2% of participants answered yes to taking the vaccine to protect their loved ones. Conversely, famous people taking the vaccine would not encourage most of the population to accept the vaccine (18.5%).

DISCUSSION

Vaccination is a proven method for protecting the population against diseases. However, the acceptance of vaccines among the population has been a challenge for decades. The degree of acceptance varies depending on different variables such as social class, education level and background.[14–17] The current study aimed to measure public acceptance of COVID-19 vaccination and the factors that may play an important role in increasing the acceptance of vaccination in future pandemics.

In general, the population in Saudi Arabia is supportive of the COVID-19 vaccine (72.0%). A previous global study conducted in 19 countries with 13426 participants to examine the level of public acceptance of receiving a COVID-19 vaccination showed a range of acceptance from 54.9% (in Russia) to 88.6% (in China).[17] Furthermore, another study conducted in Jordan showed a level of acceptance of 37.4%, while a study in France showed a percentage of 76%.[18 19] A previous study in Saudi Arabia showed an acceptance level of 64.7%.[12] The reason behind our slightly increased acceptance level (72%)

Table 4 Differences in demographic characteristics regarding willingness to receive the COVID-19 vaccination

Variable	Are you willing to receive the vaccination for COVID-19?			P value
	Yes	No	Hesitated	
Gender				**0.001**
Male	600 (74.4%)	91 (11.3%)	115 (14.3%)	
Female	593 (69.6%)	78 (9.2%)	181 (21.2%)	
Age				0.099
18–24	261 (70.5%)	41 (11.1%)	68 (18.4%)	
25–34	351 (70.6%)	52 (10.5%)	94 (18.9%)	
35–44	343 (70.9%)	49 (10.1%)	92 (19%)	
45–54	136 (73.5%)	23 (12.4%)	26 (14.1%)	
55 and over	102 (83.6%)	4 (3.3 %)	16 (13.1%)	
Marital status				0.73
Single	445 (73.1%)	59 (9.7%)	105 (17.2%)	
Married	748 (71.3%)	110 (10.5%)	191 (18.2%)	
Monthly income				**0.006**
<3000	390 (66.7%)	71 (12.1%)	124 (21.2%)	
3000–9999	273 (71.8%)	37 (9.7%)	70 (18.4%)	
10 000–19 999	336 (74.5%)	44 (9.8%)	71 (15.7%)	
>20 000	194 (80.2%)	17 (7.0%)	31 (12.8%)	
Job				**0.005**
Unemployed (student, retired, others)	573 (69.9)	76 (9.3%)	171 (20.9%)	
Employed (government, private, entrepreneur)	620 (74%)	93 (11.1%)	125 (14.9)	
Do you live in a:				**0.029**
City	1081 (72.9%)	143 (9.6%)	259 (17.5%)	
Village	112 (64%)	26 (14.9%)	37 (21.1%)	
Education				0.149
Secondary or lower	199 (66.3%)	37 (12.3%)	64 (21.3%)	
Diploma	82 (71.3%)	9 (7.8%)	24 (20.9%)	
Bachelor's	701 (72.9%)	99 (10.3%)	162 (16.8%)	
Master's	132 (71.7%)	20 (10.9%)	32 (17.4%)	
PhD	79 (81.4%)	4 (4.1%)	14 (14.4%)	
Suffer from disease				0.179
No	950 (71.1%)	144 (10.8%)	243 (18.2%)	
Yes (heart disease, diabetes, hypertension, other)	243 (75.7%)	25 (7.8%)	53 (16.5%)	
Infected with COVID-19				**0.010**
Yes	139 (64.1%)	24 (11.1%)	54 (24.9%)	
No	1054 (73.1%)	145 (10.1%)	242 (16.8%)	

Bold=significant.

could be that the former Saudi study had variances in the construction and delivery of its questionnaires; also, the timing of its surveys could help explain the variances in acceptance levels. In comparison with global vaccination acceptance levels, this study presented a high acceptance level of the COVID-19 vaccination. Saudi Arabia is on the road to herd immunity because of the increased number of vaccinated individuals.[20]

The current study showed that one of the main reasons for vaccination refusal is fear of potential side effects, which corresponds to previous studies.[21–25] Furthermore, the analysis showed that there was a significant difference between gender, monthly income, employment, whether one lives in a city or village and whether one has been previously infected with COVID-19 between individuals willing, refusing and hesitating to take the vaccination.

The study showed that the male population had the highest percentage of accepting COVID-19 vaccinations, which corresponds to other studies.[3 15 26] According to another study, the reason behind this outcome could

Table 5 Logistic regression analysis for sociodemographic prediction of intent to uptake the COVID-19 vaccine among respondents

Are you willing to receive a vaccination for COVID-19?		B	Sig.	Exp(B)	95% CI for Exp(B)	
					Lower bound	Upper bound
No	Intercept	−2.12	0.00			
	Male	0.28	0.11	1.33	0.94	1.88
	Female	Reference				
	<3000	1.26	**<0.01**	3.54	1.81	6.91
	3000–9999	0.54	0.09	1.72	0.93	3.20
	10000–19999	0.40	0.19	1.50	0.82	2.71
	>20000	Reference				
	City	−0.48	**0.04**	0.62	0.39	0.99
	Village	Reference				
	Previously infected	0.25	0.29	1.29	0.80	2.06
	Not previously infected	Reference				
	Unemployed (student, retired, others)	−0.65	**0.01**	0.52	0.33	0.83
	Employed (government, private, entrepreneur)	Reference				
Hesitated	Intercept	−1.56	0.00			
	Male	−0.31	**0.03**	0.73	0.55	0.97
	Female	Reference				
	<3000	0.41	0.10	1.50	0.92	2.46
	3000–9999	0.34	0.16	1.41	0.88	2.27
	10000–19999	0.24	0.31	1.27	0.80	2.02
	>20000	Reference				
	City	−0.21	0.30	0.81	0.54	1.21
	Village	Reference				
	Previously infected	0.57	**<0.01**	1.77	1.25	2.50
	Not previously infected	Reference				
	Unemployed (student, retired, others)	0.21	0.22	1.24	0.88	1.73
	Employed (government, private, entrepreneur)	Reference				

Bold=significant.

Table 6 Possible reasons for hesitation among participants are tabulated below

Variable	Answer	Count	Percentage of total respondents
Worries about future side effects	Yes	1012	61.00
Need for more time to see effects	Yes	960	57.90
Worries about unforeseen impact	Yes	957	57.70
General mistrust of vaccination benefit	Yes	642	38.70
Incorrect social media videos or advertisements	Yes	498	30.00
Concerns about commercial profiteering	Yes	365	22.00
Need for long-distance travel to get the vaccination	Yes	320	19.30

be the reported high levels of morbidity and mortality among the male population infected with COVID-19.[3 26 27] Another possible explanation, which is supported by other regional studies,[26 27] is that women were marginally more likely than their male counterparts to hold the belief that COVID-19 was part of a global conspiracy, which may explain the lower level of acceptance among the female population.

One of the important findings in this research indicates that the majority of the population in Saudi Arabia is supportive of the COVID-19 vaccine. Of the 1658 participants in this survey, 1193 (72.0%) showed acceptance of the vaccine, 169 (10.2%) were unwilling to take the vaccine and 296 (17.9%) hesitated. A study of vaccine hesitancy performed in Cameroon among Cameroonians concluded that about 85% of the study's participants were more hesitant or might refuse COVID-19 vaccination compared with our findings.[28]

Moreover, this study found that participants with an income less than 3000 SR (66.7%) were more likely to refuse to receive the vaccination, which is consistent with a previous study performed in Japan.[29] In contrast, those employed (74%) and living in cities (72.9%) were less likely to refuse to take vaccinations. Conversely, participants who were previously infected with COVID-19 were more likely to hesitate to take the vaccination, while men were less likely to hesitate. This could be related to the fact that being previously infected with COVID-19 would provide immunity towards the coronavirus, though studies have proven that immunity after infection is temporary.[30]

In this study, willingness to take the vaccination between age groups was nearly significant. People over age 55 years were more likely to accept the vaccine, which corresponds to global studies reporting a higher acceptance rate among the older population.[15 17 31 32] One factor that governments should focus on while campaigning for vaccinations is possible future side effects.

Further, participants between 25–34 and 35–44 years of age (18.9% and 19%, respectively), people with less than 3000 SR of monthly income, the unemployed (20.9%), village residents (21.1%) and those who were previously infected with COVID-19 showed the highest levels of hesitation. The survey indicated that the most important factors in encouraging people to accept the vaccine include performing more research, caring for loved ones and health officials' reports on the safety of vaccines. These factors play an essential role in aiding governments to convince their people to accept vaccines.

This research has different limitations. The first is that being a cross-sectional study, it portrayed a response of the community's perception towards the acceptance of the COVID-19 vaccine at the time of the study. Participants were asked about what would prevent them from taking the vaccine, and a significant number of participants (32.4%) conveyed their refusal or hesitation to take it because of possible future side effects. The participants' real intentions might differ in the future. The second limitation was that the survey was performed using a web-based, self-administered questionnaire in place of personal interviews. Web-based surveys may lead to several issues, including biased answers. However, to avoid contact and the spread of infection, it can be used. Furthermore, using a web-based survey did not allow for calculating the response rate due to difficulties in tracking the number of subjects who received the questionnaire link. Third, although the study has different parameters pertaining to the acceptance of vaccinations, we cannot specifically identify the incentive behind the acceptance, hesitation or refusal to receive the vaccine. Finally, the strategy of sampling technique (convenient) may introduce bias, although the age and gender of the population were similar to recent data published by the General Authority of Statistics in Saudi Arabia. In contrast, the education-level distribution was slightly shifted towards educated individuals (bachelor's level and higher). The current results may be representative of the educated group, which can be attributed to the fact that educated individuals may be more willing to participate in research. Unfortunately, such bias was not controlled, which may have affected the current study results. However, during the pandemic, this was the only viable option to conduct such a study, since we could not conduct face-to-face interviews.

Notwithstanding the previously mentioned limitations, this study provided acceptable results with an expressive sample size across the kingdom and provided insight into residents' levels of acceptance of the COVID-19 vaccine.

Table 7 Factors that would encourage people to accept the vaccine are presented below

Variable	Answer	Count	Percentage of total respondents
More research	Yes	1403	84.6
Protecting family member or ones you love	Yes	1329	80.2
Data from the health minister about the side effects on vaccinated individuals	Yes	1246	75.20
One of you family members taking it	Yes	1095	66
More time	Yes	1020	61.5
More campaigns to increase awareness	Yes	1019	61.5
Availability of the vaccination nearby	Yes	877	52.9
Famous individuals taking the vaccination	Yes	307	18.5
I will never change my mind	Yes	205	12.4

CONCLUSION

The rapid spread of COVID-19 and the emergence of several variants of the coronavirus made the need to increase the number of vaccinated people a necessity. Public acceptance of the COVID-19 vaccine is essential for protecting the world population and stopping the COVID-19 pandemic. This cross-sectional study was conducted on 1658 randomly selected residents of Saudi Arabia to evaluate the acceptability of COVID-19 vaccination among the Saudi population. The population in Saudi Arabia showed a high acceptance level (72.0%) compared with global studies. Participants' history of viral infection and trust in the healthcare system were found to be important factors in the public's acceptance of the vaccine. Certain sociodemographic factors were found to be significant indicators of the intention to accept the COVID-19 vaccine among the kingdom's population. The government and the Ministry of Health should work together to educate the public about the importance of the COVID-19 vaccination.

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