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Exploring the underlying factors of COVID-19 vaccination hesitancy in Ahvaz, Iran: a comprehensive cross-sectional study

Purpose: Around 70% of the Iranian population had received two doses of coronavirus disease 2019 (COVID-19) vaccines by the end of 2021. In this study, we evaluated the reasons for vaccination refusal among people in Ahvaz, Iran.

Materials and Methods: In this cross-sectional study, 800 participants (400 vaccinated and 400 unvaccinated) were recruited. A demographic questionnaire was completed through interviews. The unvaccinated participants were asked about the reasons for their refusal. The Shapiro-Wilk test, independent t-test, chi-square test, and logistic regression were used for analyzing data.

Results: Older people were 1.018 times more likely to refrain from vaccination (95% confidence interval [CI], 1.001–1.039; p=043). People who were manual workers as well as those who were unemployed/housewives were 0.288 and 0.423 times less likely to receive vaccination, respectively. Those with high school education and married women were 0.319 and 0.280 times less likely to receive vaccination, respectively (95% CI, 198–0.515; p<0.001; 95% CI, 0.186–0.422; p<0.001). Participants who had hypertension or suffered from neurological disorders were more likely to receive the vaccination. Finally, people affected with severe COVID-19 infection were 3.157 times more likely to get vaccinated (95% CI, 1.672–5.961; p<0.001).

Conclusion: The results of this study showed that lower level of education and older age were contributed to reluctance for vaccination, while having chronic diseases or being already infected with severe COVID-19 infection were associated with more acceptance of vaccination.

Keywords: COVID-19 vaccination, Vaccination refusal, Chronic disease, Infection, Iran

Introduction

Coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 virus is an infectious disease that started first in China in December 2019, only to become a pandemic in the world a few months later. More than 500,000,000 people have thus far been infected with COVID-19 infection, and more than 6 million people around the world have died from this disease [1]. In Iran, more than 7 million cases have so far been affected by the virus, and about 150,000 deaths associated with COVID-19 have been reported [2]. Infection Prevention and Control strategies such as using facial masks in closed areas, social distancing, and vaccination are the measures recommended by the World Health Organization for the prevention of COVID-19 infection [3]. There is evidence showing that vaccination reduced mortality and infection

prevalence among American people [4]. The rate of COVID-19 vaccination is different in different parts of the world. For example, this rate is 67.6% in the United States, 67% in India, 89.4% in China, and 79.8% in Brazil. According to statistics, 58.1 million of the Iranian population have received two doses of vaccines, which means that 69.1% of the Iranian population are now fully vaccinated against COVID-19 [5].

Despite the inarguable benefits of vaccination, some people around the world are reluctant to receive COVID-19 vaccines. Steinert et al. [6] in their study found that 6.4% to 61.8% of the people in different European countries refuse to receive vaccines. Another study showed that even among nurses, 20.7% refuse to receive vaccines because they are not sure about the safety of vaccines [7]. Another study in Turkey showed that most of the study participants (66.1%) refused to receive foreign vaccines and were typically willing to receive domestic vaccines [8]. A study on 1,928 participants in Iran showed that 69% of the participants were willing to receive vaccines, and female gender, lower educational attainment, and loss of relatives due to COVID-19 infection were significantly related to the negative attitudes regarding vaccination [9]. Abbasi et al. [10] showed that only a small number of Iranian people with multiple sclerosis were hesitant against CO-VID-19 vaccination (6.9%), while the majority accepted vaccination. Another study in Iran showed that although most of the Iranian participants liked to receive vaccines, 80% did not prefer domestic vaccines, and around 70% refused vaccination because of their adverse effects [11]. There are around 170 COVID-19 vaccines around the world. These may include a whole virus, protein subunit, viral vector, or nucleic acid (RNA and DNA) [12]. The list of vaccines imported in Iran include: Oxford- AstraZeneca (Sweden, Britain), Sinopharm (inactivated, China), Sinovac Biotech (inactivated, China), Covaxin (inactivated, India), and Sputnik-V (viral vector, Russia). There are also some other vaccines that are either developed in Iran or produced by cooperation with other countries. These include Sobrana 02 (protein subunit, Cuba and Iran), Razi Cov Pars (protein subunit, Iran), Spikogen (protein subunit, Iran), Fakhravac (inactivated, Iran), and COVIran Barekat (inactivated, Iran). Despite the variety and availability of these vaccines, around 30% of the Iranian population have been reluctant to receive the vaccination. There is some evidence of vaccination hesitancy in special groups in Iran. For instance, a study by Moini et al. [13] on 477 Iranian pregnant women showed that around 50% of these women were hesitant about COVID-19 vaccination, and the most prevalent reason for this was fear of vaccine side effects. On the contrary, Abbasi et al. [10] in their study on 1,479 patients with multiple sclerosis, found that only a small group of patients (6.9%) were reluctant to receive vaccination. Despite information about vaccination hesitancy in special groups, there is little, if any, information about the general population of Iran. There is a need to shed more light on this issue and scrutinize vaccination refusal among the Iranian population. This study was, therefore, a scholarly attempt to explore the underlying factors of COVID-19 vaccination hesitancy in Ahvaz, Iran.

Materials and Methods

This was a cross-sectional study conducted on 800 people in Ahvaz, Iran. Ahvaz is the capital of Khuzestan province located in the Southwest of Iran and has a population of 1000,000 (sub-national, 2018). Different ethnicities including Arab, Fars, Bakhtiari, and Turk live in this province.

Inclusion criteria
People older than 18 years who had either received or not received vaccination against COVID-19 and were willing to participate in the study were recruited. People who were not willing to participate were excluded from the study.

Ethics statement
The design of the study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (Ref. ID: IR.AJUMS.REC.1400.576). All eligible participants provided written informed consent prior to data collection. Data collection started in January 2022 and finished in March 2022.

Sample size
The sample size was calculated using OpenEpi (2021; https://www.openepi.com/Menu/OE_Menu.htm). According to the last national census, considering Arab ethnicity with lowest rate of vaccination (62%) in Khuzestan province, and 95% confidence interval, the final sample size was calculated to be 362, and assuming 10% non-respondents, the final sample size was calculated to be 400.

Instruments
A demographic questionnaire involving questions about age, sex, educational attainment, occupation, marital status, history of medical disorders, and history of COVID-19 infection

was prepared and completed through interviews. The validity of this questionnaire was assessed by content validity. The participants in the group without vaccination were asked to provide their reason for vaccination refusal.

Procedure

Three public health centers from the west and east banks of the Karun River in Ahvaz were chosen randomly, and eligible people who received or not received vaccination were requested to complete the demographic questionnaire, and the latter was further asked to provide a reason for vaccination refusal. The questionnaires for illiterate participants were completed by interview. All eligible participants provided written informed consent prior to data collection.

Outcomes

Our results reveal the reasons for refusal of vaccination.

Statistics

All data entered into IBM SPSS ver. 23.0 (IBM Corp., Armonk,

Table 1. Demographic characteristics of participants in two groups of vaccinated and unvaccinated

Characteristic	Vaccinated (N=400)	Unvaccinated (N=400)	p-value
Age (yr)	30.9±10.03	33.4±10.68	0.001
Sex			0.127
Female	234 (58.5)	248 (62.0)	
Male	166 (41.5)	152 (38.0)	
Occupation			<0.0001
Manual worker	33 (8.3)	16 (4.0)	
Employee	58 (14.5)	133 (33.3)	
Unemployed/housewife	219 (54.8)	152 (38.0)	
Self-employed	90 (22.5)	99 (24.8)	
Marital status			<0.0001
Single	162 (40.5)	90 (22.5)	
Married	238 (59.5)	310 (77.5)	
History of medical disorders			<0.0001
No	316 (79.0)	228 (57.0)	
Diabetes	40 (10.0)	58 (14.5)	
Hypertension	7 (1.8)	49 (12.3)	
Cardiac disease	0	32 (8.0)	
Renal disease	11 (2.8)	0	
Neurological disease	4 (1.0)	28 (7.0)	
Thyroid disease	22 (5.5)	5 (1.3)	
Educations attainment			<0.0001
Illiterate	45 (11.3)	3 (0.8)	
High school	127 (31.8)	52 (13.0)	
Diploma	108 (27.0)	136 (34.0)	
University degree	120 (30.0)	209 (52.3)	
History of COVID-19 infection before vaccination			<0.0001
No	71 (17.8)	17 (4.3)	
1	100 (25.0)	169 (42.3)	
2	158 (39.5)	173 (43.3)	
≥3	71 (17.8)	41 (10.3)	
History of infection in family members before vaccination			<0.0001
No	116 (29)	22 (5.5)	
Yes (my spouse)	156 (39.1)	285 (71.3)	
Yes (my parents)	97 (24.3)	75 (18.8)	
Yes (sister/brother)	31 (7.8)	18 (4.5)	

Values are presented as mean±standard deviation or number (%).
COVID-19, coronavirus disease 2019.

NY, USA). The normal distribution of continuous data was assessed by the Shapiro-Wilk test. The independent t-test and chi-square test were used for continuous and categorical data, respectively. For a better understanding of the relationship between vaccination refusal and some demographic factors, logistic regression was used. In all tests, $p < 0.05$ was considered statistically significant.

Results

The demographic characteristics of the participants are illustrated in Table 1. As this table shows, unvaccinated people were significantly older, were typically employed and married, and had medical disorders such as diabetes or hypertension. Most of the unvaccinated participants (n=209, 52.2%) had a university degree as opposed to 120 (30%) of their counterparts in the vaccinated group ($p < 0.0001$). Unvaccinated individuals in this study were more likely to have been infected with COVID-19 once or twice ($p < 0.0001$). Also, COVID-19 infection among relatives was significantly more common among unvaccinated participants ($p < 0.0001$).

Table 2 shows the association between vaccination and the

demographic and medical characteristics of the participants. As this table shows, older people were 1.018 times less likely to receive vaccination (95% confidence interval [CI], 1.001–1.039; p=0.043). People who were manual workers or those who were unemployed/housewives were 0.288 and 0.423 times less likely to receive vaccination, respectively. Those with high school education and married women were 0.319 and 0.280 times less likely to receive vaccination, respectively (95% CI, 198–0.515; p<0.001; 95% CI, 0.186–0.422; p<0.001).

Participants who had hypertension were 11.596 times more likely to get vaccinated (95% CI, 2.217–60.641; p=004), and those who suffered from neurological disorders were 6.028 times more likely to receive their vaccines (95% CI, 1.107–32.826; p=038). People infected with COVID-19 once were 0.247 times less likely to receive their vaccine, while those infected twice were 3.157 times more likely to receive their vaccine (95% CI, 0.108–0.562; p=0.001 and 95% CI, 1.672–5.961; p<0.001, respectively).

The most commonly mentioned reasons that participants indicated for refraining from vaccination are illustrated in Fig. 1. The most common reasons were as follows: they had no trust in the existing vaccines (34.5%); they claimed if they are

Table 2. Logistic regression for assessing the relationship between vaccination and some demographic variables

Variable	β	SE	Wald	df	Sig.	Exp (β)	95% CI
Age	0.018	0.009	4.082	1	0.043	1.018	1.001–1.036
Self-employed			14.942	1	0.002		
Worker	-1.244	0.425	8.556	1	0.003	0.288	0.125–0.663
Employee	-0.468	0.299	2.447	1	0.118	0.626	0.348–1.126
Unemployed or housewife	-0.860	0.249	11.937	1	0.001	0.423	0.260–0.689
University degree			51.736	1	0.000		
Illiterate	-3.535	0.327	5.495	3	0.139	2.214	1.166–4.204
High school	-1.142	0.244	21.870	1	0.000	0.319	0.198–0.515
Diploma	0.188	0.220	0.734	1	0.392	1.207	0.785–1.856
Marital status	-1.274	0.209	37.027	1	0.000	0.280	0.186–0.422
Medical disorders			23.681	6	0.001		
No medical disorder	0.211	0.651	0.105	1	0.746	1.235	0.344–4.427
Diabetes	0.664	0.686	0.935	1	0.334	1.942	0.506–7.453
Hypertension	2.451	0.844	8.430	1	0.004	11.596	2.217–60.641
Cardiac disorders	20.612	6,934.551	0.000	1	0.998	894,372,446.122	0.000
Renal disorders	-22.724	11,320.773	0.000	1	0.998	0.000	0.000
Neurological disorders	1.796	0.865	4.317	1	0.038	6.028	1.107–32.826
COVID-19 infection (no)			53.337	3	0.000		
COVID-19 infection (1)	-1.399	0.420	11.103	1	0.001	0.247	0.108–0.562
COVID-19 infection (2)	1.150	0.324	12.566	1	0.000	3.157	1.672–5.961
COVID-19 infection (3)	0.412	0.313	1.733	1	0.188	1.510	0.817–2.791
Constant	-0.098	0.815	0.014	1	0.904	0.907	

SE, standard error; df, degrees of freedom; Sig., significance; CI, confidence interval; COVID-19, coronavirus disease 2019.
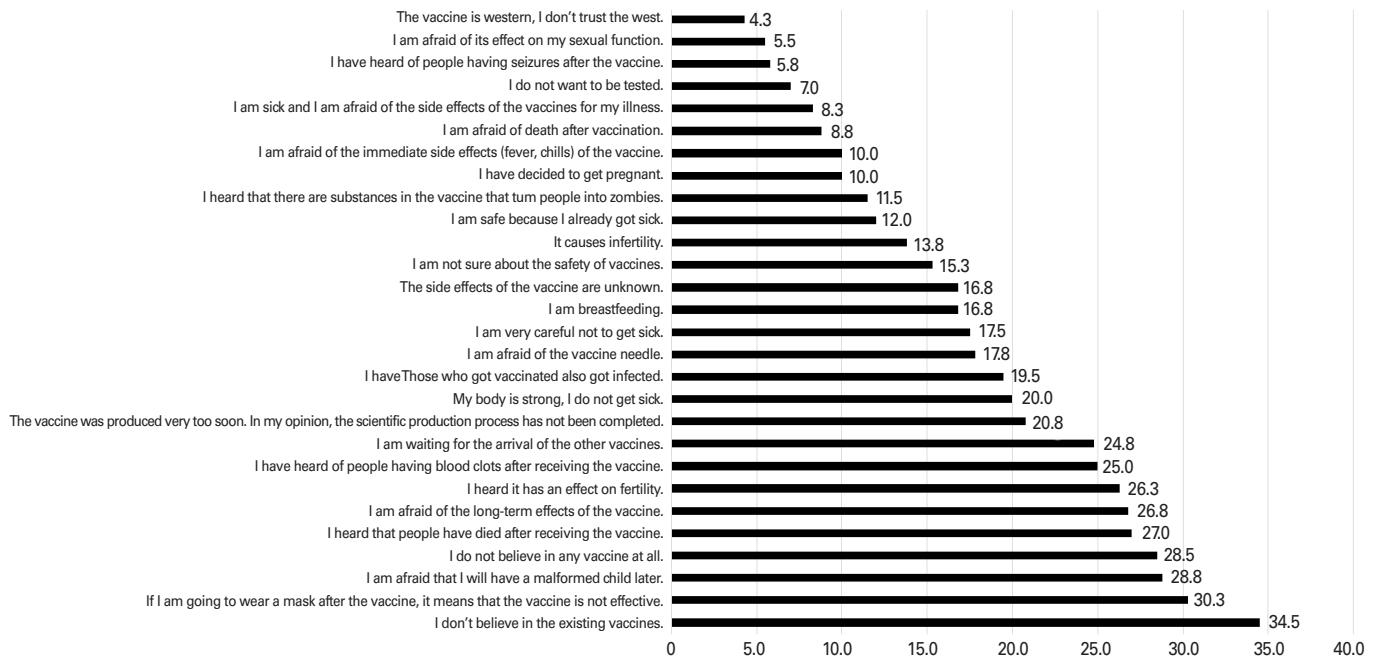
Fig. 1. The reasons for vaccination refusal among participants.

Table 3. Type of vaccines the participants received

Type of vaccine	First dose	Second dose	Third dose
Sinopharm	300 (75.0)	245 (61.3)	159 (39.8)
Covaxin	4 (1.0)	17 (4.3)	13 (3.3)
Astrazeneca	23 (5.8)	7 (1.8)	2 (0.5)
COVIran Barekat	73 (18.3)	65 (16.3)	41 (10.3)

Values are presented as number (%).

supposed to wear a mask after receiving the vaccine, it means that the vaccine is not effective (30.3%); they were worried that vaccines might cause malformation in their offspring (28.8%); they did not believe in any vaccine at all (28.5%); and they had heard that people died after vaccination (27%).

Table 3 shows the type of vaccines that the participants received. Most of the participants (n = 300, 75%) received Sinopharm for their first dose, while Covaxin was the least vaccine received as the first dose. Most participants considered Sinopharm for their second and third doses (61.3% and 39.8%, respectively). Overall, 66 (16.5%) did not receive the second dose, 184 (46%) did not receive the third dose, 51.5% were satisfied with vaccination, and 51.3% were satisfied with the type of vaccine.

Discussion

This study aimed to evaluate the reasons for COVID-19 vaccination refusal in Ahvaz, Iran. According to our results, those with a high school education were less likely to receive the vaccination. In line with our results, a study on 479 people in Pakistan showed that while 40.5% received COVID-19 vaccines, 29% were hesitant about vaccination, and 30% refused to get vaccinated. The authors found that older age, female sex, and lower education contributed to vaccination refusal [14]. Also, a study in Russia showed that older people and those with a lower level of education were more reluctant against vaccination [15]. While the participants in the present study did not relate ethnicity or religion to their vaccination refusal, a study in Venezuela on 327 participants showed that the most common reasons for hesitancy against COVID-19 vaccination were ethnicity and religion, whereas income and educational attainment had weak and moderate negative correlations with hesitancy, respectively [16].

Our results showed that participants who had hypertension or neurological disorders were more likely to have their vaccination done. In their study on 998 patients with chronic diseases, Jilang et al. [17] found that around 95% of their participants were willing to receive vaccines. They found that people who had diseases in their vital organs had more negative attitudes against vaccination [17].

The results of the present study showed that people infected with COVID-19 infection once were less likely to receive their vaccine, while those who were infected twice were more likely to receive their vaccine. Consistent with our results, a study in the United States showed that hospitalized people

who got a serious form of COVID-19 infection with the possibility of death were more likely to have full vaccination [18].

Our results showed that the most prevalent reasons for refusal of vaccination were as follows: having no trust in the existing vaccines or any vaccines at all, the ineffectiveness of vaccines, malformation in the offspring caused by vaccines, and death due to vaccination. In line with our results, Sun et al. [19] found that people are reluctant to receive vaccines because they are not sure about the safety of vaccines, or have heard bad news about people who have got vaccinated. For many years, various vaccines for children have been produced in Iran, and almost everyone is willing to use these vaccines for their children. However, when it came to COVID-19 vaccines, the issue was completely different. First, the Iranian government banned the import of US-made vaccines. Second, domestic vaccines were not prepared on time. Finally, perhaps some people were doubtful about the process of manufacturing the vaccines. Although developed countries introduced COVID-19 vaccines less than 1 year after the beginning of the pandemic, the Iranian government banned the import of vaccines made in the United States and England.

After a significant delay, the Iranian-made COVIran Barekat vaccine along with some other made in China and South Korea became available to Iranian people [20]. The medical and health staff were the first group to receive the vaccination. The Iranian government adopted a number of strategies to encourage people to get vaccinated. This included mass media advertisement, prohibition of hiring people who were not vaccinated, and preventing unvaccinated students from entering classes, to name only a few.

Free vaccination centers were easily accessible to people, and pregnant women were encouraged to attend public health centers for vaccination [21].

Limitations of the study

In this study, we selected the public health centers randomly but did not recruit participants randomly, and this may affect the generalizability of the results of this study. Some reasons for the refusal of vaccination are politically sensitive. For example, the Iranian government banned importing vaccines from countries such as the United States, and the participants might not have been willing to mention this matter.

In conclusion, the results of this study showed that lower level of education and older age were contributed to vaccination refusal, while having chronic diseases or severe COVID-19 infection were associated with more acceptance of vaccination. Lack of trust in existing vaccines in Iran and unacceptance of vaccination were among the top reasons for the refusal of vaccination. Policymakers should provide more reliable information about vaccines to enhance the public's knowledge in this regard, and by increasing access of people to more reliable vaccines, they may help them to have a better choice.

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References

1. CSSEGISandData: COVID-19 data repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University [Internet]. San Francisco (CA): GitHub Inc.; 2022 [cited 2023 Mar 17]. Available from: https://github.com/CSSEGISandData/COVID-19

2. REUTERS. COVID-19 Tracker: Asia and the Middle East: Iran [Internet]. London: REUTERS; 2022 [cited 2023 Mar 15]. Available from: https://graphics.reuters.com/world-coronavirus-tracker-and-maps/countries-and-territories/iran/

3. World Health Organization. Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed: interim guidance, 12 July 2021. Geneva: World Health Organization; 2021.

4. Suthar AB, Wang J, Seffren V, Wiegand RE, Griffing S, Zell E. Public health impact of COVID-19 vaccines in the US: observational study. BMJ 2022;377:e069317.

5. World Health Organization. Vaccines and immunization: overview [Internet]. Geneva: World Health Organization; 2020 [cited 2023 Mar 1]. Available from: https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1

6. Steinert JI, Sternberg H, Prince H, et al. COVID-19 vaccine hesitancy in eight European countries: prevalence, determinants, and heterogeneity. Sci Adv 2022;8:eabm9825.

7. Khubchandani J, Bustos E, Chowdhury S, Biswas N, Keller T. COVID-19 vaccine refusal among nurses worldwide: review of trends and predictors. Vaccines (Basel) 2022;10:230.

8. Yigit M, Ozkaya-Parlakay A, Senel E. Evaluation of COVID-19 vaccine refusal in parents. Pediatr Infect Dis J 2021; 40:e134-6.

9. Nakhostin-Ansari A, Zimet GD, Khonji MS, et al. Acceptance or rejection of the COVID-19 vaccine: a study on Iranian people's opinions toward the COVID-19 vaccine. Vaccines (Basel) 2022;10:670.

10. Abbasi N, Ghadiri F, Moghadasi AN, et al. COVID-19 vaccine hesitancy in Iranian patients with multiple sclerosis. Mult Scler Relat Disord 2022;60:103723.

11. Micaeili-Mirak S, Namazi S, Ghadrdan E. A survey of Iranian population attitude about vaccination against COVID-19 and evaluation of its spontaneous reporting of adverse effects. J Biomed Sci 2021;3:1234-40.

12. VaccinesWork. There are four types of COVID-19 vaccines: here's how they work [Internet]. Geneva: GAVI; 2020 [cited 2023 Mar 1]. Available from: https://www.gavi.org/vaccineswork/there-are-four-types-covid-19-vaccines-heres-how-they-work

13. Moini A, Rabiei M, Pirjani R, Abiri A, Maleki-Hajiagha A. COVID-19 vaccine hesitancy among pregnant women and their reported reasons for vaccine refusal: a prospective study in Tehran, Iran. Vaccine 2023;41:1490-5.

14. Samo AA, Sayed RB, Valecha J, Baig NM, Laghari ZA. Demographic factors associated with acceptance, hesitancy, and refusal of COVID-19 vaccine among residents of Sukkur during lockdown: a cross sectional study from Pakistan. Hum Vaccin Immunother 2022;18:2026137.

15. Maleva TM, Kartseva MA, Korzhuk SV. Socio-demographic determinants of COVID-19 vaccine uptake in Russia in the context of mandatory vaccination of employees. Popul Econ 2021;5:30-49.

16. Andrade G. Predictive demographic factors of COVID-19 vaccine hesitancy in Venezuela: a cross-sectional study. Vacunas 2022;23:S22-5.

17. Jiang N, Gu P, Sun X, et al. Acceptance of COVID-19 vaccines in patients with chronic diseases: a cross-sectional study. J Clin Nurs 2022;31:3286-300.

18. Tenforde MW, Self WH, Adams K, et al. Association between mRNA vaccination and COVID-19 hospitalization and disease severity. JAMA 2021;326:2043-54.

19. Sun Y, Li B, Li N, et al. Acceptance of COVID-19 vaccine among high-risk occupations in a Port city of China and multifaceted strategies for increasing vaccination coverage: a cross-sectional study. Risk Manag Healthc Policy 2022;15:643-55.

20. Nojomi M, Moradi-Lakeh M, Pourmalek F. COVID-19 in Iran: what was done and what should be done. Med J Islam Repub Iran 2021;35:97.

21. Fotoukian Z, Navabi N, Chaboksavar F, Mohammadkhah F. Strategies to increase the acceptance of COVID-19 vaccine in the Iranian community. J Isfahan Med Sch 2021; 39:341-3.