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ORIGINAL RESEARCH ARTICLE

Public Preferences and Willingness to Pay for a COVID-19 Vaccine in Iran: A Discrete Choice Experiment

Alireza Darrudi[1] · Rajabali Daroudi[1] · Masud Yunesian[2] · Ali Akbari Sari[1]

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Abstract

Background and objective The coronavirus disease 2019 (COVID-19) pandemic is a major international threat and vaccination is the most robust strategy to terminate this crisis. It is helpful for policymakers to be aware of community preferences about vaccines. The present study aims to investigate the public's preferences and willingness to pay for the COVID-19 vaccine in Iran.

Methods This research is a cross-sectional study performed using a discrete choice experiment for a sample of the public population of several provinces of Iran in 2021. The samples were divided into two groups: one group expressed their preferences regarding the vaccine's attributes, and another group expressed their preferences regarding prioritizing individuals to get the vaccine. The discrete choice experiment design included five attributes including effectiveness, risk of severe complications, price, location of vaccine production, and duration of protection related to preferences for vaccine selection and six attributes including age, underlying diseases, employment in the healthcare sector, the rate of virus spread, the necessary job, and cost to the community related to preferences for prioritizing individuals to get the vaccine. A total of 715 individuals completed the questionnaire. The conditional logit regression model was used to analyze the discrete choice experiment data. Willingness to pay for each attribute was also calculated.

Results The willingness to pay for the COVID-19 vaccine with 90% (70%) efficacy, the risk of severe complications for 1 (5) person per one million people, imported (domestic) vaccine, and 24-month (12-month) duration of protection attributes was about US$71 (US$37). The preference for vaccination for respondents was enhanced by increasing the efficacy and the duration of vaccine protection and decreasing complications and costs. The likelihood of prioritizing individuals to get a vaccination was increased for a person with an underlying disease, employment in the healthcare sector, the necessary job for the community, the high potential for virus spread in the community, and the high cost of death to the community. The age variable was not statistically significant for prioritizing individuals to get the vaccine.

Conclusions In the setting of the COVID-19 vaccination program, the public's preferences identified in this study should be considered. The obtained results provide useful information for policymakers to identify individual and social values for an appropriate vaccination strategy.

Key Points for Decision Makers

The willingness to pay for the coronavirus disease 2019 vaccine was about US$71 for a vaccine with 90% effectiveness, a risk of severe complications for 1 person per 1 million people, imported vaccine, and 24-month duration of protection attributes.

Risk of severe side effects and efficacy were the strongest attributes of the public's preferences for vaccine selection.

Potential capacity to spread the virus in the community and employment in the healthcare sector were the strongest attributes of the public's preferences for prioritizing individuals to get the vaccine.

✉ Ali Akbari Sari
akbarisari@tums.ac.ir

1 Department of Health Management and Economics, School of Public Health, Tehran University of Medical Sciences, Poursina Ave., 1417613191 Tehran, Iran

2 Department of Environmental Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

1 Introduction

The current global coronavirus disease 2019 (COVID-19) pandemic is a major international threat. Coronavirus disease is caused by severe acute respiratory syndrome coronavirus 2 [1]. By 20 November, 2021, more than 257 million confirmed cases of COVID-19 were reported globally, with more than 5 million deaths [2]. In Iran, more than 6 million confirmed cases of COVID-19 and more than 128,000 deaths have been reported to date [3]. Although some drugs have been used to treat patients with COVID-19 [4, 5], no specific treatment has been approved by international organizations. Therefore, vaccination is one of the most promising strategies in this crisis.

Even with the availability of a safe and effective COVID-19 vaccine, it is not clear whether people will accept or buy the vaccine. Therefore, it is essential to evaluate the vaccine's acceptance rate and the willingness to pay (WTP) for the vaccine. The evaluation of WTP for the vaccine, defined as the maximum amount of money that people are willing to pay for a vaccine, determines the potential market and obtains information that can be used to formulate the best payment strategy for a new vaccine. The WTP is influenced by many factors, including sociological and demographic characteristics and individuals' previous attitudes and beliefs. These factors in different societies do not necessarily have a fixed relationship to the WTP. Therefore, identifying the determinants associated with the WTP for the COVID-19 vaccine is essential for the government and other organizations to design an excellent intervention to be used in key populations [6–9]. Studies have evaluated the acceptance and the WTP for the COVID-19 vaccine globally but in Iran such evidence is limited [10, 11].

Another issue after vaccine acceptance by individuals is that when the COVID-19 vaccine becomes available there will not be enough supply to vaccinate the entire population. That is why policymakers are developing vaccine prioritization strategies at national and international levels [12].

Rationing can fill the gap between service and available sources. The consequences of rationing include prioritizing services, effective resource allocation, and the effective management of resource distribution [13, 14]. According to a study conducted in 2018, there are 12 types of strategies for rationing in health, including explicit and implicit rationing, rationing based on price or monetary rationing, and rationing based on age [15]. However, these strategies must enjoy adequate public support. Therefore, it is also necessary to determine the public's preferences about the vaccine.

The discrete choice experiment (DCE) is the most ordinal method that calculates the WTP and determines the public's preference in the healthcare sector [16]. For the first time, this study is using the DCE method to estimate the WTP and the public's preferences for a COVID-19 vaccine in Iran.

2 Method

In this cross-sectional study, the DCE method was used to calculate the WTP and determine the public's preferences for the COVID-19 vaccine. The public's preferences have been measured regarding both the vaccine type and prioritizing individuals to get the vaccine.

2.1 Identification of Attributes and Levels

First, a list of attributes was extracted by reviewing studies [12, 17–20] and expert opinions. The first list of attributes and levels included 19 attributes at different levels for the vaccine and 11 attributes at different levels for individuals (see Table 1 in the Electronic Supplementary Material [ESM]). Then, the final attributes were selected by a panel consisting of experts from the fields of health economics, virology, health policymaking, and healthcare management (seven people), by ranking attributes, of which five attributes were related to the vaccine and six attributes were related to individuals.

The five attributes related to preferences for vaccine selection included effectiveness, risk of severe complications, price, location of vaccine production, and duration of protection. The six attributes related to preferences for prioritizing individuals to get the vaccine were age, underlying diseases, employment in the healthcare sector, the rate of virus spread, the necessary job for the community, and cost to the community. The levels of relevant attributes were also chosen using articles and the opinions of experts so that they could cover the essential dimensions of the COVID-19 vaccine and individuals in the community (Table 1).

2.2 Selection of Experimental Design

In the present research, for the public's preferences regarding the vaccine selection, one attribute at five levels, one attribute at two levels, and three attributes at five levels, and for the public's preferences regarding prioritizing individuals to get the vaccine, two attributes at three levels and four attributes at two levels were included. Using the full factorial design, the total combinations led to 270[1] scenarios and 36,315[2] possible pairwise choices to calculate the WTP and the public's preferences for the COVID-19 vaccine and 144[3] scenarios and 10,296[4] possible pairwise choices to evaluate the public's preferences for prioritizing individuals in the community to get the vaccine. To resolve the difficulty of

[1] $n = 3^3*2*5$.
[2] 269*270/2.
[3] $n = 3^2*2^4$.
[4] 143*144/2.

Table 1 Attributes and levels

Section	Attributes	Levels
Public's preferences for vaccine selection	Effectiveness (%)	50% 70% 90%
	Risk of severe side effects (anaphylactic shock or death)	1 person per one million people 5 people per one million people 10 people per one million people
	Price (Rials and US$)	Free 500 thousand Rials ($2) 1 million Rials ($4) 2 million Rials ($8) 5 million Rials ($20)
	Location of vaccine production	Imported Domestic production
	Protection period (months)	6 months 12 months 24 months
Public's preferences for prioritizing individuals to get the vaccine	Age	Less than 60 years More than 60 years
	Underlying diseases (such as high blood pressure and diabetes mellitus)	Have Not have
	Employment in the health sector (direct contact with coronavirus patients)	Yes No
	Potential capacity to spread the virus in the community or the extent of the virus	Low (1–2 people) Medium (3–5 people) Many (5–10 people)
	The necessary job for society	It is necessary for society It is not necessary for society
	Cost to the community or the amount of damage to the community in the event of death and disability	Low Medium High

responding to this number of choice sets using the fractional factorial and D-efficiency in Stata software, 36 choice sets were developed to examine the public's preferences regarding vaccine selection, and 30 choice sets were provided to examine the public's preferences regarding prioritizing individuals to get the vaccine. The choice sets of public's preferences regarding the vaccine selection were divided into four blocks and each block consisted of nine choice sets. The choice sets of public's preferences regarding prioritizing individuals to get the vaccine were divided into three blocks and each block consisted of ten choice sets. In this study, there were two series of choice sets: one series related to the vaccine and another related to prioritizing individuals. An example of these choice sets is given in Figs. 1 and 2. (The figures are English translations.)

2.3 Questionnaire Development and Data Collection

Given that there were four blocks of nine choice sets for the vaccine and three blocks of ten choice sets for individuals, seven editions of the questionnaire were prepared. All questionnaires were similar and differed only in choice sets, and each individual was given only one questionnaire. The questionnaire included DCE questions and demographic questions of individuals (see the English translation of questionnaires in the ESM). Considering that the study questionnaire was the result of the opinions of experts and specialists, the content validity was confirmed by them; nevertheless, the validity of the final version of the questionnaire was approved by six experts in this field. However, as statistical methods have been used to design selection sets, this tool generally had appropriate validity and reliability. In a pilot study (30 people), the questionnaire reliability was also examined. In the assessment of the respondent's perception of the choice sets, in other words, the questionnaire's internal validity, the dominant choice set was entered into the vaccine choice sets as a test of rationality in the questionnaire, in which one scenario was logically and superior to the opposite scenario. Therefore, all individuals who carefully responded to the questionnaire were expected to choose the dominant option; thus, those who did not respond correctly to the dominant option were excluded from the study.

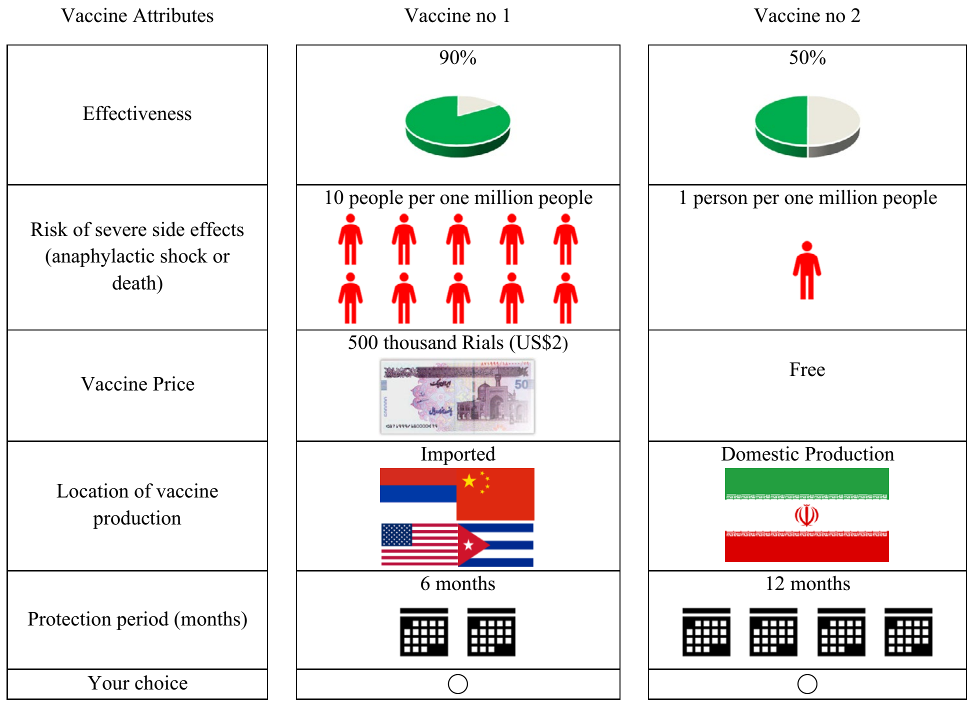

Fig. 1 Example of a discrete choice experiment choice set for vaccine selection

Data were collected from 21 March to 6 July, 2021, among the general population over 18 years of age in the Tehran province and several other provinces (Khorasan Razavi, Isfahan, Alborz) [see Table 2 in the ESM]. The convenience sampling method was used to select the sampling units. Data collection was performed both online (415 participants) and in person (300 participants) to increase generalizability by the research team members. In the online stage of collecting the questionnaires, an online questionnaire was designed using the EPOLL website, and the questionnaire link was sent to individuals through communication channels such as text messages and communication groups. In the in-person collection stage, the designed online questionnaire was completed according to individuals' answers in public places (hospitals, government centers, public spaces) by the research team members using tablets. Individuals who answered the dominant question incorrectly, completed the questionnaire incompletely, or refused to continue completing the questionnaire for any reason were excluded from the final analysis.

2.4 Statistical Analysis

The conditional logit is one of the common estimation models used for statistical analysis [21–24]. The selection set was estimated by a conditional logit regression model using Stata software. Only the main effect was estimated in this study. As the proposed vaccines and individuals are binary ($V = 1$, if the vaccine or individual is selected; $V = 0$, if the vaccine or individual is not selected), the estimated models for the vaccine and individuals (two models) are as follows:

$$\begin{aligned} V_{\text{vaccine selection}} = {} & \beta 1\ \text{effectiveness}_{70\%} \\ & + \beta 2\ \text{effectiveness}_{90\%} \\ & + \beta 3\ \text{serious side effects}_{5:1000000} \\ & + \beta 4\ \text{serious side effects}_{1:1000000} \\ & + \beta 5\ \text{cost}_{8\$} + \beta 6\ \text{cost}_{4\$} + \beta 7\ \text{cost}_{2\$} \\ & + \beta 8\ \text{cost}_{\text{free}} + \beta 9\ \text{product}_{\text{import}} \\ & + \beta 10\ \text{duration}_{12} + \beta 11\ \text{duration}_{24} \end{aligned}$$

$$\begin{aligned} & V_{\text{prioritizing individuals to get the vaccine}} \\ & = \beta 1\ \text{Age}_{\text{More than 60 years}} \\ & + \beta 2\ \text{underlying disease}_{\text{have}} \\ & + \beta 3\ \text{employment in the health sector}_{\text{Yes}} \\ & + \beta 4\ \text{virus spread rate}_{\text{medium}} \\ & + \beta 5\ \text{virus spread rate}_{\text{Much}} \\ & + \beta 6\ \text{job necessary} \\ & + \beta 7\ \text{costs for the community}_{\text{medium}} \\ & + \beta 8\ \text{costs for the community}_{\text{Much}} \end{aligned}$$

The willingness for final payment for an attribute level equals the final replacement rate between the level and attribute cost. Therefore, if the price attribute coefficient was b and the coefficient of levels of one of the studied attributes was b_1, the WTP would be obtained through the following relationship:

$$\text{WTP} = -b_1/b.$$

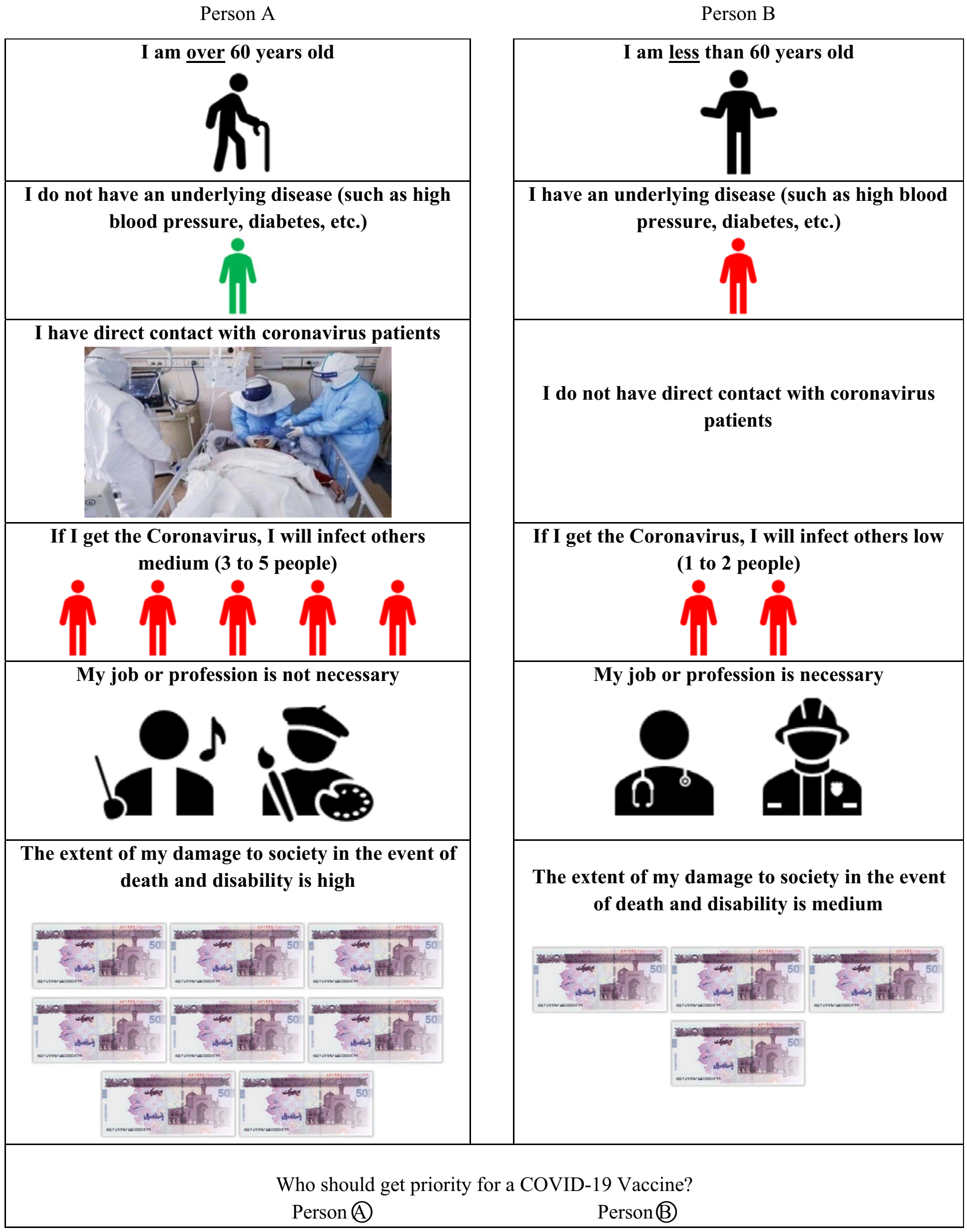

Fig. 2 Example of a discrete choice experiment choice set for prioritizing people. *COVID-19* coronavirus disease 2019

The exchange rate for converting IR.Rials to US$ was IR.Rials 257,000 = US$1 at the time of the study. All analyses were performed using STATA software version 13.1.

3 Results

3.1 Sample Characteristics

In this study, a total of 715 people completed the questionnaire (including the pilot study and the main study). Four hundred and ten people expressed their preferences regarding the vaccine attributes, and 305 people expressed their preferences regarding prioritizing individuals to get the vaccine. In the descriptive findings section, all of these questionnaires were included in the study, but in the analytical section, 22 people were removed because of a short response time less than the minimum time required to respond (6 minutes), and eight people were excluded from the analyses because of incorrect responses to the dominant option, and 685 people finally remained.

The subjects' demographic characteristics are presented in Table 2. In this study, 59% were female and about 71% were aged under 40 years (mean age = 34.64 years). About

73% had a bachelor's degree or higher, and over 47% were employed. About 62% of the subjects were married, and 69% were not heads of households. The average number of household members was 3.65, and 54% had households of at least four people. About 90% of the subjects were covered by one of the health insurers. Moreover, 45% of the participants had supplementary insurance. The monthly income and expenses of most participants were US$156–US$233 (25%) and US$156–US$233 (29%), respectively, and 13% of participants had a history of illness, physical problems, or a disability including mental health issues, obesity, and blood pressure (Table 2).

3.2 Estimating the Public's Preferences for the COVID-19 Vaccine Using the Conditional Logit Model

Table 3 shows that the coefficients of all attributes were statistically significant. The results showed that the highest coefficients were related to the complications of 1 person per one million people ($b = 1.253$, $p < 0.000$) and 90% effectiveness attributes ($b = 0.902$, $p < 0.000$). Respondents' preferences for the COVID-19 vaccine increased with greater efficacy and a longer duration of protection and decreased with an increased price and severe complications. In addition, the location of vaccine production also affected the respondents' preference, and the imported vaccines had a higher chance of acceptance than the domestically produced vaccines. The odds ratio of efficacy attribute was 2.46, indicating that the odds of accepting a vaccine with a higher efficacy (90%) is 2.46 higher than a vaccine with a lower efficacy (50%) (Table 3).

3.3 Estimating the Public's Preferences for Prioritizing Individuals to Get the COVID-19 Vaccine Using the Conditional Logit Model

Table 4 shows that the coefficients of all attributes except for age were statistically significant. The results showed that the highest coefficients were related to the attributes of a high rate of virus spread ($b = 0.947$, $p < 0.001$) and employment in the healthcare sector ($b = 0.574$, $p < 0.001$). Respondents' preferences for choosing a person to get the vaccine increased with the underlying disease, employment in the healthcare sector, increasing potential for virus spread in the community, necessary job for the community, and the high cost of death to the community. The odds ratio of having an underlying disease was 1.47, indicating that an individual with an underlying disease

Table 2 Characteristics of all respondents

Variable	Frequency	Percentage
Sex		
Female	420	58.74
Male	295	41.26
Age (years)		
18–29	252	35.24
30–39	254	35.52
40–49	127	17.76
50–59	60	8.39
60–69	20	2.80
> 69	2	0.28
Educational status		
Associate degree and lower	190	26.57
Bachelor	206	28.81
Masters	180	25.18
PhD and higher	139	19.44
Employment status		
Employed	339	47.40
Unemployed	242	33.84
Housewife	104	14.55
Retired	30	4.20
Marital status		
Single	251	35.10
Married	443	61.96
Widowed/divorced	21	2.94
Heads of households		
Yes	224	31.33
No	491	68.67
Total number of household members		
≤ 3	330	46.15
≥ 4	385	53.85
Health insurance		
Have	643	89.93
Not have	72	10.07
Supplementary insurance		
Have	322	45.03
Not have	393	54.97
Monthly household income ($)		
< 78	64	8.95
78–156	160	22.38
156–233	179	25.03
233–311	137	19.16
> 311	175	24.48
Monthly household expenditure ($)		
< 78	47	6.57
78–156	186	26.01
156–233	208	29.09
233–311	139	19.44
> 311	135	18.88
Illness, physical problem, or disability		
Yes	94	13.15

Table 2 (continued)

Variable	Frequency	Percentage
No	621	86.85

was more likely to be chosen to get the vaccine than a person without an underlying disease (Table 4).

3.4 Estimating WTP for the Vaccine

Estimating the WTP shows that respondents are willing to pay more for higher efficacy and a longer duration of protection than other attributes. An individual was shown to be willing to pay US$24.50 on average for a vaccine with 90% efficacy, US$34.24 for the risk of severe complications of 1 person per million people, US$1.96 for the imported vaccines, and US$10.48 for the 24-month duration of protection. For example, the WTP for a hypothetical vaccine with 70% efficacy, the risk of severe complications of 5 people per 1 million people, an imported vaccine, and the 12-month duration of protection is equal to US$39.16 (Table 5 and Fig. 3).

4 Discussion

COVID-19 is, at present, a global dilemma. Prevention by vaccination leads to reduced human losses and casualties. In the present study, the public's preferences and the WTP for the COVID-19 vaccine were calculated using the DCE method in Iran.

Respondents prefer individuals with an underlying illness, employed in the healthcare sector, a high potential for virus spread in the community, the necessary job for the community, and an increased cost of death for the community to get the vaccine. The findings showed that although the rate of virus spread had the highest impact on preferences, employment in the healthcare sector and the high cost

Table 3 Conditional logit model of the public's preferences for the coronavirus disease 2019 vaccine

Attribute/level	Coefficient	Odds ratio		*P*-value
		Odds ratio	95% Confidence interval	
Effectiveness (%)				
50	Reference			
70	0.427	1.533	1.377–1.707	0.000
90	0.902	2.465	2.199–2.763	0.000
Risk of severe side effects				
10 people per one million people	Reference			
5 people per one million people	0.761	2.140	1.914–2.393	0.000
1 person per one million people	1.253	3.502	3.127–3.923	0.000
Price ($)				
20	Reference			
8	0.499	1.647	1.404–1.932	0.000
4	0.560	1.751	1.494–2.053	0.000
2	0.585	1.795	1.525–2.113	0.000
Free	0.757	2.133	1.822–2.497	0.000
Location of vaccine production				
Domestic production	Reference			
Imported	0.078	1.081	1.000–1.169	0.049
Protection period (months)				
6	Reference			
12	0.179	1.196	1.070–1.336	0.002
24	0.389	1.475	1.324–1.644	0.000
N	386			
Number of obs	6924			
Prob > chi-square	0.0000			
Log-likelihood	− 1929.542			
Pseudo R2	0.1959			

obs observations, *Prob* probability

Table 4 Conditional logit model of the public's preferences for prioritizing receiving the coronavirus disease 2019 vaccine

Attribute/level	Coefficient	Odds ratio		*P*-value
		Odds ratio	95% Confidence interval	
Age (years)				
Less than 60	Reference			
More than 60	− 0.058	0.943	0.867–1.025	0.171
Underlying disease				
Not have	Reference			
Have	0.388	1.474	1.355–1.602	0.000
Employment in the health sector				
No	Reference			
Yes	0.574	1.777	1.635–1.931	0.000
Potential capacity to spread the virus (virus spread)				
Low (1–2 people)	Reference			
Medium (3–5 people)	0.450	1.568	1.397–1.761	0.000
Many (5–10 people)	0.947	2.578	2.280–2.915	0.000
The necessary job for society				
It is not necessary for society	Reference			
It is necessary for society	0.396	1.485	1.368–1.613	0.000
Cost to the community				
Low	Reference			
Medium	0.166	1.180	1.053–1.324	0.004
High	0.556	1.745	1.555–1.958	0.000
N	299			
Number of obs	5962			
Prob > chi-square	0.0000			
Log-likelihood	− 1723.2727			
Pseudo R2	0.1660			

obs observations, *Prob* probability

Table 5 WTP of individuals for different levels of attributes of the coronavirus disease 2019 vaccine based on the conditional logit model

Attribute/level	Coefficient	WTP			
		IR.Rials	US$	95% Confidence interval	
Effectiveness (%)					
70	0.430	3,004,635	11.69	7.37	18.28
90	0.900	6,297,037	24.50	17.90	34.62
Risk of severe side effects					
5 people per one million people	0.762	5,327,291	20.73	14.80	29.80
1 person per one million people	1.258	8,800,021	34.24	26.05	46.82
Location of vaccine production					
Imported	0.072	503,357	1.96	− 0.13	5.10
Protection period (months)					
12	0.176	1,229,041	4.78	1.52	9.72
24	0.385	2,692,840	10.48	6.31	16.82
Price	− 0.000001				

WTP willingness to pay

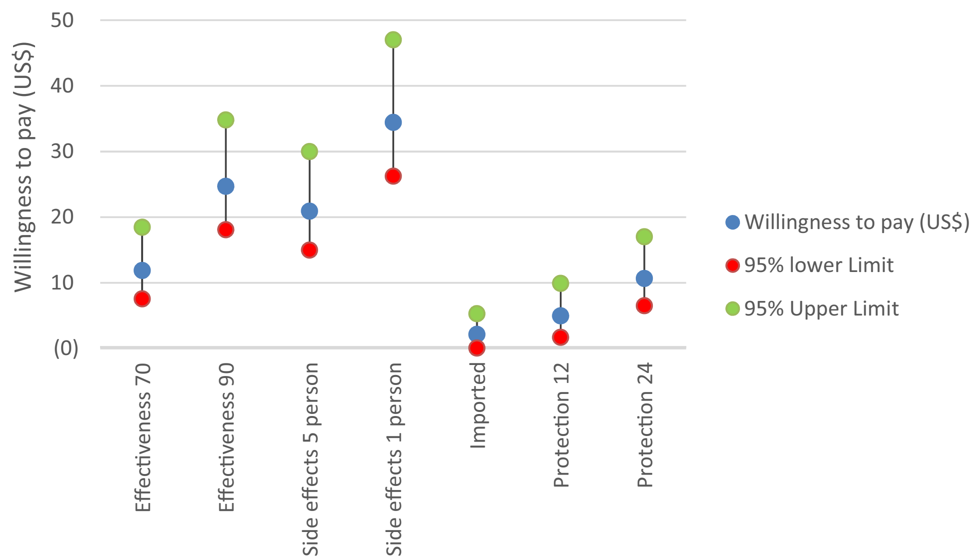

Fig. 3 Willingness to pay of individuals for different levels of attributes of the coronavirus 2019 vaccine based on the conditional logit model

of death for the community were also preferred. These findings were consistent with the results of Luyten et al.'s [12] study, showing that the coefficients of underlying disease characteristics, the necessary job for the community, the rate of virus spread, and death costs for the community were high and preferred in individuals' choices.

While the elderly are referred to as the most at-risk groups for COVID-19, the age coefficient was not statistically significant in this study, indicating that in the respondents' viewpoints, age was not the criterion for deciding whether to get a vaccine. A study by Luyten et al. [12] showed that age was statistically significant; but, similar to our findings, age had the lowest coefficient among other attributes. The reason that age was not significant was probably people's low awareness of the odds of death with increasing age, which requires planning to promote public awareness in this regard. It is also possible that the public's preference was in favor of the youth.

The COVID-19 vaccination policy in Iran according to the national vaccination guideline is carried out in four priority phases. The first phase includes health personnel who deal directly with patients with COVID-19 and the elderly with severe underlying diseases and chemical, respiratory, and upper 50% veterans, the second phase includes high-risk groups such as the elderly aged over 65 years and individuals aged 16–64 years, who have an underlying disease, the third phase includes people in crowded centers who have a lower risk of infection than the population of the previous stages, individuals aged 55–64 years without an underlying disease, and people in essential occupations and services, including those healthcare workers who are not in the front line, and the fourth phase involves the general public [25].

The public's preference for choosing the COVID-19 vaccine increases with higher efficacy and a longer duration of protection and decreases with the high price and severe complications. The location of vaccine production also affects the preferences, and the imported vaccine has a higher chance of acceptance than domestically produced vaccines. These findings were consistent with Dong et al.'s [17] study in China.

A DCE study for elicit preferences of the Quebec population toward a COVID-19 vaccination program found effectiveness, side effects, the duration of the protective effect, and the origin of the vaccine were the most preferred attributes [26]. This study supports our findings.

The results of the study showed that according to the respondents, the imported vaccines had a higher chance of acceptance than the domestically produced vaccines, showing that people have less trust in the domestically produced vaccines or have less desire for domestically produced vaccines, which requires planning to build trust in people toward domestically produced vaccines. It is worth noting that the *P*-value of this attribute was close to 0.05, which is also likely to be insignificant.

The results showed that the highest coefficient was related to the efficacy attribute, showing that, in people's viewpoint, vaccine efficacy was the most important attribute in choosing the vaccine. This finding was consistent with the results of Dong et al.'s [17] study. Additionally, efficacy was found to be the factor that most influenced vaccine selection in a DCE survey in the UK; further, the positive effect of high efficacy was more pronounced for those aged ≥ 55 years [27]. An Internet-based DCE survey administered in Chinese provinces found that the public preferred the high effectiveness of the vaccine [28]. These studies support our findings that vaccine efficacy was the most important attribute in choosing the vaccine.

Estimating the willingness for final payment shows that respondents are willing to pay more for a vaccine with higher efficacy and a longer duration of protection than other attributes. As the vaccine complications increase, individuals' WTP will decrease. This finding was in line with Dong et al.'s [17] study.

Being aware of the public's preferences for vaccination, including concerns about severe complications and the WTP for vaccination, may help policymakers decide on the COVID-19 vaccine and the successful implementation of the COVID-19 vaccination in national programs requires enough attention to the public's preferences. The exchange between health, economy, and the health system is complicated, and the exact value of public opinion compared to the opinions of experts and politicians is unclear. Nevertheless, given the collective dimensions of the COVID-19 pandemic, public opinion preferences are a fundamental input value for discussion.

Several limitations exist in the present study. First, an online survey may create a selection bias. Individuals who did not have access to the Internet or had poor literacy were thus excluded. However, 84% of residents have access to the Internet in Iran [29], which may have limited this bias. Second, because of the COVID-19 epidemic conditions and social distance, we used the convenience sampling method may not be representative of the country's population. Additionally, most of the people who participated in our study were educated; thus, any generalization of these results should be undertaken with caution. Third, as a tool to measure the preferences, the DCE cannot include too many attributes and levels, which makes it different from the real situation. There is still debate about the optimal number of attributes in the literature. However, the more attributes there are, the more difficult it will be to compare options or sets of choices. Based on studies, between four and six attributes are acceptable and no more than eight attributes should be specified [30, 31].

5 Conclusions

Generally, the WTP for the COVID-19 vaccine in Iran was higher than the cost of the vaccine (the cost of the vaccine in Iran was from US$4 to US$14.5 per dose [32]); however, the WTP varied depending on the vaccine attributes. Furthermore, we found that attribute employment in the health sector, potential capacity to spread the virus, the necessary job for society, underlying disease, and the cost to the community were important for prioritizing vaccination that was in line with government policy and practice.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s41669-022-00359-x.

Declarations

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Conflicts of interest/Competing interests Alireza Darrudi, Rajabali Daroudi, Masud Yunesian, and Ali Akbari Sari have conflicts of interest that are directly relevant to the content of this article.

Ethics approval The Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.SPH.REC.1400.006) approved this study. Ethical considerations were taken into account during data collection and analysis. The confidentiality of the participants was protected, and no personal information could be identified in any publications arising from the study. Participants were informed that their participation is entirely voluntary.

Consent to Participate Informed consent was obtained from all the respondents included in the study.

Consent for publication Not applicable.

Availability of data and material The data used in the study are available from the corresponding author on reasonable request.

Code availability We used STATA SE software version 13.1 codes for our analyses. The codes are available on the STATA Corp website.

Authors' contributions AD participated in designing the study, gathering data, analyzing and interpreting data, and writing the manuscript. RD participated in designing the study, analyzing and interpreting the data, and writing the manuscript. AAS participated in designing the study, interpreting the data, and writing the manuscript. MY provided advice on the study's implementation and the data collection. All authors read and approved the final version of the article.

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