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Freebie Seekers or Desperate Buyers? An Analysis of Willingness to Pay for COVID-19 Vaccine in Türkiye

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ABSTRACT

The aim of the study is to determine the level of price that individuals living in Türkiye are willing to pay (WTP) for a hypothetical COVID-19 vaccine. In addition, the study also aims to identify the socioeconomic factors affecting that level of WTP. The data is collected via a virtually applied questionnaire. Probit estimations are employed to determine the level of price that is willing to be paid. Further, the socioeconomic factors affecting the revealed WTP level are identified with an ordered-probit estimation strategy. The average price level that the participants are willing to pay for two doses of a hypothetical COVID-19 vaccine which immunises for 12 months is ₺316.93 (\$42.66). Higher education groups, public employees, married people, and urban individuals are more likely to pay at higher price levels of hypothetical COVID-19 vaccine. Interestingly, the individuals living with a pregnant woman or a baby, the ones who experienced severe COVID-19 disease and the ones who already decided to be vaccinated are more likely to pay at relatively low-price levels. This study may contribute to broader literature as it will provide evidence from Türkiye for international comparisons.

KEYWORDS

COVID-19; Türkiye; vaccine; willingness to pay; probit

Introduction

COVID-19 became a pandemic (Ministry of Health, 2020a) soon after it was discovered in Wuhan City in China (World Health Organization, 2020c). The total number of cases has exceeded 228 million (at the time this study was written), and the total number of deaths has approached almost two million globally (World Health Organization, 2021). In Türkiye, the number of cases has reached nearly seven million and the death toll has exceeded sixty thousand during the same time (World Health Organization, 2020b). In the course of the pandemic, protective measures such as social distancing and isolation have been recommended to protect individuals from the disease (Ministry of Health, 2020b; World Health Organization, 2020a). Several vaccines have been developed both nationally and globally to mitigate the spread (Bedford et al., 2020; Lurie, Saville, Hatchett, & Halton, 2020) which affects not only the physical health of people, but also their mental health and well-being (Brooks et al., 2020). At this point, attitudes toward the vaccines are interesting to research as it will provide intuition to policy makers.

This study aims to determine the level of price that individuals living in Türkiye are willing to pay for a hypothetical COVID-19 vaccine. To do this, a willingness to pay (WTP) approach is employed. There are modest examples of WTP studies for the COVID-19 vaccine throughout the world. To the best knowledge of the authors, there has been no research conducted in Türkiye yet. Therefore, it is

believed that this study will contribute to the literature as it will give intuition from Türkiye in case of an outbreak.

The WTP approach is used to determine the highest price level that individuals are willing to pay for a good or service (Bredert, Hahsler, & Reutterer, 2006; Hanemann, 1991). WTP level is predominantly determined by income since the price levels that individuals are willing to pay notably increases with increasing income levels (Horowitz & McConnell, 2003). The price that individuals are willing to pay increases as their level of schooling increases (Cameron, Newman, Rongprakhon, & Scarpa, 2013; Harapan, Fajar, Sasmono, & Kuch, 2017; Hou et al., 2014). In addition, demographic characteristics such as age and gender are also associated with the WTP levels. Their impacts on the maximum price level that individuals are willing to pay varies in studies. Another factor playing important roles in WTP decision is the risk perception of the individuals (Cerda, Rojas, & García, 2007). Accordingly, higher risk perceptions lead to increasing WTP levels on average (Ren et al., 2020; Rajamoorthy et al., 2018; Kim, Pjesivac, & Jin, 2019 (Cerda, Rojas, & García, 2007).

It is possible to find WTP studies for recently developed vaccines for Ebola, Zika, and hepatitis B in the literature (Harapan et al., 2019; Rajamoorthy et al., 2019; Ughasoro, Esangbedo, Tagbo, Mejeha, & Bausch, 2015). As for the vaccines developed for COVID-19, relatively limited research has been conducted so far. Berghea, Berghea, Abobului, and Vlad (2020) state that people were willing to pay between \$24 and \$237 for the COVID-19 vaccine. In addition, García and Cerda (2020) discover that the level of WTP was approximately \$185 (on average). For the case of Malaysia Wong, Alias, Wong, Lee, and AbuBakar (2020) reveal that the individuals were willing to pay approximately \$31 for each dose of COVID-19 vaccine. As for Indonesia, Harapan et al. (2020) find the WTP level for a hypothetical COVID-19 vaccine was approximately \$57. Finally, Sarasty, Carpio, Hudson, Guerrero-Ochoa, and Borja (2020) observe that the WTP level for a hypothetical COVID-19 vaccine was in the range of \$147.61–\$195.65 in Ecuador.

This study aims to identify the price level that individuals living in Türkiye are willing to pay for a hypothetical COVID-19 vaccine. In addition, it is aimed to reveal the factors affecting identified WTP level for the hypothetical COVID-19 vaccine in Türkiye. The data of 698 individuals selected according to snowball sampling were exploited to understand the WTP level and its socioeconomic determinants. The data was collected via a virtually applied questionnaire between January 8, 2021 and January 13, 2021 before the free government vaccination campaign. Probit estimations are employed to reveal the highest price level for the COVID-19 vaccine. In addition, ordered probit estimations are performed to identify the socioeconomic and sociodemographic characteristics affecting WTP levels. Subsequently, marginal effects are estimated for each WTP category. The findings suggest that the level of price that participants are willing to pay for two doses of a hypothetical COVID-19 vaccine is £316.93 (\$42.66).

Data and methods

The data of the study of 698 individuals living in Türkiye who were selected according to snowball sampling. The data was collected via a questionnaire applied in a virtual environment between January 8, 2021 and January 13, 2021. The questionnaire was initially tested with a small sample ($n = 44$) to check the validity of the questions. As a result of pretest phase, some questions were corrected and the questionnaire were applied to broader sample in consequence. The participants were informed about the design of the research in detail before the application of the questionnaire. In addition, they were reminded to make rational choices that they would be willing to pay considering their disposable monthly income. The participants were also asked whether they would like to have a COVID-19 vaccination. Accordingly, 189 participants were excluded from the study since they did not desire to be vaccinated.

The questionnaire applied consists of three parts. The first part collects the information of socio-demographic characteristics of the participants, such as age, gender, education, occupation, residence and the number of dependents. The second part presents a hypothetical scenario that is designed in the

light of literature (Berghea, Berghea, Abobului, & Vlad, 2020; García & Cerda, 2020; Harapan et al., 2020; Mudatsir et al., 2019; Muniz Junior et al., 2019; Ughasoro, Esangbedo, Tagbo, Mejeha, & Bausch, 2015; Wong, Alias, Wong, Lee, & AbuBakar, 2020; Yeo & Shafie, 2018). Accordingly, it has been stated that a hypothetical COVID-19 vaccine is 95% effective when two doses are taken, while there is a possibility (2%–3.8%) of mild side effects such as headache and weakness after the second dose. The protection period of the hypothetical COVID-19 vaccine is assumed as 12 months. The third part asks whether the individuals would demand a vaccine that would cost from ₺300 to approximately ₺1788 on an annual basis. The lowest price for the two doses of the hypothetical vaccine is ₺300, which is a hypothetical bid upon the price level that was determined in the European Union (Reuters, 2020). The price levels individuals are willing to pay under ₺300 are assumed as a demand for free of charge. The bids of WTP are divided into 10 categories with an increasing ratio of 25% as 0 TL, 300 TL, 375 TL, 468 TL, 585 TL, 732 TL, 913 TL, 1144 TL, 1430 TL and 1788 TL, respectively.

The price that the individuals are willing to pay for a hypothetical COVID-19 vaccine is determined using a probit design. Further, the socioeconomic and sociodemographic factors affecting the identified price level are revealed with ordered probit design which is a generalization of probit analysis in case of an ordinal outcome variable with more than two categories. Subsequently, marginal effects are calculated for each outcome category. While age and income are included in the model as continuous variables; gender, marital status, education, and region of residence are measured categorically.

Results

Findings suggest that almost half of the respondents are indecisive about getting vaccinated while the other half are almost equally divided in accepting or refusing to get vaccinated. The participants who are reluctant to be vaccinated ($n = 189$) are excluded from the analysis. Summary statistics of the factors used in the models are presented in Table 1.

The average WTP of the respondents is estimated as ₺316.93. This value corresponds to \$42.66 with the average exchange rates at the period between January 8, 2021 and January 13, 2021.

The results are shown in Table 2.

Table 1. Summary statistics.

Variable Name	Description	Number of			
		Obs.	Mean	Min.	Max.
<i>Age</i>	Age of respondent	504	34.339	18	65
<i>Female</i>	Gender of respondent = female	504	0.545	0	1
<i>Male</i>	Gender of respondent = male (reference category)	504	0.454	0	1
<i>Married</i>	Marital status of respondent = Married	504	0.573	0	1
<i>Single</i>	Marital status of respondent = single (reference category)	504	0.426	0	1
<i>Education 1</i>	Lower education category – high school	504	0.220	0	1
<i>Education 2</i>	Middle education category – bachelors degree (reference category)	504	0.543	0	1
<i>Education 3</i>	Higher education category – masters degree and above	504	0.236	0	1
<i>Occupation 1</i>	Occupation 1 = working in public sector	504	0.343	0	1
<i>Occupation 2</i>	Occupation 2 = working in private sector	504	0.216	0	1
<i>Occupation 3</i>	Occupation 3 = being retired	504	0.069	0	1
<i>Occupation 4</i>	Occupation 4 = being unemployed (reference category)	504	0.371	0	1
<i>Income</i>	Monthly income (Turkish Lira)	504	8,279.677	0	200,000
<i>Elderly</i>	Living with someone 65 years of age (or older)	504	0.166	0	1
<i>Pregnant</i>	Living with someone who is pregnant or has a baby	504	0.134	0	1
<i>Chronic</i>	Having a chronic disease	504	0.123	0	1
<i>Chronic2</i>	Living with someone with a chronic disease	504	0.371	0	1
<i>Cigarette</i>	Smoking	504	0.246	0	1
<i>Covid-19</i>	Whether has had COVID-19 before	463	0.105	0	1
<i>Covid-19_2</i>	Whether around the person has had COVID-19 before	425	0.604	0	1
<i>Region 1</i>	Living in district (reference category)	504	0.373	0	1
<i>Region 2</i>	Living in city center	504	0.626	0	1
<i>Vaccine</i>	COVID-19 vaccine decision of the respondent	698	0.729	1	3

Table 2. WTP for COVID-19 vaccine.

	Coef.	Std. Err.	z	P > z	(95% Conf. Interval)	
<i>WTP</i>	316.9345	4.217.657	75.14	0.000	308.6681	325.201

The results of the ordered probit estimations are presented in Table 3. The categories in the table imply the WTP levels for a hypothetical COVID-19 vaccine. It seems marital status, education, occupation, region, income, being decisive about getting the COVID-19 vaccine, living with a baby or a pregnant person, experiencing COVID-19 before, and getting to know someone had severe COVID-19 have significant effects on the price level that the participant is willing to pay.

Accordingly, being married is associated with an increase in the probability of being in a lower WTP category. As for the marginal effects obtained for each WTP category, married individuals are more likely to be in lower WTP groups than their non-married counterparts. In addition, increasing education is related with the increases in WTP. Highly educated individuals are most likely to be in higher WTP categories in comparison with middle education category. Furthermore, public employees are more likely to be in the higher categories of WTP compared to their unemployed counterparts. The marginal effects obtained suggest that private employees are more likely to be middle WTP categories. Living in the city center is associated with increases in WTP levels. Urban residents are more likely to be in the higher WTP category than those are living in districts. On the contrary, living with a pregnant woman or a baby is related with decreases in the WTP levels. Those individuals are more likely to be in relatively low WTP categories. The individuals who decided to be vaccinated are more likely to be in lower WTP categories. This implies that the individuals who decided to be vaccinated already desire to be vaccinated for free of charge or for a relatively low cost. Finally, it is unfortunate that no significant impacts of income, gender, having a chronic disease, living with someone older than 65 years of age, smoking, and having experienced COVID-19 disease are observed on the WTP levels for a hypothetical COVID-19 vaccine.

Discussion

The study aims to identify the price level that individuals living in Türkiye are willing to pay for a hypothetical COVID-19 vaccine. To do this, probit estimations are employed in the study. In addition, the factors affecting identified WTP level are revealed by exploiting an ordered probit estimation design.

Twenty-five percent of the respondents declare that they are reluctant to get vaccinated against COVID-19. This is in line with the existing literature since approximately 25% of the participants refuse to be vaccinated in China (Fu et al., 2020) and France (Detoc et al., 2020). However, unlike the literature, it is understood that approximately half of the respondents are undecided about getting vaccinated. This may be related with the timing of the study since it was conducted in early 2021 when it coincided with the first weeks of vaccination in Türkiye.

It is found that average WTP level for two doses of a hypothetical COVID-19 vaccine that immunizes for 12 months is ₺316.93 (\$42.66). This value is precisely close to ₺300 which is the starting bid. This may be related with high level of sociality in Turkish Health System. The result may imply that Turkish population desires to get vaccinated for free of charge or for a very low cost. The amount is relatively low compared to the amounts revealed in previous literature from Chile (García & Cerda, 2020), Indonesia (Harapan et al., 2020), Ecuador (Sarasty, Carpio, Hudson, Guerrero-Ochoa, & Borja, 2020), Romania (Berghea, CE Berghea, Abobului, & Vlad, 2020) and Malaysia (Wong, Alias, Wong, Lee, & AbuBakar, 2020). This indicates relatively low willingness to pay of Turkish population for a hypothetical COVID-19 vaccine compared to other societies. Such difference may be because of (i) the differences in characteristics of the societies and/or (ii) the differences in the severity of the disease in the aforementioned countries.



Table 3. Determinants of WTP.

Variables	Ordered Probit Coef.	Average Partial Effects After Ordered Probit										
		Category:1	Category:2	Category:3	Category:4	Category:5	Category:6	Category:7	Category:8	Category:9	Category:10	
Age	-0.0015	0.0005	0.00003	-0.00002	-0.00006	-0.0000	-0.00002	-0.00005	-0.00001	-0.00001	-0.00001	-0.0002
Female	0.1498	-0.0505	-0.0027	0.0024*	0.0060	0.0071	0.0026	0.0051	0.0010	0.0010	0.0017	0.0271
Married	-0.2770*	0.0925**	0.0057**	-0.0041	-0.0106*	-0.0128*	-0.0047*	-0.0094*	-0.0018	-0.0018	-0.0032*	-0.0512**
Education 1	0.0565	-0.0188	-0.0012	0.0008	0.0021	0.0026	0.0009	0.0019	0.0003	0.0003	0.0006	0.0104
Education 3	0.2922**	-0.0965***	-0.0100	0.0035***	0.0106***	0.0136***	0.0051**	0.01039**	0.0021	0.0021	0.0035*	0.0575***
Occupation 1	0.4536***	-0.1505***	-0.0147	0.0057***	0.0168***	0.0214***	0.0080**	0.0161**	0.0032*	0.0032*	0.0055**	0.0882**
Occupation 2	0.2548	-0.0824*	-0.0080	0.0028***	0.0086**	0.0111*	0.0042*	0.0085*	0.0017	0.0017	0.0029	0.0503
Occupation 3	0.2747	-0.0876	-0.0109	0.0024**	0.0086	0.0117	0.0045	0.0092	0.0019	0.0019	0.0032	0.0567
Region 2	0.2648**	-0.0905***	-0.0035	0.0046***	0.0112***	0.0129**	0.0046**	0.0092**	0.0018	0.0018	0.0031*	0.0463**
Income	0.00002***	-8.99e-06***	-5.24e-07**	4.18e-07***	1.06e-06***	1.27e-06***	4.66e-07***	9.22e-07***	1.85e-07*	1.85e-07*	3.15e-07**	4.87e-06***
Chronic	-0.1504	0.0515	0.0013	-0.0027	-0.0064	-0.0073	-0.0026	-0.0051	-0.0010	-0.0010	-0.0017	-0.0258
Chronic2	-0.0535	0.0179	0.0009	-0.0008	-0.0021	-0.0025	-0.0009	-0.0018	-0.0003	-0.0003	-0.0006	-0.0096
Elderly	0.0749	-0.0250	-0.0017	0.0010	0.0028	0.0035	0.0012	0.0025	0.0005	0.0005	0.0008	0.0140
Pregnant	-0.3232*	0.1128**	-0.0004	-0.0069	-0.0148*	-0.0162**	-0.0057*	-0.0110**	-0.0021	-0.0021	-0.0036*	-0.0517***
Cigarette	0.1163	-0.0387	-0.0029	0.0016	0.0044	0.0054	0.0020	0.0040	0.0008	0.0008	0.0013	0.0219
Covid-19	-0.2023	0.0701	0.0003	-0.0041	-0.0090	-0.0100	-0.0035	-0.0069	-0.0013	-0.0013	-0.0023	-0.0331
Covid-19_2	-0.1994*	0.0691**	0.0004	-0.0040	-0.0089*	-0.0099*	-0.0035*	-0.0068**	-0.0013	-0.0013	-0.0022*	-0.0326**
Vaccine	-0.2718***	0.0906***	0.0051**	-0.0041***	-0.0104***	-0.0126***	-0.0046***	-0.0092***	-0.0018**	-0.0018**	-0.0031**	-0.0498***

*** $p < .01$, ** $p < .05$, * $p < .1$.

It is found that married individuals have lower WTP levels compared to their non-married counterparts. In addition, lower levels of WTP are detected among the individuals living with someone pregnant or with a baby. This may be related with their disposable incomes.

The individuals with higher educational status have relatively high WTP levels which confirms the literature suggesting higher willingness to pay of highly educated individuals (García & Cerda, 2020; Wong, Alias, Wong, Lee, & AbuBakar, 2020). The finding may be because higher awareness level of highly educated individuals about COVID-19 and the vaccination. In addition, public employees are more likely to pay more compared to unemployed which is compatible with the existing literature (García & Cerda, 2020; Sarasty, Carpio, Hudson, Guerrero-Ochoa, & Borja, 2020; Wong, Alias, Wong, Lee, & AbuBakar, 2020). This may be related not only with their welfare but also with their higher risk of infection through compulsory working situation. In this context, the effects of distance working opportunities on the demand of getting vaccinated may be interesting to research and may provide insights for policy makers. In addition, urban residents are more likely to be in higher WTP categories compared to their rural counterparts. This may also be associated with comparatively high risk of infection in city centers.

Lower levels of WTP are encountered among the individuals who experienced COVID-19 before. This may be associated with their beliefs that they have already immunized. Interestingly, it is found that the individuals who already decided to get vaccinated are more likely have lower levels of willingness to pay for a hypothetical COVID-19 vaccine. It is believed that this indicates their "freebie-seeking" behavior, in other words, their expectation of getting vaccinated free of charge.

In contrast, no significant impacts of income are observed on the average level of WTP for a hypothetical COVID-19 vaccine. It is believed that may be because of the closeness of the identified WTP level and the starting bid.

Finally, it is unfortunate that no significant impacts of having a chronic disease and living with someone vulnerable are observed. The findings may be related with the limited number of observations for the relevant variables.

Conclusion

In this study, the WTP level of a hypothetical COVID-19 vaccine in Türkiye is investigated. In addition, social and demographic characteristics affecting the identified WTP level are examined. Using the data of 698 individuals, the study employs (i) probit estimations to understand the WTP levels among Turkish society and (ii) ordered probit estimations to reveal the effects on the identified WTP level for a hypothetical COVID-19 vaccine that immunizes for 12 months. The results are interesting since they provide intuition for policy makers. The study may contribute to broader literature as it will provide evidence from Türkiye for international comparisons.

As a result, the WTP level for two doses of a hypothetical COVID-19 vaccine in Turkish society is determined as ₺316.93 (\$42.66). Since it is not remarkably different from the starting bid, it is understood that the society demands to get vaccinated for a very low cost or free of charge.

It is revealed that educational status, occupational status, marital status, and place of residence have notable impacts on the average WTP level for a hypothetical COVID-19 vaccine. Accordingly, higher educational status, publicly working and urban residence are related with the increases in the amounts that willing to be paid. In contrast, being married, living with someone pregnant or a baby, and having already decided to be vaccinated are associated with the reductions in the amounts that are willing to be paid for a hypothetical COVID-19 vaccine. Apart from these, there seem no significant impacts of income, gender and having a chronic disease on the average WTP level for the vaccine.

In light of the findings, it is believed that further studies investigating the impacts of (i) distance working opportunities and (ii) the vulnerabilities on the demand of getting vaccinated may have significant contributions to the literature.

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Author contributions

All authors made substantial contributions to the conception, design of study, data acquisition and analysis of this study. All authors agree to be accountable for all aspects of this work.

Ethical approval

This study was ethically approved by the Scientific Research Projects unit of the University of Health Sciences with the registration number 20/500 on January 8, 2021.

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