

## Original Article

## Investigation of Turkish Community Vaccine Hesitancy and Reasons During the COVID-19 Pandemic: A descriptive Study

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### Abstract

**Background:** Vaccine hesitancy and refusal are becoming increasingly common. During the COVID-19 pandemic, vaccine refusal and vaccine hesitancy had a negative impact on vaccination campaigns in Turkey.

**Objective:** The aim of this study is to determine the vaccine hesitancy and its reasons in Turkish society during the pandemic.

**Method:** This descriptive cross-sectional study was conducted online between October 2021 and January 2022 with 502 adult individuals living in Turkey who met the inclusion criteria.

**Results:** It was determined that %54.9 of the participants had hesitantly vaccinated, and %7.2 refused the vaccine. The mean scores on the Vaccine Hesitancy Scale in Pandemics of those who refused the vaccine ( $33.916 \pm 7.00$ ) were substantially higher than those who experienced vaccine hesitancy ( $28.818 \pm 4.78$ ) and those who did not ( $24.389 \pm 4.51$ ) ( $p < 0.05$ ). It was determined that individuals aged 65 and over were vaccinated without any hesitation compared to younger participants, and the rates of vaccine rejection and refusal to be vaccinated by women, university graduates and those without chronic disease were found to be significantly higher ( $p < 0.05$ ).

**Conclusion:** During the Covid-19 pandemic, individuals exhibiting vaccine hesitancy and rejection, as well as the risk factors that contribute to these circumstances, should be assessed on a regular basis. It is predicted that offering community the training by qualified nurses on the factors that lead to vaccine hesitancy and refusal will aid in increasing immunization rates and establishing community immunity in Turkish society.

**Keywords:** Vaccine hesitancy; COVID-19; Pandemic; Turkey.

### Introduction

Due to the rapid spread and severity of the COVID-19 virus, the World Health Organization defined it as a pandemic on 11 March 2020 (Republic of Turkey Ministry of Health Directorate General of Public Health, 2021). This global problem growing day by day has caused very serious economic and social problems particularly in the healthcare system (Nicola et al., 2020). As of December 2021, the total number of cases infected with COVID-19 was reported as 9.482.550 and the number of deaths related to COVID-19 as 82.361 in Turkey (Republic of Turkey Ministry of Health COVID-19 Vaccination Information Platform, 2022).

Vaccines are among the greatest discoveries of the 20<sup>th</sup> century in terms of public health and play a

key role in controlling epidemics (Spencer et al., 2017). Trials for vaccines were accelerated due to the COVID-19 pandemic and as of September 2020, COVID-19 vaccination program was initiated in Turkey within the scope of phase-3 studies concerning the inactive Sars-Cov-2 vaccine developed in China. TURKOVAC, the inactive COVID-19 vaccine developed with the support of the Health Institutes of Turkey (TUSEB) in Turkey, was included in the vaccination program with the "Emergency Use Approval" of The Turkish Medicines and Medical Devices Agency (TITCK) of the Ministry of Health (TUSEB, 2022). Examining the vaccination rates in Turkey, it has been reported that 57.157.272 1<sup>st</sup> dose, 51.976.752 2<sup>nd</sup> dose and 22.251.633 3<sup>rd</sup> dose vaccines were applied as of 12 January 2021 (Republic of Turkey Ministry of

Health COVID-19 Vaccination Information Platform, 2022). While accelerated vaccine development studies are a great achievement for science, they may cause concerns about safety in societies, which leads to vaccine hesitancy (Lazarus et al., 2021).

In a study conducted in the USA, it was seen that individuals worried about the safety and efficacy of vaccines because of the rapid approval processes of COVID-19 vaccines (Savoia et al., 2021). Vaccine hesitancy is the delay in acceptance or refusal of vaccines despite availability of vaccination. This defines a condition in which one or more vaccines are refused. However, in vaccine refusal, individuals refuse to be vaccinated on their own will (Larson et al., 2015). Especially in recent years, the reluctance for vaccination has increased and vaccine refusal or vaccine hesitancy have become a global issue. This, in turn, causes a decrease in the number vaccinated individuals and the recurrence of previously eradicated diseases in some countries (Puri et al., 2020). The "Vaccine Hesitancy Study Group" was established by the World Health Organization (WHO) in 2012 and vaccine hesitancy was accepted as one of the top ten threats to global health in 2019 (WHO, 2019).

Studies evaluating the prevalence of vaccine hesitancy and the factors affecting it indicate different rates among countries. Vaccine hesitancy is more common in developed countries than it is in developing countries (Larson et al., 2014). In studies conducted on COVID-19 vaccination in different countries, it was seen that participants refused to be vaccinated by 20% in Canada (Taylor et al., 2020), 14% in Italy (Barello et al., 2020), 31% in Turkey (Salali & Uysal, 2020), 14% in England ((Salali & Uysal, 2020) and 14% in Australia (Dodd et al., 2021). The study carried out by İkişik and colleagues (2021) in our country, 45,3% of the participants stated that they were hesitant to have the COVID-19 vaccine recommended by the Ministry of Health (İkişik et al., 2021).

According to the SAGE Working Group, the factors influencing vaccine hesitancy include contextual effects (e.g. culture, gender, and socioeconomic group and geographical barriers), individual and social group effects (e.g. beliefs, attitudes, knowledge and experiences about vaccines), effects concerning vaccines and vaccination (e.g. costs, method of application and delivery, introduction of a new vaccine, vaccine

suppliers, vaccination calendar) (SAGE, 2014). Studies show that fear of reliability (Pogue et al., 2020), being afraid of the side effects of vaccines, distrust in institutions (WHO, laboratories) (Freeman et al., 2022), beliefs that the vaccine is ineffective, beliefs in conspiracy theories ((İkişik et al., 2021) and misinformation have been influential on hesitancy for COVID-19 vaccines. Since misinformation may deter people from getting vaccinated, it is important that the public is provided with accurate and reliable information in this regard (Jain & Sinha, 2020).

Fight against vaccine hesitancy is a must for a successful vaccination campaign. There is a need for determining the population's attitude towards COVID-19 vaccines and to identify the factors associated with the population's vaccine hesitancy to manage the COVID-19 pandemic.

## Methods

**Design:** The present research is a descriptive cross-sectional study.

**Objective:** The aim of the research was to determine the vaccine hesitancy in Turkish society and its reasons during the pandemic. The research questions were as follows:

1. What is the vaccine hesitancy rate in Turkish society during the pandemic?
2. What are the factors affecting individuals' vaccine hesitancy during the pandemic?

**Setting and Sample:** The population of the study consisted of adult individuals living in Turkey between October 2021 and January 2022 (N= 60.863.705). Individuals who were 18 years-old and over, Turkish citizens, Turkish literate, able to answer questions on an online platform and voluntary to participate were included in the study. Snowball sampling among nonprobability sampling techniques was employed in order to reach more participants. The number of subjects in the sample was calculated using the online tool "sampsiz" (Sampsiz, 2021). A recent study conducted by İkişik and colleagues (2021) in İstanbul has reported the vaccine hesitancy rate of the participants as 45,3% (İkişik et al., 2021). Considering the results of this study, the sample size was determined as minimum 384 with a 50% incidence, 95% confidence interval, 5% error and  $p < 0.05$  significance level; the study was completed with 502 individuals who satisfied the inclusion criteria.

**Instruments:** The data were collected using the Individual Information Form and the Scale of Vaccine Hesitancy in Pandemics. The Individual

Information Form developed by the researchers aimed to obtain the participants' socio-demographic data and their attitudes and thoughts about the COVID-19 vaccine. Opinions of three experts were received for the question form and a pilot study was conducted with 10 individuals to test the understandability of the form. Based on the feedback obtained from the individuals who participated in the pilot study, necessary changes were made to the question form and these individuals were excluded from the research.

**The Scale of Vaccine Hesitancy in Pandemics** is the modified version of "The Vaccine Hesitancy Form" developed by Larson et. al (2014) for pandemics (Larson et al., 2014). Turkish reliability and validity study of the scale was conducted by Çapar and Çınar (2021). The scale is a 5-point Likert Type measurement tool with the choices of 1=Completely Disagree, 2=Disagree, 3=Neither Agree Nor Disagree, 4=Agree and 5 =Completely Agree. High scores obtained over the scale indicate high vaccine hesitancy during the pandemic. The Scale of Vaccine Hesitancy in Pandemics consists of 10 items and two subscales. The first subscale "Distrust" includes 8 items (I1-R, I2-R, I3-R, I4-R, I5-R, I6-R, I7-R, I8). The items added the letter R are reverse items. High scores obtained under this subscale show increased distrust for vaccines in pandemics. The second subscale "Risk" consists of 2 items (I9, I10). High scores obtained from this subscale reveal that the risk of vaccine is high in pandemics (Çapar & Çınar, 2021). Cronbach's Alpha coefficient for reliability of the scale is 0,901. Cronbach's Alpha coefficient for the present study, on the other hand, is 0,79.

**Data Collection:** The data of the study were collected online via Google Forms in order to avoid the risk of infection and be able to reach all the 81 cities in Turkey. The link to the questionnaire form was first sent to individuals known by the researchers through WhatsApp Messenger in the first place. In the first section of the questionnaire form, the participants were informed about the aim of the study. The participants who accepted to fill in the questionnaire form were asked to click on "Yes". After receiving their consent, the participants were asked to fill in the questionnaire form and share it with the people they knew. It took approximately 10 minutes to fill in the form. The questionnaire remained open for 4 months and the data collection process was finalized when the number of sample subjects did not change in the last 10 days.

**Data Analysis:** Data analysis was performed using the SPSS 21.0 (Statistical Package For Social Sciences, IBM Corp., Armonk, NY, ABD) package program. The data were evaluated using the descriptive statistical methods of percentages, standard deviation, frequencies, mean values and Skewness and Kurtosis ( $\pm 1$ ) distribution test for examining normal distribution. As the data showed normal distribution, independent t test and One-way ANOVA were applied for the comparison of the differences of independent groups. Differences were detected using the Tukey Post Hoc test in comparing more than two groups. The differences between categorical variables were examined using the chi-square analysis. Logistic regression analysis was performed for the factors influencing vaccine hesitancy. Significance was accepted as  $p < 0.05$ .

**Ethical Considerations:** This study was approved by the Ethics Committee of X University and the Scientific Research Platform of the Ministry of Health, General Directorate for Healthcare Services. The aim of the study was explained to the participants in writing and their consent was obtained. The participants were not given any kind of promotion to take part in the research. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki.

## Results

A significant difference was found between the groups in terms of vaccine refusal and hesitancy according to their age, gender, educational background, region of residence and chronic diseases ( $p < 0.05$ ). It was seen that individuals aged sixty-five and over had vaccines without hesitancy compared with younger participants and that those who refused to get vaccinated mainly consisted of young and middle-aged individuals in the 18-32 and 33-45 age groups ( $p < 0.05$ ). Vaccine refusal and hesitancy rates of women, university graduates and individual with no chronic diseases were found to be significantly high ( $p < 0.05$ ) (Table 1).

Almost half the participants were found to have had tests for COVID-19. It was found that the rate of those who did not have a COVID-19 test or had a positive test result was higher in the vaccine refusal group compared with the other groups ( $p < 0.05$ ). It was also determined that 54.9% of the participants got vaccinated with hesitation while 7.2% did not get vaccinated. In the group that got vaccinated without hesitation, the rate of those

receiving the 3<sup>rd</sup> or 4<sup>th</sup> doses was found to be higher ( $p < 0.05$ ). It was seen that the participants chose to have inactive vaccines at a higher rate ( $p < 0.05$ ). The rate of vaccine hesitancy in previous vaccines was higher among participants who refused to get vaccinated ( $p < 0.05$ ) compared with the other groups. The most frequent reasons expressed by the participants who had vaccine hesitancy included feeling worried because of not knowing the long-term effects of the vaccine on the body (76.4%), feeling worried about the short-term side effects of the vaccine such as allergies (42.4%) and feeling distrust as vaccine production was made in a very short period (37.7%). The most stated reasons by vaccine refusers, on the other hand, were feeling worried because of not knowing the long-term effects of the vaccine on the body (58.3%), distrust in vaccine producers (52.8%) and not believing that vaccines protect from disease (44.4%) (Table 2).

The comparison of the participants' mean scores on the Scale of Vaccine Hesitancy in Pandemics (SVHP) in terms of vaccine hesitancy or vaccine refusal states is presented in table 3. It was seen that the total mean scale scores and the mean scores on the distrust subscale of the individuals who refused vaccines were seen to be significantly higher ( $p < 0.05$ ).

The total mean scale scores of the participants were found to vary significantly by their educational background, overall health status and

vaccine doses ( $p < 0.05$ ). In the further analyses performed using the Post Hoc Tukey test, it was seen that the difference in the educational background of the participants occurred in the university and postgraduate education graduates; the difference in the overall health status occurred in those expressing their health status as moderate and good; and the difference in vaccine doses occurred in those who had a single dose and four doses. University graduates were found to have higher SVHP mean scores than postgraduate graduates, those with a moderate level of overall health status than those with poor health status and those who got a single dose of vaccine than those who had four doses (Table 4).

Table 5 presents the logistic regression analysis showing the factors which influence vaccine hesitancy (gender, age, educational background, vaccine dose and overall health status). The model created was able to explain 12.6% of the dependent variable (Nagelkerke R Square=0.126). according to the model, it was seen that the independent variables of age, educational background, vaccine dose and overall health status did not predict vaccine hesitancy. It was also seen that women were twice as likely to have vaccine hesitancy as men (OR=2.288, GA=1.497-3.496) and those who had 1 dose of vaccine were 1.8 times more likely to have hesitancy than those who had more doses (OR=1.801, GA=1.303-2.489).

**Table 1: Socio-demographic characteristics of the participants (n=502)**

Characteristic	Experiencing Vaccine Hesitations (n=276)	No Vaccine Hesitations (n=190)	Rejecting the Vaccine (n=36)	Total (n=502)	Test/p value
	n/%	n/%	n/%	n/%	
<b>Age</b>					
18-32 years	158 (57.2)	93 (48.9)	18 (50.0)	269 (53.6)	
33-45 years	96 (34.8)	55 (28.9)	16 (44.4)	167 (33.3)	$X^2 = 24.042^*$ $p = 0.001^{**}$
46-64 years	21 (7.6)	37 (19.6)	2 (5.6)	60 (12.0)	
65 years and older	1 (0.4)	5 (2.6)	-	6 (1.1)	
<b>Gender</b>					
Female	213 (77.2)	109 (57.4)	25 (69.4)	347 (69.1)	$X^2 = 20.684$ $p = 0.000$
Male	63 (22.8)	81 (47.6)	11 (30.6)	155 (30.9)	
<b>Education</b>					
Primary education	5 (1.8)	7 (3.7)	1 (2.8)	13 (2.6)	$X^2 = 12.941$ $p = 0.044$
Secondary education	31 (11.2)	23 (12.1)	11 (30.6)	65 (12.9)	
University	201 (72.8)	131 (68.9)	21 (58.3)	353 (70.4)	
Postgraduate education	39 (14.1)	29 (15.3)	3 (8.3)	71 (14.1)	
<b>Income</b>					
Income less than expense	67 (24.3)	53 (27.9)	7 (19.4)	127 (25.3)	$X^2 = 6.576$
Income equals expense	174 (63.0)	103 (54.2)	26 (72.2)	303 (60.4%)	

Income more than expenses	35 (12.7)	34 (17.9)	3 (8.4)	72 (14.3%)	p= 0.160
<b>Residence</b>					
living area	86 (31.2)	73 (38.4)	9 (25.0)	168 (33.5)	
Aegean	31 (11.2)	28 (14.7)	3 (8.3)	62 (12.4%)	
Black Sea	40 (14.5)	26 (13.7)	6 (16.7)	72 (14.3%)	X <sup>2</sup> = 22.092
Marmara	71 (25.7)	27 (14.2)	10 (27.8)	108 (17.2%)	<b>p= 0.037</b>
Central Anatolia	22 (8.0)	21 (11.1)	3 (8.3)	46 (9.2%)	
Mediterranean	22 (8.0)	8 (4.2)	2 (5.6)	32 (6.4%)	
Southeastern Anatolia	4 (1.4)	7 (3.7)	3 (8.3)	14 (2.8%)	
<b>Employment</b>					
Yes	144 (52.2)	90 (47.4)	19 (52.8)	253 (50.4%)	X <sup>2</sup> = 1.127
No	132 (47.8)	100 (52.6)	17 (47.2)	249 (49.6%)	p= 0.569
<b>General health status</b>					
Good	200 (72.5)	151 (79.5)	27 (75.0)	378 (75.3%)	
Moderate	72 (26.1)	37 (19.4)	7 (19.4)	116 (23.1%)	X <sup>2</sup> = 7.021
Poor	4 (1.4)	2 (1.1)	2 (5.6)	8 (1.6%)	p= 0.135
<b>Chronic illness</b>					
Yes	43 (15.6)	45 (23.7)	4 (11.1)	92 (18.3%)	X <sup>2</sup> = 6.287
No	233 (84.4)	145 (76.3)	32 (88.9)	410 (81.7%)	<b>p= 0.043</b>
<b>Comorbidity</b>					
Yes	7 (16.3)	13 (28.9)	-	20 (21.7%)	X <sup>2</sup> = 3.217
No	36 (83.7)	32 (71.1)	4 (100)	72 (78.3%)	p= 0.200
<b>Total</b>	<b>276</b>	<b>190</b>	<b>36</b>	<b>502</b>	

\* $\chi^2$ = Chi-Square test

\*\* p&lt;0.05

**Table 2: Participants' characteristics and attitudes toward COVID-19 (n=502)**

	Experiencing Vaccine Hesitations (n=276)	No Vaccine Hesitations (n=190)	Rejecting the Vaccine (n=36)	Total (n= 502)	Test/p value*
	n/%	n/%	n/%	n/%	
<b>Testing for COVID-19</b>					
Yes	133 (48.2)	93 (48.9)	17 (47.2)	243 (48.4%)	X <sup>2</sup> = 0.048
No	143 (51.8)	97 (51.1)	19 (52.8)	259 (51.6%)	p= 0.976
<b>COVID-19 test result</b>					
Pozitif	49 (17.8)	19 (10.0)	11 (30.5)	79 (15.7%)	X <sup>2</sup> = 15.269
Negatif	84 (30.4)	74 (38.9)	6 (16.7)	164 (32.7%)	<b>p= 0.004</b>
Not get tested	143 (51.8)	97 (51.1)	19 (52.8)	259 (51.6%)	
<b>A first-degree relative diagnosed with COVID-19</b>					
Yes	111 (40.2)	62 (32.6)	16 (44.4)	189 (37.6)	X <sup>2</sup> = 3.521
No	165 (59.8)	128 (67.4)	20 (55.6)	313 (62.4)	p= 0.172
<b>Someone in the family or environment who has died due to COVID-19</b>					
Yes	135 (48.9)	77 (40.5)	14 (38.9)	226 (45%)	X <sup>2</sup> = 3.787
No	141 (51.1)	113 (59.5)	22 (61.1)	276 (55%)	p= 0.151
<b>Vaccine dose</b>					
1 dose	50 (18.1)	14 (7.4)	-	64 (13.7%)	
2 doses	186 (67.4)	123 (64.7)	-	309 (66.3%)	X <sup>2</sup> = 21.857
3 doses	35 (12.7)	40 (21.1)	-	75 (16.1%)	<b>p= 0.000</b>
4 doses	5 (1.8)	13 (6.8)	-	18 (3.9%)	
<b>COVID-19 vaccine type</b>					
Inactivated vaccine	39 (14.1)	18 (9.5)	-	57 (12.2%)	
mRNA vaccine	200 (72.5)	127 (66.8)	-	327 (70.2%)	X <sup>2</sup> = 9.258
Inactivated vaccine+mRNA vaccine	37 (13.4)	45 (23.7)	-	82 (17.6%)	<b>p= 0.010</b>

<b>Reasons for COVID-19 vaccine hesitations or refusal**</b>					
I don't believe the vaccine protects against disease	55 (19.9)	-	16 (44.4)	71(22.8)	X <sup>2</sup> = 10.890 p= <b>0.001</b>
I don't trust vaccine manufacturers	88 (31.9)	-	19 (52.8)	107(34.4)	X <sup>2</sup> = 6.170 p= <b>0.013</b>
I heard from media such as TV and internet that the vaccine is harmful.	59 (21.4)	-	8 (22.2)	67 (21.5)	X <sup>2</sup> = 0.013 p= 0.908
I'm concerned about the vaccine's short-term side effects, such as allergies.	117 (42.4)	-	12 (33.3)	129 (41.3)	X <sup>2</sup> = 1.077 p= 0.299
I'm scared because I don't know the long-term effects of the vaccine on my body	211 (76.4)	-	21 (58.3)	232 (74.4)	X <sup>2</sup> = 5.482 p= <b>0.019</b>
Negative experiences of those who have been vaccinated	54 (19.6)	-	12 (33.3)	66 (21.2)	X <sup>2</sup> = 3.619 p= 0.057
I don't trust it because the vaccine is produced for a very short time.	104 (37.7)	-	14 (38.9)	118 (37.8)	X <sup>2</sup> = 0.020 p= 0.888
The virus is constantly changing, the vaccine is useless	68 (24.6)	-	10 (27.8)	78 (25.0)	X <sup>2</sup> = 0.289 p= 0.865
Negatively affects fertility (infertility)	42 (15.2)	-	10 (27.8)	52 (16.7)	X <sup>2</sup> = 3.617 p= 0.057
I think they will control us remotely with microchips placed in the vaccine.	8 (2.9)	-	3 (8.3)	11 (3.5)	X <sup>2</sup> = 2.765 p= 0.096
<b>Having any vaccinations before</b>					
Yes	253 (91.7)	172 (90.5)	30 (83.3)	455 (90.6%)	X <sup>2</sup> = 2.611
No	23 (8.3)	18 (9.5)	6 (16.7)	47(9.4%)	p= 0.271
<b>Being hesitant about previous vaccinations</b>					
Yes	28 (11.1)	4 (2.3)	6 (20.0)	38 (8.4%)	X <sup>2</sup> = 15.916
No	225 (88.9)	168 (97.7)	24 (80.0)	417(91.6%)	p= <b>0.000</b>
<b>Having health problems with previous vaccinations</b>					
Yes (pain, fever, weakness, fatigue, allergies)	16 (6.3)	16 (9.3)	2 (6.7)	34 (7.5%)	X <sup>2</sup> = 1.344
No	237 (93.7)	156 (90.7)	28 (93.3)	421(92.5%)	p= 0.511
<b>Total</b>	<b>276</b>	<b>190</b>	<b>36</b>	<b>502</b>	

\* $\chi^2$ = Chi-Square test, p<0.05 \*\* There has been more than one response. It was calculated using the responses of participants who had hesitations about the vaccine and refused it.

**Table 3: Mean Scores of Vaccine Hesitancy Scale in Pandemics (n=502)**

Total and sub-dimension scales	Experiencing Vaccine Hesitations (n=276)	No Vaccine Hesitations (n=190)	Rejecting the Vaccine (n=36)	Total (n=502)	Test/p value*
	X±SD (min-max)	X±SD (min-max)	X±SD (min-max)	X±SD (min-max)	
Total score of Vaccine Hesitancy Scale in Pandemics	28.818±4.78 (14-43)	24.389±4.51 (14-38)	33.916±7.00 (23-46)	27.508±5.59 (14-46)	F= 79.988 <b>p= 0.000</b>
Lack of confidence sub-dimension score	22.134±4.19 (12-36)	18.778±3.86 (8-30)	26.666±6.10 (16-37)	21.18± 4.76 (8-37)	F= 9.175 <b>p= 0.000</b>
Risk sub-dimension score	6.684±1.57 (2-10)	5.610±1.51 (2-10)	7.25±1.55 (4-10)	6.31± 1.65 (2-10)	F= 0.652 p= 0.522

\* One-Way ANOVA test, p&lt;0.05

**Table 4: Comparison of Some Socio-Demographic Characteristics with the mean score of Vaccine Hesitancy Scale in Pandemics**

Sociodemographic Characteristics	Vaccine Hesitancy Scale in Pandemics	
	Mean±SD	Test
<b>Age</b>		
18-32 years	27.53±4.98	
33-45 years	28.08±6.27	F= 2.396
46-64 years	25.95±6.11	p= 0.067
65 years and older	25.66±2.16	
<b>Gender</b>		
Female	27.80±5.47	t= 1.814
Male	26.83±5.80	p= 0.07
<b>Eğitim</b>		
Primary education	27.15±7.24	F= 2.750 p= 0.042
Secondary education	28.27±6.37	
University	27.71±5.32	Post Hoc Tukey Test (3-4) p= 0.046
Postgraduate education	25.83±5.56	
<b>Income</b>		
Income less than expense	28.23±5.38	F= 2.843
Income equals expense	27.49±5.64	p= 0.059
Income more than expenses	26.27±5.58	
<b>Residence</b>		
living area	27.14±6.10	
Aegean	26.79±5.11	
Black Sea	27.33±5.99	F= 2.843
Marmara	28.13±5.14	p= 0.059
Central Anatolia	27.30±5.00	
Mediterranean	27.93±4.64	
Southeastern Anatolia	30.78±5.52	
<b>Employment</b>		
Yes	27.26±6.12	t= -1.000
No	27.75±4.99	p= 0.318
<b>General health status</b>		F= 4.209 p= 0.015
Good	27.11±5.72	
Moderate	28.81±4.99	Post Hoc Tukey Test (1-2) p= 0.011
Poor	26.87±4.99	
<b>Chronic illness</b>		
Yes	26.93±5.72	t= -1.088
No	27.63±5.55	p= 0.277
<b>COVID-19 test result</b>		
Pozitif	28.32±5.25	t= 1.601
Negatif	27.07±5.94	p= 0.111
<b>Vaccine dose</b>		
1 dose	29.57±4.89	F= 12.696 p= 0.000
2 doses	27.11±5.06	
3 doses	25.48±4.61	Post Hoc Tukey Test (1-4) p= 0.000
4 doses	22.66±4.86	
<b>Total</b>	<b>502</b>	



**Table 5. Logistic Regression Analysis of Factors Affecting on Vaccine Hesitation**

Variables (Reference category)	B	Wald	Odds Ratio (OR)	%95 CI	P*
Gender (Female)	0.828	14.645	2.288	1.497-3.496	<b>0.000</b>
Age (18-32 age)	0.178	1.431	1.195	0.893-1.599	0.232
Education (Primary education)	-0.109	0.411	0.897	0.643-1.251	0.522
Chronic illness (Yes)	-0.316	1.317	0.729	0.425-1.251	0.251
Vaccine dose (1 dose)	0.588	12.705	1.801	1.303-2.489	<b>0.000</b>
General health status (Moderate)	-0.225	0.938	0.798	0.506-1.259	0.333

\*p<0.05 CI: confidence interval

## Discussion

A well-planned vaccine program is required to achieve social immunity and to control the spread of disease during pandemics. In order for vaccine programs to be successful, it is necessary that the vaccines are accepted by the public. The present study was conducted to determine the frequency of vaccine hesitancy and the influencing factors in the Turkish society during the COVID-19 pandemic. The findings of the study show that 54.9% of the participants had the vaccines with hesitancy while 7.2% were not vaccinated. Previous studies on COVID-19 vaccine hesitancy in Turkish society indicate that vaccine hesitancy frequency is 37.9%-45.3% (İkişik et al., 2021; Yilmaz et al., 2021). When studies from different countries were reviewed, it was seen that vaccine hesitancy rate was 31.1% in Italy (Reno et al., 2021), 35% in Ireland (Murphy et al., 2021), 31% in the United Kingdom (Murphy et al., 2021), and 59% in Portugal (Soares et al., 2021). Vaccine hesitancy is a state that can be affected by many individual, cultural and social factors (WHO, 2019). These rational differences among countries may be because of such factors as religion, living conditions, trust in politicians and healthcare services on individuals' attitudes and behaviors towards vaccines (Soares et al., 2021).

In the present study, it was seen that individuals who experienced vaccine hesitancy and vaccine refusal were in the 18-32 years age group, which also includes generation Z. Some individuals think that their freedom has been limited because of several practices like wearing masks, taking safety precautions, and getting vaccinated during the COVID-19 pandemic (Palitsky et al., 2021). Individuals in generation Z are known to attach great importance to their freedom and individualism (Berkup, 2014). This finding may have come out because Gen Z sees vaccines as a threat to their freedom. In addition, the fact that

elderly individuals are closer to the reality of death (Yalom, 2008) and COVID-19 triggers concerns about death could have caused these individuals to have an increased willingness to be protected with vaccination and decreased hesitancy. The literature presents varying results about the relationship between vaccine hesitancy and age. Parallel with our findings, some studies report that vaccine hesitancy and refusal decrease as age increases (Murphy et al., 2021; Soares et al., 2021) whereas some others indicate that age is not influential in vaccine decision-making (Yilmaz et al., 2021). In the study conducted by Schwarzinger and colleagues (2021) in France, on the other hand, it was found that vaccine hesitancy was lower in the young and elderly population. It was envisaged that the young, who were less affected by the disease, preferred to get vaccinated in order to go back to normal life and to indirectly protect their elderly family members at risk (Schwarzinger et al., 2021).

In the present study, it was found that men held more positive attitudes towards vaccination and women's vaccine hesitancy rate was significantly higher. This is consistent with the findings of many previous studies (Salali & Uysal, 2020; Lazarus et al., 2021; Reno et al., 2021). Since it is often mothers who make the decisions about their children's health, it is thought that women are more likely to search for information about vaccines and be exposed to anti-vaccine content online (Smith & Graham, 2019).

This study determined that university graduates experienced more vaccine hesitancy or refusal. Different from our findings, Yilmaz and colleagues (2021) reported that vaccine refusal and hesitancy significantly decrease as the level of education increased (Yilmaz et al., 2021). Findings concerning the relationship between educational background and vaccine hesitancy are similar in the literature (Reno et al., 2021). On the

other hand, in the study conducted by Soares and colleagues (2021), vaccine hesitancy rate was low among individuals who had a lower level of education but higher level of income, while university graduates who experienced income losses during the pandemic had a higher rate of vaccine hesitancy (Soares et al., 2021). The Working Group on Vaccine Hesitancy stated that the relationship of the determiners of vaccine hesitancy like education and socio-economic status were not in a single direction (WHO, 2019). In line with these findings, it could be asserted that the relations among different factors and their effects on vaccine hesitancy vary. In addition, the fact that university graduates are represented more in the sample in the present study may have been effective on the result.

In the present study, the participants who had no chronic disease and stated their overall health status as good had significantly higher rates of vaccine hesitancy. According to a study conducted in the USA, participants who had no comorbid disease were more hesitant about the COVID-19 vaccine (Ruiz & Bell, 2021). Results of previous studies support our findings and report that those who see COVID-19 a threat for themselves experience less vaccine hesitancy and vaccine refusal (Reno et al., 2021; Soares et al., 2021).

It was seen in the study that the participants who had a single dose of vaccine had more vaccine hesitancy compared with those who had four doses. This relates to the risk that individuals perceive about the disease. It is possible that the risks were normalized after the first dose decreasing the perceived risk, which brought about less hesitancy in the following vaccines (Beck, 2016). It is stated in the study of Reno and colleagues (2021) that risk perception about the disease may affect vaccine acceptance and that individuals who had moderate to low-risk perceptions were more hesitant about the COVID-19 vaccine compared with those with a higher risk perception (Reno et al., 2021).

When the participants who had vaccine hesitancy or refused vaccination were asked about the reasons; most of them expressed that they were worried because they did not know the long-term effects of the vaccine, they did not trust as vaccine production was made in a very short time, they distrusted the vaccine producers and that they did not believe the vaccine protected against disease.

Similar to our findings, previous studies conducted in our country and others reported that many individuals held concerns because the vaccine was started to be applied before the study phases were completed and they suspected the safety and efficacy of the COVID-19 vaccines that were developed rapidly (Reno et al., 2021; Yilmaz et al., 2021). High efficacy and safety of the COVID-19 vaccines may decrease vaccine hesitancy by increasing trust in vaccines. It is recommended that healthcare authorities give the most accurate and up-to-date data to the public to increase trust in vaccines. In addition, it would be beneficial if healthcare authorities are informed about the side effects of the vaccines, take necessary precautions for the side effects, and inform patients (Çıtak & Aksoy, 2020).

#### Limitations

Although the study was conducted throughout Turkey, the small size of the sample, higher representation of women and university graduates in the sample and the differences among regions in terms of participation are the limitations of our study. Since the responses are limited to internet users, sample bias could be an issue.

**Conclusion:** As a result of the study, it was concluded that approximately 55% of the population got vaccinated with hesitation while 7.2% refused vaccination. The primary reason behind vaccine hesitancy and refusal was seen to be lack of trust in the COVID-19 vaccine and the concerns about the side effects of the vaccine. It was also determined that the young population, women, university graduates and those who had no chronic disease had higher rates of vaccine hesitancy and vaccine refusal.

It is important to remember that the groups showing vaccine hesitancy and refusal, as well as the factors causing hesitancy, are valid only for the period in which this study was conducted. Carrying out similar studies with larger sample groups and at regular intervals may help specify the target groups for vaccine campaigns more accurately. It is considered that offering education to these groups on the factors causing vaccine hesitancy and refusal by competent nurses will contribute to the increase in vaccination rates in society and achieving social immunity during the Covid-19 pandemic. It is recommended that healthcare authorities share up-to-date data on the efficacy and reliability of the vaccine with evidence through effective communication

channels to eliminate public hesitancy about vaccines. It would be beneficial to determine the groups at risk for vaccine hesitancy and plan campaigns accordingly for vaccine campaigns to be successful.

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