

Hatice İKİŞİK¹, Mehmet Akif SEZEROL², Yusuf TAŞÇI², Işıl MARAL¹

¹Istanbul Medeniyet University Faculty of Medicine, Department of Public Health; Istanbul/TURKEY

²Institute of Health Sciences, Istanbul University, Department of Public Health; Üsküdar Provincial Health Directorate; Istanbul/TURKEY

Correspondence

Hatice İKİŞİK, Istanbul Medeniyet University, Faculty of Medicine, Department of Public Health

Unalan Mah. D100 Karayolu Yanyol 34700 Uskudar Istanbul/TURKEY

Email: drhatice.ikiisik@gmail.com

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/IJCP.14336](#)

This article is protected by copyright. All rights reserved

COVID-19 Vaccine Hesitancy: A Community-Based Research in Turkey

Aim: The frequency of vaccine refusal and hesitation, which is associated with many factors, is increasing worldwide. The purpose of this study is to estimate the frequency of vaccine refusal against COVID-19 vaccines and to identify the underlying factors for refusal or hesitation.

Materials and Methods: This is a cross-sectional study carried out in a district of Istanbul between 25-30 December 2020. A sample of people between the ages of 20-85 in the district was selected, and a total of 384 people were enrolled. A questionnaire about the COVID-19 vaccine was administered to the participants by phone. The questionnaire consisted of questions about the sociodemographic characteristics of participants and their thoughts about possible COVID-19 vaccines.

Results: 45.3% of the participants were hesitant about getting the COVID-19 vaccine, which was declared appropriate by the Ministry of Health. The rate of those who think that the COVID-19 vaccine will be effective in preventing and controlling the disease was 51.6%. 89.6% of the participants were hesitant about getting their children vaccinated. Those who do not consider COVID-19 disease as a risk to their health were 22.9%, and 32.8% thought that they would be protected from the disease by natural and traditional ways. The median score of the participants' risk perception was 7 (IQR: 6-8; Mean: 6.8; SD: 1.7). The median value of risk perception score of

those who accept the vaccine was 6 (IQR: 4-6), while the median value for those who did not accept the vaccine was 4 (IQR: 4-6) ($p < 0.01$). Factors affecting vaccine acceptance were determined as the perception of risk (OR: 1.26% 95CI 1.03-1.55) and age (OR: 0.94% 95CI: 0.91-0.98) in logistic regression analysis.

Conclusion: Half of the participants were hesitant about the COVID-19 vaccines. The success of COVID-19 vaccination programs largely depends on the public willingness to accept the vaccine.

Key words: COVID-19; COVID-19 vaccine; vaccine hesitancy; vaccine refuse; vaccine acceptance; Turkey.

INTRODUCTION

In the COVID-19 pandemic, nearly 2 million deaths and more than 88 million confirmed coronavirus cases (COVID-19) had been reported in a year. (1) This ever-growing global problem not only caused health effects but also caused many negative economic and social consequences. (2,3) As of January 10, 2021, there have been approximately 2.5 million confirmed COVID-19 cases, and more than 22 thousand COVID-19 related deaths have been reported in Turkey. (4) Social restrictions were imposed when deemed necessary in order to control the spread of increasing cases nationally. (5,6) In Turkey, like the rest of the world, it has taken place in the agenda to end the pandemic medically and socially by immunizing more than 70% of the population with safe, effective, affordable, and accessible vaccines. Today, there are 259 COVID-19 vaccine projects ongoing to develop effective and reliable vaccines in the world. (7,8) According to World Health Organization (WHO), 28 vaccine candidates are currently under clinical evaluation, and for 8 of them, phase-3 trials are pending. (9) In Turkey, studies on the COVID-19 vaccine began on the first days of the epidemic, and 14 drug and vaccine development projects are underway. (10)

In mid-September, phase-3 studies on inactivated Sars-Cov-2 vaccine developed by China has started in Turkey, and the Ministry of Health has determined vaccination strategies. (11) After the limited dose of vaccine provided, preservation of the vaccine, who will apply it, to whom it will be administered first, and the society's willingness to be vaccinated have been discussed. The success of any COVID-19 vaccination program will depend on the public's willingness to get vaccinated.

As a country, agreements have been made for 50 million doses of inactivated vaccine, and the first 3 million doses have arrived. Following the emergency use authorization, it is planned to vaccinate suitable people over the age of 18, starting with the health providers and elderly. (12) In order to reduce the social and economic burden of the pandemic, an inclusive and reassuring vaccination program implementation was planned. It is important to start and successfully apply the planned COVID-19 vaccination program as soon as possible to ensure herd immunity and control the spread of the disease. Except for the ongoing vaccination on volunteers, no other vaccination program has started yet. In this study, we aimed to investigate the approaches of citizens living in a district of Istanbul regarding the acceptability of any future COVID-19 vaccine before the vaccination program has started.

MATERIALS AND METHOD

Method

The study was planned as a cross-sectional study and was carried out between December 25-30, 2020, in a socio-economically high-level district in the Anatolian side of Istanbul. OpenEpi. Version 3 program was used for sample calculation. The sample size was calculated as 1065, among 409453 registered people in the district between the ages of 20-85 with a 50% incidence, 3% margin of error, and 95% confidence interval. Due to the pandemic, a questionnaire method via telephone was preferred. Although the telephone questionnaire application is fast and relatively easy, the reasons such as the limitation of calling and answering in a certain time interval, the selectivity of the people in the incoming calls, and the fixed-line telephones in the majority of those who appear to have phones in the system (even though people seemed to have a fixed-line telephone number in the system, most of the numbers were out of use) were considered as obstacles to reaching the sample size. For this reason, 30% additional sampling was chosen, and the final sample size was 1387. For sample selection, 409,453 people between the ages of 20-85 in

the district were listed separately in groups by ages of five (e.g., 20-24, 25-29). The weighted percentages of age groups in the total population were calculated. In addition, the weighted percentages of males and females in each age group were also examined. Then, for the final sample size calculated (1387 people), the number of people to be selected from each age group according to their weighted percentages and then the number of males and females were determined. The lists of people in each age group by gender were created separately in SPSS, and random selection was made for the sample according to their weighted percentages. The determined inclusion criteria were as follows; being registered to the district family medicine population, being in the age range of 20-85, and being able to make phone calls.

Data Collection Tools

The data were collected via phone calls with a questionnaire created by the researchers. A pilot study was conducted to evaluate the questionnaire's comprehensibility, usability, applicability, and time spent before the implementation, and then the final version of the questionnaire was formed. Before starting the survey, the participants were informed about the research's purpose; their consent was asked after they were informed about their right to withdraw from the research, privacy, and data protection. The questionnaire was conducted on citizens who agreed to participate and given consent.

In the first part of the questionnaire, questions regarding demographic variables such as age, gender, educational status, occupation, employment status, economic status, marital status, presence of children, number of people living at home, presence of chronic illness were included. In addition, individuals were asked to make self-evaluations regarding their health such as "very good/good/medium/bad/very bad." In the second part, participants were asked whether he/she or his/her relative was diagnosed with COVID-19 disease or whether he was hospitalized. In addition, to evaluate risk perceptions about COVID-19 disease, "How would you evaluate yourself in terms of risk of contracting COVID-19?" and "How would you rate yourself on the risk of dying from COVID-19?" questions were included. The answers were asked to be evaluated as "very high (5), high (4), medium (3), low (2), very low (1), and no risk (0)". The sum of the answers given to both questions was evaluated as "risk perception score."⁽¹³⁾ The third part of the questionnaire contained 12 propositions for the COVID-19 vaccine. In order to evaluate the

approach of people to the COVID-19 vaccine, 12 items were included in the third part of the questionnaire, such as the efficacy of the vaccine on the disease, its side effects, ease of application, domestic/foreign vaccination, being have to pay, vaccination even if the patient had the disease, vaccination of family members, vaccination of only children, not considering the COVID-19 disease as a risk and preventing the disease by natural and traditional ways. For each statement, "yes / undecided / no" options were included.

Ethical Approval

This study was approved by Zeynep Kamil Obstetrics and Pediatrics Training and Research Hospital Clinical Research Ethics Committee (214/2020).

Statistical Analysis

Descriptive statistics are given as absolute frequencies (n) and relative frequencies (%) for the study's categorical variables. A chi-square analysis was performed for the respondents' sociodemographic characteristics and the COVID-19 vaccine decisions. A logistic regression analysis was used to assess the relationship (odds ratios) of demographic factors to COVID-19 vaccine acceptance. Statistical significance was accepted as $p < 0.05$. All analyzes were made with IBM SPSS statistics version 22.0.

RESULTS

Of the 1385 people included in the study, 1244 phone numbers were registered, and 143 people did not have any phone information registered in the system. Of the 1224 registered phone numbers, 532 people were reached, and 712 people (57.2%) could not be contacted due to invalid telephone numbers (e.g., out of the use of the phone, the number belonging to someone else, or death of the individual). Three calls were made for each number that could not be reached, and if it still could not be reached, it was not called again. 48.8% of those who could not be reached were men, and their mean age was 46.2 ± 16.8 . After being informed about the research via phone calls, 387 people agreed to participate in the survey, while 145 refused. The mean age of those who refused was 45.9 ± 16.9 , and 39.3% were male. Three of the 387 questionnaires were excluded due to missing data, and a total of 384 participants were enrolled. The participation rate of the survey was 72.7%. (Figure 1) Although this situation may appear as a nonresponse bias, which may arise from the possible differences between the individuals who were contacted and who

agreed to participate in the questionnaire, and those who could not be contacted or refused to participate, the degree of nonresponse bias could not be evaluated since we did not know the characteristics of those who did not respond (except for mean age and gender). While the high rate of those who could not be reached in any way might be due to the lack of updates in the registry system where the sample selection was made, the rate of those who refused to participate might be affected by factors such as their decision to participate in the data to be measured by the questionnaire, lack of information about the content of the questionnaire, problems arising from the questionnaire structure or the interviewer, and the occupation of people. Those who could not be reached and refused to participate were mostly women and over 45 years old. It was observed that the participants mostly had an education level of high school and above (71.4%).

Sociodemographic Characteristics

The mean age of the participants was 43.3 ± 13.5 and 52.6% (n = 202) of them were male. 68.0% (n = 261) were married and had children. The median value of the number of people living in the household was 3 y (IQR:2-4) and the household income of 51.7% (n = 163) was between 2435 and 7000 TL. 27.6% of the participants (n = 106) had a chronic disease. Among the chronic diseases reported, hypertension was present in 27.3% (n = 29), diabetes mellitus in 15.0% (n = 16), Chronic obstructive pulmonary disease (COPD) in 14.1% (n = 15) and Cardiovascular Disease in 12.3% (n = 13). Frequency of smoking was 29.2% (n = 112). 49.1% (n = 188) of the participants were university graduates while 53.4% (n = 205) were still working. According to professions, 39.0% (n = 150) were self-employees, 17.7% (n = 68) were housewives, 13.0% (n = 50) were workers, 14.5% (n = 56) were civil servants, 5.2% (n = 20) were students and 4.6% (n = 18) of them had a work position in the health sector. 57.3% of the participants (n = 220) stated their own health status as "good". (Table 1) The study population was similar to the indicators of the district where the study was conducted in terms of gender, age distribution, education level, and economic status (14). Since district data on chronic illness and smoking status, which were among the independent variables, could not be found, the data of the individuals in the study were evaluated according to Istanbul data. According to these data, the frequency of smoking and the presence of chronic diseases in the participants were considered to be consistent with Istanbul in general (15). It was observed that the rate of participants diagnosed with COVID-19 was higher than the country population (16).

COVID-19 Infection Status and Hospitalization

18.2% (n = 70) of the participants were diagnosed with COVID-19 disease and 2.1% (n = 8) were hospitalized due to this disease. The rate of those whose relatives were diagnosed with COVID-19 was 47.7% (n = 183), and 33.9% (n = 61) of them were hospitalized. The median score of all participants for COVID-19 risk perception of developing and dying from the disease was 7 (n = 383) (IQR: 6-8; Mean: 6.8; S.S.: 1.7). While the median risk perception score of those who accept the vaccine (n = 210) was 6 (IQR: 4-6), among those who did not accept the vaccine (n = 71), the median value was 4 (IQR: 4-6). The difference in risk perception score was statistically significant. (p <0.01). In the question of vaccination among 383 participants in the study, those who chose "not sure" were excluded from the statistical correlation calculation for those who accepted and rejected the risk score, so the risk score was calculated for 281 participants.

COVID-19 Vaccine Acceptability

54.7% (n = 210) of the participants declared that they would have the vaccine, the suitability of which has been declared by the Ministry of Health. The rate of citizens who thought that the COVID-19 vaccine would effectively prevent and control the disease was 51.6% (n = 198). 54.4% (n = 209) stated that they would have the vaccine if it was easily applicable, and 54.9% (n = 211) stated that they accepted vaccination If the vaccine was free of charge. 58.9% (n = 226) agreed to get vaccinated unless it has side effects. While 57.0% (n = 219) of the participants preferred to have a national vaccine, 47.1% (n = 181) stated that they would get vaccinated even if the vaccine came from abroad. 48.7% of the participants (n = 187) wanted to be vaccinated even if they have had the disease. 47.9% (n = 184) of the participants stated that they would get all family members vaccinated. 10.4% (n = 40) stated that they only would get their children vaccinated. Those who do not consider COVID-19 disease as a risk to their health had a rate of 22.9% (n = 88), and 32.8% (n = 126) thought that they would be protected from the disease by natural and traditional ways. The distribution of the responses to the COVID-19 vaccine recommendations is given in Table 2.

A logistic regression analysis model consisting of 8 independent variables was applied to evaluate vaccine acceptance factors. The model was found to be statistically significant, $X^2(10, N = 234) = 24,22$; p = 0.007. The group of variables in the model can explain a part of the variance regarding the acceptance of the vaccine between 9.8% (Cox and Snell R squared) and 14.7%

(Nagelkerke R squared). The model found that among those who refused the vaccine had a 0.79 factor decrease in their COVID-19 disease risk perception scores (OR: 1.26% 95CI 1.03-1.55) relative to those who accepted the vaccine, and also as age increases, individuals' chances of rejecting the vaccine may decrease. (OR: 0.94% 95 CI: 0.91-0.98). (Table 3)

DISCUSSION

As a result of epidemiological characteristics such as the prevalence, fatality, and infectivity of the disease, the pandemic has caused great sociological, economic, and psychological destructions in society. (14) In the ongoing process, the hope of getting rid of the disease was attributed to the vaccine. With many COVID-19 vaccines being developed, the hesitation and acceptance of the COVID-19 vaccine in the community should be well understood to reach the vaccination levels that will provide herd immunity. Vaccination hesitations - unwillingness or refusal to get vaccinated - are among the ten most significant global health threats. (18) Our findings show that while one in two people in the community would accept a potential COVID-19 vaccine for all family members and themselves. In addition to the undecided people, close to one-fifth of the population refused the vaccine. Those who think about having only their children vaccinated consist of 10% of the society. Although it is stated that more than 70% of the population should be vaccinated to provide herd immunity according to the studies, such a rate cannot yet be given for COVID-19 disease (19) There are many studies on the acceptance of the SARS-COV2 vaccine in the world. Acceptance rates of up to 70% have been observed in different societies.(20,21) Studies in the United States and Britain show that around 50% of people will not be vaccinated. Also, in a U.K. study, parents had higher vaccine acceptance for their children compared to our study.(22,23) Therefore, vaccine hesitations are an important and possibly growing problem. Vaccination hesitation rates are also associated with the periods in which studies are conducted. In studies conducted in the first three months after the pandemic announcement, those who stated that they would not be vaccinated against SARS-CoV-2 ranged from 14 to 26%.(24,25) Vaccine rejections, which have shown an increasing trend, especially in childhood vaccination in recent years, pose the risk of spreading vaccine-preventable diseases. In parallel, anti-vaccine activities in the community may also affect individuals' intentions to vaccinate for COVID-19. These rates should not always be considered a good acceptance indicator, as many factors affect the vaccine decision and may change over time. These rates should not always be considered as a good acceptance indicator, as there are many factors

affecting the vaccine decision and may change over time. Unless the origins of the broad variation in COVID-19 vaccine intent are well understood and addressed, there may be differences in vaccine coverage across countries. Not knowing the social acceptance factors with a significant share in vaccine management could delay global control of the pandemic and the subsequent social and economic recovery.

Our data show that there are two positive determinants of community acceptance of potential future vaccines. These determinants are individuals' perceptions of high risk and age. Our study found that the risk perceptions of those who accepted the vaccine were higher than those who rejected the vaccine. Deliberative, experiential, and emotional risk perceptions of individuals are evaluated to take protective measures against health threats and then perform health behaviors to mitigate the threat. It was observed that the most potent predictor in predicting the protection motivation was the emotional risk perception. (26) For this reason, it can be thought that the high-risk perceptions of individuals related to COVID-19 disease and dying from COVID-19 disease are also effective in the acceptance of the vaccine to prevent the disease. In addition, it can be evaluated that optimism or excessive trust bias in individuals related to the disease affects protective behaviors such as social distance and hand washing, as well as causing low-risk perception and hence hesitation about the necessity of the vaccine.(27,21) Besides, exposure to various inaccurate news about the disease on social media has increased the anxiety and risk perception in the society who do not have sufficient information and are uncertain about the disease. Exposure to inaccurate news about the disease on social media has increased the anxiety and risk perception in society with insufficient information and uncertainty. (28-30)

In similar studies, it is seen that as the risk perception increases, the vaccine acceptance increases. (21) It is essential to manage the social risk perception well in order to ensure success in the pandemic. The vaccine, which is highly anticipated for society in all these negativities, has formed the world agenda as an important strategy to stop the escalation in the COVID-19 epidemic. According to the findings of our study, as the age increased, vaccine acceptance increased. Additionally, vaccine acceptance was higher in males and those without children. There are studies reporting similar results with ours that were conducted to determine the community vaccine intention. (32,21) In our country, it is possible that the restrictive measures regarding the pandemic that covers over 65 years of age and continuing for a long time and the news about the disease mortality specific to this age group in the media might have affected the vaccine

acceptance of the elderly group. As the subjective perception of personal risk increases, the rate of acceptance of the vaccine increases. (33) However, there are also studies where acceptance is higher in the young age group, and adverse results are associated with higher anxiety and easier access to more information in young people. (31) In addition, vaccine acceptance rates were higher in married people, in primary/secondary school graduates, those who are still working, those with chronic diseases, those with middle-income levels, and those who smoke, although there was no statistical significance. Numerous studies have reported that the risk of becoming infected is perceived as an indicator of the intention behind vaccination. In our study, those with chronic diseases that may progress to a more severe course if infected or whose risk of infection can be considered to be relatively higher, those who are currently working, smokers, married, and those with a low educational level were more willing to getting vaccinated. (21)

Studies have shown that higher trust in the health system was associated with the use of preventive health services such as vaccination.(34) In order to maximize vaccine acceptance, health authorities need to build trust in the public through the transparent management of vaccine development stages and the production and effectiveness of the SARS-COV2 vaccine.

Individuals should be encouraged to get vaccinated for both to collaborate on COVID-19 control measures and to accomplish both community and individual health responsibilities. Clear and consistent communication by government officials in a vaccination program to be conducted here is crucial to establishing public trust in vaccination programs and developing positive health behavior. (35,36)

This study has several strengths and limitations. In terms of strengths, this is the first study we know to reveal the social vaccine intention in our country. In this respect, our study provides new information about barriers and incentives for vaccinating people against SARSCoV2. The acceptance of participants to get vaccinated was examined during the period when the outbreak had reached the highest level since its start in Turkey before the vaccination process was initiated.

It is possible that vaccination attitudes will change over time as more pro-vaccination information is provided by health authorities and policymakers about a potential COVID-19 vaccine and as more public information becomes available. One limitation of the study is that although the design is cross-sectional, it has hesitations to generalize to the representative sample of the district where it was conducted due to the response rates. Our findings may be influenced by possible selection

bias because respondents needed to have a phone to survey them, which can limit the generalizability of our sample. Additionally, since this is a questionnaire-based study, it is likely that respondents' responses may be affected by a social desirability bias. Participants can give expected answers to the questions. Finally, combining the "unstable" group with the "yes" and "no" groups could result in the loss of some statistical results while splitting the outcome variable acceptance of the COVID-19 vaccine into two. Our current study did not investigate the barriers to vaccine hesitancy. However, applying the questionnaire over the phone to collect the data is still one of the few methods available during the pandemic period. Further quantitative and qualitative studies are needed to investigate variables other than those investigated in this study to reveal the factors affecting vaccination attitudes.

RESULTS:

As a result, in our study, the intention of the participants to accept a hypothetical vaccine that has not yet been applied was questioned, and it was found that 18.2% of them refused the vaccine. The success of COVID-19 vaccination programs will largely depend on the public willingness to adopt the vaccine. In the ongoing pandemic, building trust to support the public acceptance of a potential COVID-19 vaccine provides an opportunity to support general immunization programs for all vaccine-preventable diseases. To increase trust, all stakeholders should demonstrate a transparent, evidence-based scientific policy and demonstrate clear accurate communication. By understanding the underlying factors of vaccine rejection for public health, interventions within the scope of the vaccination program should also be prepared accordingly.

References

1. World Health Organization (WHO): Coronavirus disease (COVID-19) dashboard
Accessed on 01.2021 Found at: <https://covid19.who.int/>
2. Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *Int J Surg.* 2020;78:185-93.
3. Abrams EM, Szeffler SJ. COVID-19 and the impact of social determinants of health. *Lancet Respir Med.* 2020;8(7):659-661.
4. Ministry of Health of Turkey Covid-19 Patient Table. Accessed on 01. 2021 Found at: <https://covid19.saglik.gov.tr/>

5. Ministry of Interior, Within the scope of combating coronavirus - circulars on new restrictions and measures. Accessed on 01. 2021 Found at: <https://www.icisleri.gov.tr/koronavirus-ile-mucadele-kapsaminda-sokaga-cikma-kisitlamalari---yeni-kisitlama-ve-tedbirler-genelgeleri>.
6. Guner R, Hasanoglu I, Aktas F. COVID-19: Prevention and control measures in community. *Turk J Med Sci*. 2020;50(SI-1):571-577.
7. Haidere MF, Ratan ZA, Nowroz S, et al. COVID-19 Vaccine: Critical Questions with Complicated Answers. *Biomol Ther (Seoul)*. 2021;29(1):1-10.
8. Mullard A. COVID-19 vaccine development pipeline gears up. *Lancet*. 2020;395(10239):1751-1752.
9. World Health Organization (WHO): Draft landscape of COVID-19 candidate vaccines. Accessed on 12. 2020. Found at: <http://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines>.
10. Ministry of Health of Turkey. Domestic vaccine joint working group meeting. Accessed on 01.2021. Found at: <https://www.saglik.gov.tr/TR,75070/saglik-bakani-koca-yerli-asi-ortak-calisma-grubu-toplantisina-baskanlik-etti.html>
11. TÜSEB, Turkey Institutes of Health Chairmanship, CoronoVac vaccine efficacy results. Accessed on 01.2021. Found at: <https://www.tuseb.gov.tr/haberler/coronavac-asisi-ara-etkililik-sonuclari>
12. Ministry of Health of Turkey. Statement on the coronavirus scientific board meeting Access on 01.2021. Found at: <https://www.saglik.gov.tr/TR,78114/koronavirus-bilim-kurulu-toplantisina-iliskin-aciklama-07012021.html>.
13. Gidengil CA, Parker AM, Zikmund-Fisher BJ. Trends in risk perceptions and vaccination intentions: A longitudinal study of the first year of the H1N1 pandemic. *American Journal of Public Health*. 2012;102(4):672-679.
14. Endeksa. Demographic analysis of Uskudar/Istanbul. Access on 03.2021. Found at: <https://www.endeksa.com/tr/analiz/istanbul/uskudar/demografi>
15. National Household Health Survey – Prevalence of Noncommunicable Disease Risk Factors in Turkey 2017 (STEPS). Üner S, Balcılar M, Ergüder T editors. World Health Organization Country Office in Turkey, Ankara, 2018. Access on 03.2021. Found at: https://www.who.int/ncds/surveillance/steps/WHO_Turkey_Risk_Factors_A4_TR_19.06.2018.pdf

16. Worldometer. Worldometer coronavirus statistics page. Access on 03.2021. Found at: <https://www.worldometers.info/coronavirus/country/turkey/>
17. Akyıl FT, Karadoğan D, Gürkan CG, et al. What we learned about COVID-19 so far? Notes from underground. *Turkish thoracic Journal*. 2020;21(3):185–192.
18. World Health Organization. Ten threats to global health in 2019. Accessed on 01.2021 Found at: <https://www.who.int/emergencies/ten-threats-to-global-health-in-2019>
19. Fine P, Eames K, Heymann DL. "Herd immunity": a rough guide. *Clin Infect Dis*. 2011;52(7):911-916.
20. Lazarus JV, Ratzan SC, Palayew A, et al. A global survey of potential acceptance of a COVID-19 vaccine. *Nat Med*. 2020.
21. Al-Mohaithef M, Padhi BK. Determinants of COVID-19 Vaccine Acceptance in Saudi Arabia: A Web-Based National Survey. *J Multidiscip Healthc*. 2020;13:1657-1663.
22. Bracken M. *A trend that worries health experts: As U.S. gets closer to COVID-19 vaccine, fewer people say they'd get one*. Accessed on 9. 2020. Found at: <https://morningconsult.com/2020/09/11/vaccine-acceptance-public-poll/>
23. Bell S, Clarke R, Mounier-Jack S, Walker JL, Paterson P. Parents' and guardians' views on the acceptability of a future COVID-19 vaccine: A multi-methods study in England. *Vaccine*. 2020;38(49):7789-7798.
24. Barello S, Nania T, Dellafiore F, Graffigna G, Caruso R. 'Vaccine hesitancy' among university students in Italy during the COVID-19 pandemic. *European Journal of Epidemiology*. 2020;35(8):781-783.
25. Peretti-Watel P, Seror V, Cortaredona S, et al. A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. *The Lancet Infectious Diseases*. 2020;20(7):769-770.
26. Ferrer RA, Klein WMP, Avishai A, Jones K, Villegas M, Sheeran P. When does risk perception predict protection motivation for health threats? A person-by-situation analysis. *PLOS ONE*. 2018;13(3):e0191994.
27. Orte C, Sanchez-Prieto L, Dominguez DC, Barrientos-Baez A. Evaluation of Distress and Risk Perception Associated with COVID-19 in Vulnerable Groups. *Int J Environ Res Public Health*. 2020;17(24).

28. Brug J, Aro AR, Oenema A, de Zwart O, Richardus JH, Bishop GD. SARS risk perception, knowledge, precautions, and information sources, the Netherlands. *Emerg Infect Dis*. 2004;10(8):1486-1489.
29. Cori L, Bianchi F, Cadum E, Anthonj C. Risk Perception and COVID-19. *Int J Environ Res Public Health*. 2020;17(9).
30. Anderson EC, Carleton RN, Diefenbach M, Han PKJ. The relationship between uncertainty and affect. *Frontiers in Psychology*. 2019;10.
31. Andre FE, Booy R, Bock HL, et al. Policy and practice Vaccination greatly reduces disease, disability, death and inequity worldwide. *Bull. World Health Organ*. 2008;040089:140–146
32. Siciliani L, Wild C, McKee M, et al. Strengthening vaccination programmes and health systems in the European Union: A framework for action. *Health Policy*. 2020;124(5):511-518.
33. Dror AA, Eisenbach N, Taiber S, et al. Vaccine hesitancy: the next challenge in the fight against COVID-19. *Eur J Epidemiol*. 2020;35(8):775-779.
34. Larson HJ, Cooper LZ, Eskola J, Katz SL, Ratzan S. Addressing the vaccine confidence gap. *The Lancet*. 2011; 378:526-535.
35. Quinn SC, Parmer J, Freimuth VS, Hilyard KM, Musa D, Kim KH. Exploring communication, trust in government, and vaccination intention later in the 2009 H1N1 pandemic: results of a national survey. *Biosecur Bioterror*. 2013;11(2):96-106.
36. Shore DA. Communicating in times of uncertainty: the need for trust. *J Health Commun*. 2003;8 Suppl 1:13-14.

Table 1: Risk perception and vaccine intention by demographic characteristics

	Risk Perception	Vaccine Intention						Total	
		Yes		Not Sure		No			
Age Groups	Median±IQR	n	%	n	%	n	%	n	%
20-30	4 (4-6)	28	38,9	23	31,9	21	29,2	72	18,8
31-40	4 (4-6)	53	49,5	30	28,0	24	22,4	107	27,9
41-50	6 (5-7)	48	51,6	34	36,6	11	11,8	93	24,2
51-60	6 (4-6)	44	72,1	9	14,8	8	13,1	61	15,9
>60	6 (4-7)	37	72,5	7	13,7	7	13,7	51	13,3
		p=0,001 $\chi^2=30,109$							
Gender									
Female	5 (4-6)	84	46,2	63	34,6	35	19,2	182	47,4
Male	5 (4-6)	126	62,4	40	19,8	36	17,8	202	52,6
		p=0,02 $\chi^2=12,542$							
Marital Status									
Married	5 (4-6)	148	56,7	69	26,4	44	16,9	261	68,0
Single	5 (4-6)	62	50,4	34	27,6	27	22,0	123	32,0
		p=0,402 $\chi^2=1,825$							
Having Children									
No	6 (4-6)	59	47,6	34	27,4	31	25,0	260	67,7
Yes	5 (4-6)	151	58,1	69	26,5	40	15,4	124	32,3
		p=0,05 $\chi^2=5,914$							
Chronic Disease									
Yes	6 (5-7)	150	54,0	77	27,7	51	18,3	106	27,6
None	5 (4-6)	60	56,6	26	24,5	20	18,9	278	72,4
		P=0,820 $\chi^2=0,397$							
Smoking									
Smoking	5 (4-6)	144	52,9	77	28,3	51	18,8	112	29,2
Not smoking	5 (4-6)	66	58,9	26	23,2	20	17,9	272	70,8
		p=0,516 $\chi^2=1,322$							
Education Status									
Primary/Secondary	5 (4-6)	61	56,0	27	24,8	21	19,3	109	28,4

High School/University	5 (4-6)	148	54,0	76	27,7	50	18,2	274	71,4
		p=0,838 $\chi^2=0,353$							
Working Status									
Working	5 (4-6)	115	56,1	55	26,8	35	17,1	205	53,4
Not working	5 (4-6)	95	53,1	48	26,8	36	20,1	179	46,6
		p=0,637 $\chi^2=0,727$							
Economic Status									
Below 2434 TL	6 (4-6)	57	54,8	30	28,8	17	16,3	104	33,0
2435-7000 TL	6 (4-6)	94	57,7	37	22,7	32	19,6	163	71,7
Over 7001 TL	5 (4-6)	27	56,2	13	27,1	8	16,7	48	15,2
		p=1,543 $\chi^2=0,819$							
Total	5 (4-6)	210	54,7	103	26,8	71	18,5	384	100

Table 2: Distribution of the responses to the statements about COVID-19 vaccine by vaccine intention

Covid-19 vaccine propositions	Vaccine Intention						p
	Yes		Not Sure		No		
	n	%	n	%	n	%	
Vaccination will be effective in preventing and controlling the disease.	198	51,6	136	35,4	50	13	p < 0.001 $\chi^2 = 157,89$
If the vaccine is easy to apply, I will have it.	209	54,4	90	23,4	85	22,1	p < 0.001 $\chi^2 = 527,11$
If vaccines are not paid, I will have it.	211	54,9	86	22,4	87	22,7	P < 0.001 $\chi^2 = 525,10$
If the vaccine does not have side effects, I will have it.	226	58,9	92	24	66	17,2	p < 0.001 $\chi^2 = 492,47$
I still get vaccinated even if I have had the disease.	187	48,7	111	28,9	86	22,4	p < 0.001 $\chi^2 = 417,67$
If there is a national COVID-19 vaccine, I will have it	219	57	95	24,7	70	18,2	p < 0.001 $\chi^2 = 403,24$
If there is a vaccine from abroad, I will have it.	181	47.1	118	30,7	85	22,1	p < 0.001 $\chi^2 = 389,12$
I would like all my family members to be vaccinated.	184	47.9	110	28,6	90	23,4	p < 0.001 $\chi^2 = 383.03$
I just want my children to be vaccinated.	40	10,5	100	26,2	241	63,3	p < 0.001 $\chi^2 = 109,44$
I don't think COVID-19 disease is risky for my health.	88	22,9	63	16,4	233	60,7	p = 0.02 $\chi^2 = 17,01$
I think I will be protected from the disease in natural and traditional ways	126	32,8	68	17,7	190	49,5	p < 0.001 $\chi^2 = 24.90$

* Propositions "Yes, Not Sure, No"

Table 3: Binary logistic regression for COVID-19 vaccine admission by demographic features

	OR	SE	% 95 CI	p
Gender				
Male	<i>REF</i>	<i>REF</i>	<i>REF</i>	
Female	1,34	0,36	0,66-2,72	0,40
Age	0,94	0,01	0,92-0,98	0,02
Education Status				
Primary school/ Secondary School	<i>REF</i>	<i>REF</i>	<i>REF</i>	
High School/University	0,55	0,43	0,23-1,28	0,16
Chronic Disease				
Yes	<i>REF</i>	<i>REF</i>	<i>REF</i>	
None	1,94	0,39	0,89-4,21	0,92
Having Children				
None	<i>REF</i>	<i>REF</i>	<i>REF</i>	
Yes	0,76	0,41	0,33-1,71	0,51
Working Status				
Working	<i>REF</i>	<i>REF</i>	<i>REF</i>	
Not working	1,80	0,47	0,71-4,54	0,21
Economic Status				
Below 2434 Turkish Liras	<i>REF</i>	<i>REF</i>	<i>REF</i>	
2435-7000 Turkish Liras	0,42	1,64	0,71-3,79	0,24
Over 7001 Turkish Liras	0,61	1,30	0,39-4,31	0,66
Have infected COVID-19				
No	<i>REF</i>	<i>REF</i>	<i>REF</i>	

	OR	SE	% 95 CI	<i>p</i>
Yes	0,41	1,26	0,56-2,84	0,57
Risk Perception	0,10	0,79	0,64-0,97	0,02
Constant	0,95	10,03		0,01

Abbreviations: OR: odds ratio, S.E.: standard error, CI: confidence interval, P: probability value.

* Those who declared their vaccine intention as "not sure" were not included in the analysis.

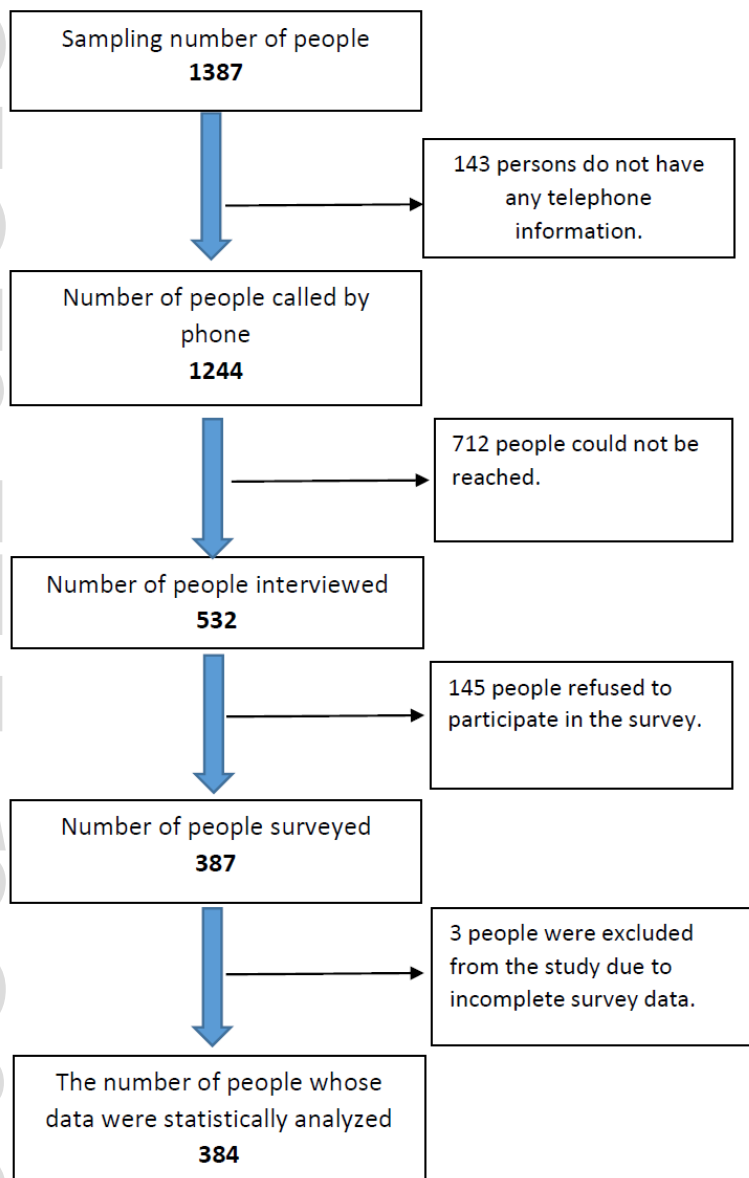


Figure 1: Flow chart of the study sampling method