

## ORIGINAL RESEARCH ARTICLE

# The effect of the COVID-19 pandemic on vaccines and vaccination-related beliefs in Türkiye: A cross-sectional study

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## Abstract

It was aimed to determine the beliefs and opinions of the people participating in our research about vaccination and to assess whether the COVID-19 pandemic process affected their belief and opinion about vaccination, and if so, in which direction. This descriptive cross-sectional study conducted a Family Health Centre in Kütahya. In this study, a questionnaire form were used to determine opinions about vaccination practices. Of the 377 people participants, 184 (48.8%) were male and 193 (51.2%) were female. While 313 (83%) of the participants were positive, 10 (2.7%) had negative opinions about vaccines and 54 (14.3%) were undecided. After the COVID-19 pandemic, the opinion of 27.3% (n:103) of the participants about vaccination has changed compared to before. It was found that 64 (63.1%) of 103 people who had a change in their opinion of vaccination had a positive change. According to our work, the risks posed by the pandemic have caused positive changes in overall vaccination opinion of the participants. (*Afr J Reprod Health* 2026; 30 [1]: 116-123).

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**Keywords:** Vaccination, anti-vaccination, vaccine hesitancy, pandemic, COVID-19

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## Résumé

Cette étude descriptive transversale, menée dans un centre de santé familiale de Kütahya, visait à déterminer les croyances et opinions des participants concernant la vaccination et à évaluer si la pandémie de COVID-19 les avait influencées, et le cas échéant, dans quel sens. Un questionnaire a permis de recueillir les opinions sur les pratiques vaccinales. Parmi les 377 participants, 184 (48,8 %) étaient des hommes et 193 (51,2 %) des femmes. 313 participants (83 %) avaient une opinion positive, 10 (2,7 %) une opinion négative et 54 (14,3 %) étaient indécis. Après le début de la pandémie, l'opinion de 27,3 % des participants (n = 103) a évolué. Parmi ces 103 personnes, 64 (63,1 %) ont vu leur opinion évoluer positivement. D'après nos travaux, les risques liés à la pandémie ont induit une évolution positive de l'opinion générale des participants concernant la vaccination. (*Afr J Reprod Health* 2026; 30 [1]: 116-123).

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**Mots-clés :** Vaccination, antivaccination, hésitation vaccinale, pandémie, COVID-19

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## Introduction

Vaccines are defined as products that create immunity against infectious diseases. They are one of the most effective and important elements of preventive medicine and public health practices in improving the health of the society. Unlike other drugs, vaccines act at both the individual and community level. As stated in the reports of such organizations as World Health Organization (WHO) and CDC, there has been a significant reduction in the incidences of infectious diseases thanks to vaccines.<sup>1</sup> Vaccines are estimated to save between two and six million lives each year. One and a half million more lives could be saved if vaccination coverage is expanded.<sup>2</sup>

WHO identified vaccine hesitancy and anti-vaccination as one of the ten most important threats to the health of children, women and the public in 2019. WHO defines anti-vaccination and vaccine hesitancy as "refusing vaccines or delay in accepting despite the availability of vaccination services".<sup>2</sup> Anti-vaccination and vaccine hesitancy is not a new concept that emerging today. It started with the introduction of vaccines.<sup>1,3</sup> Anti-vaccination and vaccine hesitancy is an individual attitude based on multiple reasons that affects the whole society.<sup>4,5</sup> Some those who are anti-vaccination and hesitancy have concerns related to the efficiency and safety of vaccination. Some think that they don't need the vaccine because they think that they aren't at risk. There are as well those who

resist vaccination for religious and philosophical reasons.<sup>4,6</sup>

The coronavirus disease 2019 (COVID-19) was first identified in the Wuhan region of China in December 2019 and was declared a pandemic by the WHO on March 12, 2020.<sup>7,8</sup> Problems that affect most of the population, such as epidemics, leave deep scars on people and can cause changes.<sup>9</sup> The effects of the COVID-19 pandemic were not limited to the medical dimension. It had some effects in terms of sociocultural, education, tourism, economy and public health.<sup>7</sup> One of them is the anti-vaccination, which has existed until today, reappeared during the COVID-19 epidemic.<sup>10</sup> As the number of vaccine-preventable diseases decreases thanks to successful vaccination programs, the fear of disease is replaced by the fear of vaccination. In other words, the success achieved with the vaccine has led the society to fear the health risks that the vaccine may be associated with rather than the diseases.<sup>4</sup> There are as well those who think that there isn't need for vaccination because infection diseases aren't dangerous.<sup>11</sup> With the current COVID-19 pandemic process, it is possible that infectious diseases may pose a danger again and such judgments about vaccines may cause changes. For this reason, there is a need for scientific research on this subject. In this respect, our aim in our work is to learn the opinions of the participants about the vaccine during the COVID-19 pandemic period so that it will be possible to assess whether the pandemic has caused a change in their views about the vaccine. If a positive change is found in our research and others on this subject, this process will encourage all public health professionals to consider this process as an opportunity for positive change in the views of vaccine opponents.

In this study, we aimed to determine the opinions of the people participating in our research about vaccination and to evaluate whether the COVID-19 pandemic process has affected their opinions and beliefs about vaccination and, if so, in which direction.

#### Questions of the study

In the study, answers to the following questions were sought:

Has the pandemic affected thoughts about vaccination?

COVID-19 pandemic and vaccination-related beliefs

In what way has the pandemic affected thoughts about vaccination?

## Methods

### *Research region, study design and sampling*

Kütahya, where the researchers work, is a province located in the west of the Republic of Türkiye with a population of 578,640 in 2021. This population consists of 284,739 (49.21%) men and 293,901 (50.79%) women and 277,270 (47.92%) of the total population live in the central district. While 136,730 of the people living in the central district are men, 140,540 are women. There are 25 Family Health Centers in the Kütahya Central District. There are 252,600 people registered in these family health centers. Among these family health centers, Yıldırım Bayazıt Family Health Center was chosen because it is an official research region of our university. The population of this descriptive cross-sectional study consists of 11933 peoples over eighteen years old registered in Yıldırım Bayazıt Family Health Centre.<sup>12</sup> With the Epi Info StatCalc program, the minimum sample size was calculated as 373 at a 95% confidence level (design effect: 1, expected prevalence: 50%, margin of error: 5%). Calculation of the non-response rate with the formula " $n_y = n / 1 - \text{expected non-response rate}$ " gave 438.<sup>13</sup> Four hundred and thirty-eight prospective participants were determined using the systematic sampling method. A list of people over the age of eighteen registered with the family health center was obtained. The sample interval was set to 27 in systematic sampling. Participants were determined by starting from the fourth person determined by lot method. The criteria for inclusion in the study were determined as being over eighteen years of age, agreeing to participate in the study, and having the mental capacity to answer the questions.

### *Data collection tools*

In the study, a questionnaire form was prepared by the researchers using the literature. Questionnaire Form consists of 26 questions to determine the sociodemographic characteristics of the researched participant group, such as age, gender, marital status, occupation, educational status, as well as their sources of information about vaccines, which

of the information sources they trust most, their views on vaccination and the change of their views on vaccination compared to pre-COVID-19.

The questions and answer options to determine their views on vaccination practices in the survey are as follows: "What do you think about vaccines when you consider all vaccines in general?", "What do you think about vaccinating children?", "What do you think about vaccinating adults?" What do you think about giving other people the COVID-19 vaccine?" with answer options "Vaccines must be administered", "Vaccines must not be administered" and "Undecided"; "Have you ever been vaccinated before?", "Have you ever had your child vaccinated before?", "Have you ever had your child not vaccinated before when it was time to get vaccinated?", "Have you ever hesitated and delayed getting your child vaccinated when it was time to get vaccinated?" with answer options "Yes", "No" and "I do not have children"; "Would you vaccinate yourself against COVID-19?", "Would you vaccinate your child for COVID-19?", "Would you vaccinate yourself with a vaccine other than COVID-19?" with answer options "Yes", "No" and "Undecided"; "After the COVID-19 pandemic, has your view of getting vaccinated changed from before?" with answer options "Yes" or "No".

In order to determine the change in their views on vaccines compared to pre-COVID-19, the participants were asked "How did your view of getting vaccinated after the COVID-19 pandemic change?", "How did your view of vaccinating children change after the COVID-19 pandemic?" and "How did your view of vaccinating adults change after the COVID-19 pandemic?" with the following answers: "I had a positive opinion before COVID-19, now I have a negative opinion", "I had a negative opinion before COVID-19, now I have a positive opinion", "I was undecided before COVID-19, now I have a negative opinion", "I was undecided before COVID-19, now I have a positive opinion", "My positive opinion increased after COVID-19" and "My negative opinion increased after COVID-19". The answers "I had a negative opinion before COVID-19, now I am positive", "I was undecided before COVID-19, now I have a positive opinion" and "My positive opinion increased after COVID-19" were considered as "positive change" about vaccination whereas "I had

a positive opinion before COVID-19, now I have a negative opinion", "I was undecided before COVID-19, now I have a negative opinion" and "My negative opinion has increased after COVID-19" were considered as "negative change" about vaccination.

### **Questionnaire survey**

A pilot study was conducted with ten people before starting the study to evaluate the survey questions. At the end of the pilot study, corrections were made to the determined questions. This research was conducted from February to May 2021 by face-to-face interview or telephone interview after reading the informed consent form and obtaining written or verbal consent, following the infection control measures due to the pandemic. The study was completed with 377 participants who agreed to answer the surveys. The number of participants was more than the minimum sample size.

### **Statistical analysis**

Data were entered and analysed using the SPSS (ver.18). Descriptive data were presented with frequency, percentage, mean±standard deviation, and minimum-maximum values. Non-numerical, nominal variables were compared with chi-square test. Statistical significance level was accepted as  $p<0.05$ .

### **Ethics approval**

Before the research was conducted, ethics committee approval was obtained from the Kütahya Health Sciences University Non-Interventional Research Ethics Committee (Decision No: 2020/16-15 Date: 18.11.2020) and necessary permissions were obtained from relevant institutions.

## **Results**

### **Socio-demographic characteristics**

Of the 377 participants, 184 (48.8%) were male and 193 (51.2%) were female. The mean age was  $45.28\pm 17.14$  (min:18, Max:83). Table 1 shows the other sociodemographic characteristics of the participants.

**Table 1:** Socio-demographic characteristics of the participants (n:377)

Characteristics		Frequency (n)	Percentage (%)
Gender	Male	184	48.8
	Female	193	51.2
Marital status	Married	242	64.2
	Single	112	29.7
	Widowed	23	6.1
Education	Primary school	126	33.4
	High school	95	25.2
	University	156	41.4
Number of children	None	118	31.3
	1-2	170	45.1
	3 or more	89	23.6
Employment status	Employed	146	38.7
Occupation (n:146)	Worker	45	30.8
	Civil servant	52	35.6
	Farmer	3	2.1
	Tradesman	22	15.1
	Other	23	15.7
Household_income	Not enough	113	30.0
	Enough	254	67.4
	More	10	2.7
Social insurance	Exists	351	93.1
Transportation to the health institution	Easy	368	97.6

**Table 2:** Distribution of participants' views and attitudes about vaccination

		Frequency (n)	Percentage (%)
When you think of all vaccines in general, what do you think about vaccines?? (n:377)	Positive opinion	313	83.0
	Negative opinion	10	2.7
	Undecided	54	14.3
What do you think about vaccinating adults? (n:375)	Positive opinion	316	84.2
	Negative opinion	13	3.5
	Undecided	46	12.3
What do you think about vaccinating children? (n:377)	Positive opinion	313	83.1
	Negative opinion	18	4.8
	Undecided	46	12.2
Have you been vaccinated before? (n:377)	Yes	361	95.8
	No	16	4.2
Has your child been vaccinated before? (n:259)	Yes	246	95.0
	No	13	5.0
Have you ever failed to vaccinate your child in due course before? (n:259)	Yes	17	6.6
	No	242	93.4
Have you ever hesitated and delayed getting your child vaccinated when it was due? (n:259)	Yes	19	7.3
	No	240	92.7
Would you get yourself vaccinated other than the COVID 19 vaccine? (n:377)	Yes	295	78.3
	No	34	9.0
	Undecided	48	12.7
Would you get yourself vaccinated COVID 19 vaccine? (n:377)	Yes	273	72.4
	No	59	15.7
	Undecided	45	11.9
What do you think about getting other people in the community vaccinated for COVID 19? (n:377)	Yes	279	74.0
	No	30	8.0
	Undecided	68	18.0

**Table 3:** The change in participants' views on vaccines after the COVID-19 pandemic (n:103)

Direction of change	About general vaccinations		About vaccinating children		About vaccinating adults	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
From negative to positive *	18	17.5	20	19.4	18	17.5
From undecided to positive *	16	15.5	12	11.7	14	13.6
Positive opinion increased*	31	30.1	36	35.0	41	39.8
From positive to negative †	23	22.3	25	24.3	20	19.4
From undecided to negative †	9	8.7	6	5.8	7	6.8
Negative opinion increased †	6	5.8	4	3.9	3	2.9
Positive	65	63.1	68	66.0	73	70.9
Negative	38	36.9	35	34.0	30	29.1

\*Positive, † Negative

### **Opinions and sources of information about vaccines**

When asked what the sources of information about vaccines (more than one answer could be given to this question), 296 (78.5%) of the participants replied as healthcare professionals, 216 (57.3%) as media, 154 (40.8%) as the internet, 127 (32.6%) as social media, 123 (32.6%) as scientific publications, 77 (20.4%) as folks. The most reliable sources of information about vaccines were found to be healthcare professionals 302 (80.1%), scientific publications 34 (9.0%), media 22 (5.8%), the internet 15 (4%), social media 3 (0.8%), folks 1 (0.3%). While 313 (83%) of the participants were positive, 10 (2.7%) had negative opinions about vaccines and 54 (14.3%) were undecided. Those who had a positive opinion about adult vaccination were 83.8% (n: 316), those who had a negative opinion were 3.4% (n: 16), and those who were undecided were 12.7% (n: 46). Those who had a positive opinion about child vaccination were 83.1% (n: 313), those who had a negative opinion were 4.8% (n: 18), and those who were undecided were 12.2% (n: 46). 95.8% (n:361) of participants declared that they had been vaccinated before. 95.0% (n:246) of participants with children (n: 259) declared that they had had their children vaccinated before. 6.6% (n: 17) of participants with children (n: 259) declared that they had not had their children vaccinated on time for any reason before. 7.3% (n: 19) of participants with children (n: 259) declared that they had delayed vaccination due to vaccine hesitancy. Of the participants, 78.2%

(n: 295) stated that they would get vaccinated (other than the COVID-19 vaccine), and 72.4% (n: 273) stated that they would get vaccinated against COVID-19. 279 (74.0%) participants stated that they believed that others in the community should get vaccinated against COVID-19. Table 2 shows the distribution of participants' responses to their views and attitudes about vaccines.

After the COVID 19 pandemic, 103 (27.3%) people changed their views on vaccines. After the COVID-19 pandemic, the change in participants' views on general vaccinations (children and adults) was 63.1% (n:65) positive. After the COVID-19 pandemic, the change in participants' views on child vaccination was 66.0% (n:68) positive. After the COVID-19 pandemic, the change in participants' views on adult vaccination was 70.9% (n:73) positive. Table 3 shows the change in participants' views on vaccines after the COVID-19 pandemic.

### **Discussion**

The study first determined participants' views on vaccination. Participants declared that healthcare professionals are the most important and reliable source of information. According to the study, the total number of those with undecided or negative opinion about vaccination is 17%. The proportions of those who are undecided or negative about adult and child vaccinations are similar. These negative views were found to have a lower impact on vaccination. According to the information provided by the study participants, their own and their children's past vaccination rates are over 95%.

Secondly, the study determined whether participants' views on vaccinations changed during the pandemic, and if so, in what direction. One hundred and three participants (27.3%) stated that their views had changed. A strengthening of a positive view, a change from undecided to positive, or a change from negative to positive were considered positive changes. Approximately two-thirds of participants reported a positive change in their views.

Information on vaccines can be obtained from different sources. Oğuzöncül *et al.*, also determined with their research that healthcare professionals are the primary sources of vaccine information. Other important sources of information are media, internet and social media.<sup>14</sup> In our work, the vaccine information sources of our participants were similar. Our work participants stated that they trust the health workers the most among the information sources we identified.

Vaccine hesitation or indecision is a delay in accepting or rejecting one or more vaccines even though the vaccine is available. Vaccine rejection is not having any vaccinations voluntarily.<sup>4</sup> Vaccine hesitation and vaccine rejection tend to increase in the world and in Türkiye.<sup>9,15</sup> While the number of families in Türkiye who didn't want their childrens to be vaccinated was 183 in 2011, it increased to 980 in 2013, 5400 in 2015, 12000 in 2016, and 23000 in 2018. If this number reaches 50000, the probability of an epidemic is quite high.<sup>15</sup> Anti-vaccination or vaccine hesitancy percentage is between 1% in China and 11% in the USA.<sup>16</sup> In our work, 2.7% of the participants thought that all age groups shouldn't be vaccinated, and 4.8% thought that childrens shouldn't be vaccinated. In addition, 4.2% of our participants in our work stated that they had never vaccinated themselves, and 5.0% stated that they had never vaccinated their children before. Also, 7.3% of the participants who had children declared that they were "undecided and delayed the vaccination" when the vaccination time came. According to these findings, it is seen that negative opinions about vaccines are a major public health problem in our work group like in the world and in Türkiye. Routine vaccination and reliable information services should be continued to reduce these rates. Additionally, all the healthcare workers

needs to consider turning new situations like the pandemic into opportunities.

In our work, the rate of those who wanted to get the COVID-19 vaccine was 72.4%. Similarly, global reports suggest that 73% of the global population may agree to have a COVID-19 vaccine.<sup>17</sup> According to a study carried out in fifteen countries, the percentage of those who want to be vaccinated against COVID-19 is 88% in Brazil, 85% in China, 71% in the USA, 68% in Germany and 57% in France.<sup>16</sup> Vaccines have both individual and community influence and when a sufficiently high proportion of the population is vaccinated, "herd immunity" occurs. When Herd Immunity is provided, the risk of epidemic is significantly reduced because very few people remain unvaccinated in the community where the disease can spread. The proportion of the population that needs to be vaccinated to achieve herd immunity depends on how contagious the disease is. It is reported that 75-90% vaccination percentage should be achieved to get rid of the Corona Virus Disease 2019 pandemic.<sup>17</sup>

Based on the results of our work, the percentage of people who do not want to be vaccinated against COVID-19 is 15.6%, and the percentage of those who are undecided is 11.9%. In a research carried out in England and Türkiye, it was detected that roughly one out of every three (31%) people in Türkiye and one in seven (14%) in England are undecided about the COVID-19 vaccine, and 3% firmly refuse to receive the COVID-19 vaccine.<sup>18</sup> In another study conducted in Türkiye, the percentage of those who never thought of getting vaccinated was 24.6% and the percentage of those who were undecided about being vaccinated was 24.6%.<sup>19</sup> In the study carried out in China, a prevalence of COVID-19 vaccine hesitation was found to be 8.40% (95% CI, 8.09-8.72).<sup>20</sup> There can be many reasons for COVID-19 vaccine indecision; like the short production process, concerns about its safety and side effects, doubts about its usefulness, as well as conspiracy theories.<sup>16</sup> In our work, it was detected that the participants were more willing to have another vaccine other than the COVID-19 vaccine. The rapid production process of the COVID-19 vaccine, the concern of side effects, and the suspicion of low effectiveness might be the

reasons why they remained aloof from COVID-19 vaccine.<sup>19</sup>

There hasn't been much work done on how the COVID-19 pandemic process affects opinions about vaccines other than COVID-19. Studies have mostly been conducted to examine opinions and attitudes about the COVID-19 vaccine.<sup>17,20-22</sup> In a work carried out with families in Türkiye who didn't have their children vaccinated, families stated that their views of not vaccinating their children before and after COVID-19 did not change.<sup>9</sup> However, we planned our study anticipating that the views of individuals about vaccines may be affected by the COVID-19 pandemic. In our work, we included adults in the family health centre region as the study group in order to reflect the situation in the general society. As a matter of fact, in our work, it was found that 27.3% of our participants had a change in their opinion of getting vaccinated after the pandemic compared to the pre-COVID-19 pandemic. There was a change in the views of our participants whose views were changed in a "positive" and "negative" direction. According to our work, positive changes (63.1%) were detected to be more than negative changes in opinions about vaccines. The outbreak of COVID-19 during the pandemic we have been experiencing, the fact that it is easily transmitted, and that the treatment hasn't yet been found at the time the work was done may have all caused a positive change in opinion about vaccines.<sup>23</sup> These results of our work makes one think that although the pandemic process provides many disadvantages in health, social and economic life, it can be an opportunity to provide positive change about vaccines.

## Limitations

This work had some limitations. For example, the research isn't representative of Kütahya as it was carried out in one family health centre regions. Moreover, it followed a cross-sectional design, in which the main weakness is the lack of clear temporal relationship between dependent and independent variables. In addition, participants' responses in this study were completely subjective. However, there are points of strength like random sampling and administration of questionnaires by trained health professionals.

## Conclusion

The research indicates a high rate of negative opinions and hesitancy about vaccination. This has not yet been negatively impacted on vaccination behavior. If it does begin to affect vaccination behavior, it could pose a serious risk to public health. Declining vaccination rates will negatively impact the health of infants, children, women, pregnant women, and adults. The research also shows that the pandemic may have changed some people's views on vaccines. According to the research, two-thirds of these changes are positive. This shows that some people's negative thoughts about vaccines may change during the pandemic. The reason for this change may be that some participants' perception that infectious diseases are no longer dangerous and common has disappeared due to the COVID-19 pandemic. Healthcare professionals should try to turn every opportunity into an advantage to reduce negative thoughts about vaccination and increase positive thoughts. For this reason, in order to change the negative opinions about vaccines, the aspects of the pandemic process that affect people positively in this regard should be determined. These determined factors should be used in training on vaccination during the possible pandemic periods and after the pandemics is over. In addition, the reasons for the formation of negative thoughts about vaccination during the pandemic process should be investigated. Health professionals should be more prominent in informing the public about vaccines and so that benefit from the sense of trust that was also found in our research.

## Conflict of interest

The authors declare that they have no conflict of interest.

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None.

## Authors contributions

MY conceived the original idea of the assessment. MY, AD collected the data. MY, İA analyzed the data. MY, AD, İA interpreted the results. MY wrote the original draft of the paper. MY, AD, İA reviewed the paper. All authors reviewed and approved the final version.

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