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RESEARCH PAPER

Vaccine rejection and hesitation in Turkey

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ABSTRACT

In Turkey, primary care staffs have observed an increased rate of vaccination refusal in recent years. The aim of the present study was to determine the prevalence of vaccination refusal and hesitancy in Turkey, in addition to the demographic features and underlying reasons. The present descriptive cross-sectional study was conducted in İstanbul and Tekirdağ, two big Turkish cities that are exposed to widespread internal migration. To reflect Turkey's demographic structure, 1004 participants were selected using cluster sampling based on birthplace, age, and level of education, from all individuals who attended family medicine outpatient clinics at Namık Kemal University and Şişli Hamidiye Etfal Training and Research Hospital. A face-to-face questionnaire method was used. Data show that this decline was mainly the result of the increasing rate of vaccine rejection and hesitation, for which the most important reason was found to be distrust of vaccine companies. It can be concluded that individuals who display vaccine refusal and hesitation are mostly born in the developed geographical regions of Turkey and have high income and educational levels. According to these results, we anticipate that vaccination rates may fall in Turkey in the coming years.

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Introduction

Vaccines are one of the most important inventions of the 20thcentury with respect to public health. The discovery of vaccines against infectious diseases that lead to epidemics has resulted in the elimination of many diseases, preventing a significant number of deaths and permanent complications.

Immunization is an effective means of protecting public health and preventing disease, which has been proven by many scientific studies. Disease prevention is always easier, healthier, and cheaper than treatment. Although vaccines have been shown to protect society from epidemics and deadly diseases in the past, modern parents are largely unfamiliar with the related history and developments.[1]

As of 2018, immunization rates in Europe and the U.S. were generally 90%, while in Afghanistan, Nigeria, Pakistan, and India these rates were 70–80%. Immunization rates decreased by 2–4% between 2012 and 2016 in Europe and some states in the U.S.[2] According to 2017 data, the immunization rate against diphtheria, tetanus, and whooping cough was92% in Europe and 91% in the U.S.[3] In 2016, this rate in Turkey was 98%, which declined to 96% in 2017.[4]

An "Extended Immunization Program" is implemented in Turkey; vaccination services are provided for the control and complete elimination of pertussis, diphtheria, tetanus, measles, rubella, mumps, tuberculosis, poliomyelitis, hepatitis B, and H. influenzae type b, and currently, all children are vaccinated free of charge. Owing to the successful vaccination programs, Turkish children became polio-free in 2002, and newborn tetanus, which caused a high mortality, was eliminated in 2009.[5] Vaccinations are also given free of charge to all age groups at family medicine centers by appointment. In addition, the population connected to family medicine units is monitored by health professionals, and families who do not apply to their family doctor are called and invited for vaccination. The monthly salaries of physicians and healthcare workers in these units increase as the vaccination rates increase due to an economically applied performance system, ensuring vaccination rates in Turkey remain high. However, there is no legal obligation for individuals in this system to be vaccinated. Individuals and parents can refuse the vaccine by filling out a form.[6]

In recent years, many countries have reported an increase in the incidence of diseases protected by vaccines. The most common reason for this situation is refusal of vaccination by families.[7] Studies conducted in developed countries in families with vaccine hesitancy have revealed many causes, such as vaccine experiences, peer behaviors, and distrust of health professionals.[8] A previous study showing an increased number of measles cases in the U.S. found that a significant number of those affected were from families who refused

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In recent years, many countries reported an increase in the incidence of eradicated diseases. The main reason for this increase is that vaccine rejection has increased among families. In Turkey as primary care staff, we observed that vaccination refusal was increasing recent years. The aim of this study was to determine the prevalence of vaccination refusal and hesitancy in Turkey, the demographic features of them and its reasons.

GÖ conceived, designed and did statistical analysis & editing of manuscript
GÖ did data collection and manuscript writing
DT did review and final approval of manuscript
ESE did data collection

vaccination, almost 70% of which gaven on-medical reasons (religious, philosophical, cultural).[9]

Another study conducted in Europe regarding the reasons and solutions for vaccine refusal and hesitancy placed emphasis on the following causes: perception of a high individual risk, complications observed due to vaccine experiences, distrust of health professionals, and psychological factors.[10] Particularly in Germany and England, socioeconomic development and educational level were found to be important factors related to vaccine rates and vaccine refusal and hesitancy. Families who refused vaccination were mostly of a high income level, and their education level was higher than the national average.[11,12]

In recent years, special training and counseling practices against vaccine hesitancy have been performed in developed countries to prevent vaccination rejection, and several controversial actions have been implemented, such as school exemptions for families who refuse vaccination, restrictions on their rights to benefit from public services; and in certain countries, dismissal of families who do not have their children vaccinated.[8,13]

Countries with lower levels of socioeconomic development have conducted less studies on vaccine refusal and hesitancy; however, the lower number of relevant studies in the literature does not mean that vaccine refusal and hesitancy are at a low level in these countries. A study examining the opinions and behaviors of primary care health professionals regarding the usefulness of vaccines in Hungary found that almost a third of doctors and half of nurses remain unconvinced that vaccines are beneficial and valuable.[14] In another study conducted in Pakistan, participants reported distrust of the government that is responsible for vaccine organizations, personal safety concerns, and vaccinations conflicting with their religious beliefs as the most important reasons for vaccine hesitancy and refusal.[15] Few studies conducted in Africa have shown that families do not have their children vaccinated even when vaccines are available. The most important cause of vaccine refusal in these regions is lack of information.[16]

It has been shown in studies conducted in Turkey that the rate of vaccine rejection has increased, with parents not providing their children with vaccinations within the scope of such programs. According to the Ministry of Health's public health data, the Turkish Medical Association announced that the number of families who signed a vaccine rejection form in 2017 reached 23,000, a figure that was 183 in 2011 and 12,000 in 2016.[17] Primary care staffs have observed an increase in vaccination refusal in recent years; therefore, the aim of the present study was to determine the prevalence of vaccination refusal in Turkey, in addition to the demographic features and underlying reasons.

Materials and methods

This was a descriptive cross-sectional study conducted in İstanbul and Tekirdağ, two Turkish cities exposed to widespread internal migration. Approval was obtained from the Ethics Committee of Namık Kemal University on 27.06.2019, No-2019.114.07.10.

The present study was performed in July 2019 in individuals over 18 years of age who attended family medicine outpatient clinics at Namık Kemal University and Şişli Hamidiye Etfal Training and Research Hospital. Of a total of 1712 individuals, 1086 agreed to participate and gave their informed consent.

To reflect Turkey's demographic structure, 1004 participants were selected using cluster sampling based on birthplace, age, and level of education. When determining the sample size, a one-month period was planned with 75 questionnaires per day considering the time factor, during which 1712 questionnaires were separated according to place of birth. Place of birth of the participants were examined. A total of 88 people who were born in the Southeastern Anatolia region with the lowest population were identified among the participants. All of these individuals were included in the study. Other participants were grouped according to their place of birth. These groups should be identified and the number of participants, the study participants with random sampling of regional distribution, has been likened to Turkey's regional population distribution.

A face-to-face questionnaire method was used, consisting of three main sections. In the first section, there were nine questions regarding the sociodemographic characteristics of the participants. The second part comprised three questions related to the level of vaccine knowledge, vaccination history, and vaccine benefits. In the third section, the participants who did not believe that vaccines are beneficial were asked one open-ended question: 'why do you think vaccines are not beneficial?'

Participants aged 18 – 44years old were defined as young, those aged 45 – 64 were defined as middle aged, and those 65 and older were defined as elderly. Those that were illiterate, and primary and secondary school graduateswere defined as having a low educational level, and high school and university graduates were defined as having a high educational level. The participants were grouped according to the regions in which they were born. Those receiving monthly wage of 0 – 2050 Turkish Liras (357USD) were considered low-income, those receiving 2051 – 4000 TL (357 – 696USD) were considered middle-income, and those receiving 4001 TL (>696USD) or greater were considered high-income.

Frequency table and descriptive statistics of the data were given as mean ± standard deviation or median (min, max). Shapiro-Wilks test was used to control the normality of data, Student-t test was used to compare two independent groups, Analysis of Variance was used to compare three independent groups, and chi-square test was used to analyze categorical variables. p value of <0.05 was accepted for statistical significance. SPSS 22.0 package program was used to evaluate the data.

Results

The mean age of the participants was 37.43 ± 14.01 years old (min = 18, max = 84).The demographic characteristics of the participants are given in Table 1.

The distribution of the answers to the question "do you know what a vaccine is?" according to age, gender, occupation, and income level is given in Table 2.

Table 1. Participant demographics.

DEMOGRAPHICS	% (n)
Age	
18 – 44	72.6 (729)
45 – 64	20.7 (208)
65 and over	6.7 (67)
Gender	
Male	50.1 (503)
Female	49.9 (501)
Marital status	
Married	68.7 (690)
Single	31.3 (314)
Employment	
Unemployed/housewives/retired	42.4 (426)
Blue collar worker	41.7 (419)
White collar worker	15.9 (159)
Income level	
Low	30.6 (307)
Medium	45.9 (461)
High	23.5 (231)
Educational level	
Illiterate	3.9 (39)
Primary school	30.5 (306)
Secondary school	14.8 (149)
High school	25.1 (252)
University	25.7 (258)
Region of birth	
Marmara	22.4 (225)
Central Anatolia	16.5 (166)
Black Sea	15.3 (154)
Mediterranean	13.6 (137)
Aegean Sea	13.2 (133)
Eastern Anatolia	10.1 (101)
Southeast Anatolia	8.8 (88)

Table 2. Distribution of vaccine knowledge according to demographics.

	Do you know what a vaccine is?		
DEMOGRAPHICS	No n(%)	Yes n(%)	*p*
Age			
18 – 44	16 (2.2)	714 (97.8)	>.05
45 – 64	5 (2.4)	202 (97.6)	
65 and over	3 (4.5)	64(95.5)	
Gender			
Male	16 (3.2)	487(96.8)	>.05
Female	8 (1.6)	493(98.4)	
Educational level			
Low	19 (3.8)	476(96.2)	.003
High	5 (1.0)	504(99.0)	
Marital status			
Married	9 (2.9)	305(97.1)	>.05
Single	15 (2.2)	675(97.8)	
Employment			
Unemployed/housewives/retired	9 (2.1)	417(97.9)	>.05
Blue collar worker	14(3.3)	405(96.7)	
White collar worker	1(0.6)	158(99.4)	
Income level			
Low	10 (3.3)	297(96.7)	.022
Medium	14 (3.0)	447(97.0)	
High	0 (0.0)	236(100.0)	

In the present study, 2.39% (n = 24) of the participants did not know what a vaccine was. Lack ofvaccine knowledge was more prevalent among low-education and low-income groups (p = .020; 0.022, respectively).

The distribution of the answers to the question "have you or your children ever been vaccinated?" according to age, gender, occupation, and income level is given in Table 3.

The rate of participants that had not been vaccinated at any time during their lives was 6.17% (n = 62). The rate of single participants indicating that they had been vaccinated in the past was significantly lower as compared with that of married participants (p < .001).

Table 3. Vaccination history according to demographics.

	Have you or your children ever been vaccinated?		
DEMOGRAPHICS	No n(%)	Yes n(%)	*p*
Age			
18 – 44	46(6.3)	684 (93.7)	>.05
45 – 64	11(5.3)	196 (94.7)	
65 and over	5(7.5)	62(92.5)	
Gender			
Male	30(6.0)	473 (94.0)	>.05
Female	32 (6.4)	469 (93.6)	
Educational level			
Low	32 (6.5)	463(93.5)	>.05
High	30 (5.9)	479(94.1)	
Marital status			
Married	37(11.8)	277 (88.2)	<.001
Single	25 (3.6)	665 (96.4)	
Employment			
Unemployed/housewives/retired	18(4.2)	408 (95.8)	>.05
Blue collar worker	33(7.9)	386 (92.1)	
White collar worker	11(6.9)	148 (93.1)	
Income level			
Low	19 (6.2)	288 (93.8)	>.05
Medium	35 (7.6)	426 (92.4)	
High	8 (3.4)	228 (96.6)	

The distribution of the answers to the question "do you think that vaccines are beneficial?" according to age, gender, occupation, and income level is given in Table 4.

In the present study, 6.57% (n = 66) of the participants considered vaccines non-beneficial. A significantly higher number of females than males stated that vaccines are non-beneficial (p < .001). A larger proportion of highly

Table 4. Participant perspectives on vaccine benefit according to demographics.

	Do you think that vaccines are beneficial?				
	No	Yes	Don't know Hesitant		
DEMOGRAPHICS	% (n)	% (n)	% (n)	% (n)	*p*
Age					
18 – 44	7.8 (57)	88.5 (646)	2.5 (18)	1.2(9)	>.05
45 – 64	4.4 (9)	90.3 (187)	3.4(7)	1.9(4)	
65 and over	0	95.5 (64)	4.5(3)	0	
Gender					
Male	2.98(15)	93.24 (469)	3.2 (16)	0.6 (3)	<.001
Female	10.17 (51)	85.42 (428)	2.4(12)	2.0 (10)	
Educational status					<.001
Low	3.2 (16)	91.5 (453)	4.4 (22)	0.8 (4)	
High	9.8 (50)	87.2 (444)	1.8(6)	1.8(9)	
Employment					
Unemployed/housewives/ retired	4.7(20)	91.6 (390)	2.6 (11)	1.2 (5)	<.001
Blue collar worker	4.1(17)	90.7 (380)	3.6 (15)	1.7 (7)	
White collar worker	18.2(29)	79.9 (127)	1.3(2)	0.6 (1)	
Marital status					
Married	8.9 (28)	86.6 (272)	3.8 (12)	0.6 (2)	>.05
Single	5.5 (38)	90.6 (625)	2.3 (16)	1.6 (11)	
Income level					
Low	3.3(10)	91.9 (282)	3.9(12)	1.0 (3)	<.001
Medium	4.8(22)	90.7(418)	3.3(15)	1.3 (6)	
High	14.4(34)	83.4(197)	0.4(1)	1.7 (4)	

Table 5. Regional distribution of participants who do not know what a vaccine is, have never been vaccinated, and think vaccines are non-beneficial.

Region	Do not know what a vaccine is (p = .000) n(%)	Have never been vaccinated (p = .001) n(%)	Think vaccines arenon-beneficial (p = .001) n(%)
Marmara	1(0.4)	10(4.4)	19(8.4)
Central Anatolia	3(1.8)	9(5.4)	12(7.2)
Black Sea	3(2.0)	12(7.8)	6(3.9)
Mediterranean	1(0.7)	4(2.9)	12(8.8)
Aegean Sea	2(1.5)	3(2.3)	8(6.0)
Eastern Anatolia	7(6.9)	11(10.9)	3(3.0)
SoutheastAnatolia	7(8.0)	13(14.8)	6(6.8)
Total	24(2.39)	62(6.2)	66(6.6)

educated participants than those less educated stated that vaccines are non-beneficial (p < .001). More white collar and low-income participants than any others stated that vaccines are non-beneficial (p < .001; p < .001, respectively).

The regional distribution of participants who had no vaccine knowledge, had never been vaccinated, and think vaccines are non-beneficial is presented in Table 5.

Among all the participants, 89.34% (n = 897) answered 'yes', 6.57% (n = 66) answered 'no', 2.79% (n = 28) answered 'I don't know,' and 1.29% (n = 13) answered 'hesitant' to the question 'do you think vaccines are beneficial?'

The distribution of the reasons stated by individuals who were hesitant and who think that vaccines are non-beneficial is given in Table 6.

The number of participants who specified that they do not trust vaccine companies was significantly higher in the young age, high-education, and high-income groups (p = .015; p = .002; p < .001, respectively).

The number of participants who answered 'I heard that vaccination is harmful on the television or the internet' was significantly higher in the young age group (p < .001).

The number of female participants who said 'my family does not recommend vaccines, they say it is harmful' was significantly higher than that of men. These women mostly had a low-income or were housewives (p = .012; p = .013; p = .032).

The number of participants who stated that they do not trust healthcare workers was 7 (0.70%),but no significant difference was found in age, gender, occupation, income level, or place of birth (p > .05). The number of people who do not trust healthcare workers in all groups was low.

Table 6. Distributions of the reasons why the vaccine isnot beneficial .

Reasons	n	% (Participants stated why)	% (All participants)
I do not trust vaccine companies	57	43.84	5.67
I heard it was harmful from the TV and the internet.	31	23.84	3.09
My family doesn't recommend it.	12	9.23	1.19
I don't trust health workers.	7	5.38	0.70
I believe it contains harmful substances	7	5.38	0.70
My family doctor doesn't recommend	2	1.53	0.20
I don't know	14	10.76	1.39
Total	130	100.00	12.74

Discussion

From 2016 to 2018, there was a 2% decrease in the vaccine rate in Turkey, and vaccine researchers and non-government organizations have started to investigate the causes of this decline. In the present study, we found that this decline may continue. The cause of this decrease was not socioeconomic- or income-related problems that led to difficulties in reaching the vaccine, as was the case before 2010; instead, the most important reason was vaccine refusal and hesitation. In particular, we found that individuals who are hesitant are more likely to have a higher socioeconomic status, income level, and education level.

The rate of those who stated that they themselves or their relatives had been vaccinated was 93.87%. Our study shows that in Turkey, the rate of vaccination is decreasing, as is seen in many other countries.[2]

There were many reasons for the lack of immunization worldwide prior to 2010, with the most common being geographic location, climatic conditions, insufficiencies in record-keeping, low education level, low economic status, and inadequate law-based measures.[18] Prior to 2010, both in Turkey and worldwide, many studies showed that the higher the mother's level of education, the higher the chance of her children being immunized.[19,20] Parents' education level is a very important indicator that suggests improved living conditions for children.[21,22] In another study conducted in Turkey, the rate of vaccination in children with mothers who were educated to primary school level was 9-times higher than that in children whose mothers were uneducated.[23]

However, in recent years, according to WHO data, there has been a decrease in immunization rates in Europe and a few states in the U.S., such as Colorado, where there are no economic, social, or legal barriers to vaccination. For example, the 2015 measles vaccination rate was 85%in Italy and 88% in the rest of Europe.[24] In the present study, within the regions of Turkey with a low socioeconomic level (Eastern Anatolia and Southeastern Anatolia), vaccination rate and knowledge were found to be low. However, the rate of those who do not think that vaccination is beneficial was significantly higher in regions with a high socioeconomic level (Marmara, Mediterranean, Aegean Sea, and Central Anatolia). The majority of these individuals were young, highly educated females with a high income. These data, from Turkey and the rest of the world, indicate that the decline in immunization rates in recent years cannot be explained by the same reasons stated by the WHO prior to 2010.

One of the most important reasons for the decrease in immunization rates as reported by the recent literature is vaccine rejection and hesitation,[2] and it is imperative to identify who is rejecting vaccines in order to prevent further declines. According to data obtained from the National Immunization Questionnaire between 1995 and 2001 in the U.S., males, Caucasians, high-income families, and married, university-educated mothers were the ones who rejected vaccination more frequently.[25] A study conducted in mothers with a high socioeconomic status revealed that this group developed a tendency to reject vaccination, significantly increasing the rate.[26]

In the present study, we found that 3 out of 10 women with a high educational level did not think that vaccination was beneficial, with the rate being 10-times higher than that in the low-education group. The individuals who rejected the vaccine or who had vaccination hesitancy were mostly young mothers with high socioeconomic and income levels. These findings show that in the pre-2010 years, a low educational level decreased the opportunity to reach vaccines, which decreased the vaccination rate; whereas on the contrary, the recently developed vaccine refusal is spreading throughout educated individuals with easy access to vaccines. Higher levels of anxiety due to a lack of, or inaccurate, information are more commonly seen in highly educated individuals with a high income; therefore, training and projects directed toward these groups need to be planned in order to reduce vaccination hesitancy and refusal.

The reasons stated by those in the U.S. who refuse the vaccine or are hesitant were mainly characteristics of the local population (cultural issues, socioeconomic status, or educational level), beliefs of local healthcare providers and leaders (e.g., clergy and politicians), and local media publications.[27] In another study, it was stated that distrust of vaccine companies is one of the most important reasons, with social media being very effective in spreading this insecurity.[28] As another important reason, cohort studies conducted in Europe and North America suggest that the largest cause of vaccine rejection is that vaccines have lost their importance, since there exists a perception in the younger generation that serious infectious diseases are no longer encountered.[29,30]

The reasons for vaccine refusal and hesitancy in developed countries have been revealed through explanations by the WHO and many studies in the literature. Although local studies, such as this,have shown that vaccine refusal and hesitancy also occur in developing and underdeveloped countries, the number of relevant studies is limited. In underdeveloped countries in particular, the causes of vaccine refusal and hesitancy are different from those in developed countries, with a lack of information about vaccines, distrust of vaccination companies, and religious and cultural factors being the main reasons.[14–16]In our study, the most common reason was the lack of trust in vaccine companies. Fifty percent of people who think vaccination is nonbeneficial said that they do not trust the vaccine companies, with approximately 5% of all participants indicating similar distrust. The second most common reason for vaccination hesitancy was hearing from the media and internet that vaccination is harmful, with 25%of all individuals saying that they saw such information on social media. The majority of these individuals were young. In our opinion, although social media and the internet are important tools for public health, sometimes confusion and misinformation can occur, especially with modern parents with high educational and income levels. We believe that the WHO and the scientific circles working to increase the prevalence of vaccines should develop educational programs directed at this young portion of society via social media. We also believe that local administrators, especially public health managers, will organize training programs together with vaccination professionals in high schools and equivalent schools to achieve real success in this regard.

Approximately 1 in 10 participants stated that their neighbors and family members say that vaccination is harmful. In Turkish society, where the familial bond and traditional lifestyle is still strong, this can be used positively to increase knowledge of vaccine usefulness; just as vaccine refusal became widespread due to this interaction, the same effect can spread the perception that vaccines are necessary.In a study conducted in the U.S., distrust of governments, vaccine companies, and healthcare professionals in those who rejected the vaccine were cited as the three most important reasons.[31]In some European studies, distrust of health professionals has been shown to be an important cause of vaccine refusal. A study conducted in Croatia showed that insecurity regarding healthcare workers reduces the proportion of childhood vaccinations in families.[32]In the present study, only 7 participants stated that they did not trust healthcare workers, a rate that was much lower than that reported in the literature. We think that the reason for this low rate is related to easy access to primary preventive healthcare services in Turkey and efforts of healthcare workers. Thus, we believe that the most important force for reducing vaccine rejection and hesitation will be healthcare workers in family health centers, who will promote vaccine usefulness via educational videos showing the destruction that can be caused by vaccine-preventable diseases.The major strength of the present study is that it was conducted in two major internal migration regions, which could be sampled according to the demographic structure reported by TurkStat 2018. Particularly in the cities that are open to foreign migration due to the great opportunity for employment after the Syrian war, the present study may show the risks of preventable infectious diseases that may arise in the future. According to the data obtained in the present study, the measures to be taken are the development of training programs and legal regulations regarding the rejection of vaccines in order to obtain more effective results. These cities should be selected as pilot provinces and the studies should begin in these regions.The most important weakness of the present study is the small population area. This type of study needs to be carried out in a much wider area and more extensively in all regions of Turkey. With these comprehensive studies, vaccination rejection and hesitation, which is a relatively new issue in our country, may be prevented, and a work plan that will be disseminated throughout the country should be prepared immediately.

Conclusion

The present study found that, in recent years, vaccine refusal and hesitancy have increased in developing countries such as Turkey to the same extent as in developed countries. As the WHO reported, vaccine refusal and hesitancy have increased in developed countries and in families with a high socioeconomic status. However, vaccine refusal and hesitancy are not only problems in developed countries, but also in developing and underdeveloped countries.Two major reasons why families in developed countries refuse vaccination are that they have not experienced the harm of infectious diseases in the pre-vaccine period and have not encountered their fatal consequences. Distrust of vaccine companies is an important reason for vaccine refusal in developing countries. Nonscientific news and

publications by the media and the internet are major factors that cause the spread of vaccine refusal and hesitancy in society. Public precautions and emergency measures similar to those in developed countries should also be taken against vaccine refusal in developing countries such as Turkey.

Disclosure of potential conflicts of interest

No potential conflicts of interest were disclosed.

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