



Parents' attitudes and refusal towards childhood vaccinations and associated factors

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Abstract

The aim of this study is to determine the demographic characteristics of vaccine refusals in Malatya province, identify reasons for vaccine hesitancy, and guide future intervention efforts. Data for this descriptive study were collected through face-to-face interviews using a socio-demographic form developed by researchers, reasons for non-vaccination, and the short form of the "Turkish Vaccine Hesitancy Scale" and "Parental Attitudes towards Childhood Vaccinations" (PACV) scales. Statistical analysis included chi-square test, Mann-Whitney U test, and Spearman correlation test. Vaccine hesitancy was found in 86.0% of parents who did not vaccinate their children. The most common reasons for non-vaccination were "lack of confidence in vaccine content" (65.1%), "observation of side effects in others after vaccination" (19.8%), and "exposure to negative statements about vaccines on social media". As the educational level of both parents increased, non-vaccination due to a lack of confidence in vaccine content was more common. There was no relationship found between the presence of vaccine hesitancy and socio-demographic characteristics. Parents who do not vaccinate have low confidence in vaccines, and the influence of media, particularly press and social media, is significant in vaccination decision-making. Efforts should be made by both healthcare professionals and policymakers to increase confidence in vaccines and prevent access to misinformation about vaccines, thus minimizing vaccine hesitancy.

Keywords: Vaccination hesitancy, public health, vaccination refusal, childhood vaccination

Introduction

Vaccination represents one of the most effective and cost-efficient public health interventions. Annually, about 4.5 million deaths can be prevented through vaccination. It is estimated that by enhancing global immunization coverage, 1.5 million deaths could be averted [1]. Despite the preventive measures of vaccines against infectious diseases and related disabilities, vaccine hesitancy is becoming an increasingly concerning issue. Vaccine hesitancy significantly contributes to the rise in preventable diseases and the occurrence of outbreaks. Several countries have reported an increase in the frequency of vaccine-preventable diseases due to families refusing to have some or all childhood vaccinations. The World Health Organization defines vaccine hesitancy as a "delay in acceptance or refusal of vaccination despite the availability of vaccination services" [2].

Vaccination rates have shown a decrease of approximately 1-4% in several countries in recent years [3,4]. Various studies have observed vaccine hesitancy rates ranging from 8% to 19% in communities, with approximately 40% to 52% of individuals expressing concerns regarding vaccinations [5]. Studies conducted among families exhibiting vaccine hesitancy have revealed various factors such as vaccine experiences, belief in anti-vaccine information on the internet, peer behavior, and distrust in healthcare professionals [6,7].

According to report of the Turkish Medical Association, the number of families signing the vaccine refusal form was 183 in 2011, which increased to 12,000 in 2016, and reached 23,000 in 2017. In Türkiye, the rate of fully vaccinated infants decreased from 98% in 2016 to 96% in 2017 [8]. If vaccine hesitancy continues unchecked, this decline is anticipated to persist.

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Identifying the reasons behind vaccine hesitancy and intervening accordingly is imperative to address this issue. This study aims to determine the demographic characteristics and reasons for vaccine hesitancy cases in the Malatya province, providing insights for future intervention efforts.

Material and Methods

The data for this descriptive study were collected between September 1 and September 30, 2023. To examine the factors associated with vaccine hesitancy, a total sample size of 72 was determined to be required for inclusion in the study, based on a medium effect size ($d=0.6$) in the t-test, with a type 1 error rate of 0.05 and a power of 0.80, calculated using the G Power software. Including the reserves, 86 individuals were included in the study. Participants were selected through a simple random method from the list of parents who did not vaccinate their children during the period 2019-2022. The study was conducted in accordance with the Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects and the protocol was approved by the Ethics Committee of Malatya Turgut Özal University (Date: 28.07.2023, Meeting No: 23).

Data were collected using face-to-face interviews and gathered through a sociodemographic form and a form on reasons for vaccine refusal prepared by researchers, the short form of the Turkish Vaccine Hesitancy Scale (VHS) developed by Kılıçarslan et al [9], and the Parenting Attitudes towards Childhood Vaccines Scale (PACV) developed by Opel et al. [10] and adapted to Turkish by Çevik et al. [11].

The VHS-Short version contains 12 items. The total score of the short form can vary between 12 and 60. A higher score on the scale means higher vaccine hesitancy of participants [9]. PACV consists of 15 questions and has three sub-dimensions: behavior, attitude, safety and effectiveness. The raw score obtained by summing the scored version of the scale is converted to a score of 100 using the conversion table. An increase in the total score of the scale indicates an increase in parents' hesitancy towards childhood vaccinations. A converted PACV score of less than 50 indicates that there is no vaccine hesitancy, and a score of 50 or above indicates that there is vaccine hesitancy [11].

Statistical analysis of the study was performed using the "Statistical Package for the Social Sciences" software (SPSS 19 for Windows, SPSS Inc., Chicago, Illinois, USA). Normal distribution suitability was assessed using the Shapiro-Wilk test. Descriptive statistics were used for data evaluation, providing numbers and percentages for data conforming to normal distribution, and mean and standard deviation for normally distributed data. For non-normally distributed data, median values and interquartile ranges (25th-75th percentiles) were provided. The relationship between categorical groups was assessed using the chi-square test, and the relationship between scale scores among independent groups was evaluated using the Mann-Whitney U test.

Results

57.0% of those who filled out the questionnaire are mothers of unvaccinated children. The mean age of the parents who completed the questionnaire is 33.3 ± 6.9 . The mean number of children per family is 2.1 ± 1.0 . 74.4% of children have mother with a high school diploma or higher, and 84.9% of the fathers have a high school diploma or higher. 82.6% of the participants expressed their income level as moderate (Table 1).

Table 1. Socio-demographic characteristics of participants

Characteristic		Frequency (n)	Percent (%)
Gender	Female	49	57.0
	Male	37	43.0
Mother's education	Literate	0	0.0
	Primary school	8	9.3
	Middle school	14	16.3
	High school	30	34.9
	Univeristy	34	39.5
	Postgraduate	0	0.0
Father's education	Literate	1	1.2
	Primary school	6	7.0
	Middle school	6	7.0
	High school	27	31.4
	University	43	50.0
	Postgraduate	3	3.5
Income	Low	9	10.5
	Moderate	71	82.6
	High	6	7.0
Number of children	1	27	31.4
	2	35	40.7
	3	15	17.4
	4	6	7.0
	5	3	3.5
Order of visited child	First	34	39.5
	Second	34	39.5
	Third	11	12.8
	Fourth	5	5.8
	Fifth	2	2.3

36.0% of unvaccinated children's parents have not vaccinated their other siblings. Among the families who reported not vaccinating their other children ($n=55$), 30% ($n=16$) stated that none of their other children received any vaccinations in the childhood immunization schedule. 60.5% of participants did not get the tetanus vaccine during pregnancy. The rate of parents not getting the Coronavirus disease (COVID-19) vaccine is 82.6%.

The most common reason for vaccine refusal is a lack of trust in vaccine content (65.1%). Second is the observation of post-vaccination side effects in acquaintances (19.8%), followed

by exposure to negative expressions about vaccines on social media (17.4%) (Table 2). When asked about the effect of vaccines, 5.8% of the participants said the vaccine didn't cause any illness, while 40.7% said the vaccine cause illness but did not know what illness it caused. The most commonly presumed illness due to vaccination was neurological and psychiatric diseases (37.4%), with autism being the most commonly mentioned within this group.

Table 2. Reasons for parents' vaccine refusal

		Frequency (n)	Percent (%)
Sibling had post-vaccine side effects	Yes	5	5.8
	No	81	94.2
Acquaintances had post-vaccine side effects	Yes	17	19.8
	No	69	80.2
Negative articles about vaccines in the press	Yes	13	15.1
	No	73	84.9
Negative expressions on social media about vaccines	Yes	15	17.4
	No	71	82.6
Negative expressions in social circles about vaccines	Yes	13	15.1
	No	73	84.9
Lack of trust in vaccine and its content	Yes	56	65.1
	No	30	34.9
Religious reasons	Yes	9	10.5
	No	77	89.5
Side effects in vaccines taken by parents	Yes	4	4.7
	No	82	95.3
The belief that vaccines cause illness	Yes	9	10.5
	No	77	89.5
Lack of knowledge about the need for vaccines	Yes	3	3.5
	No	83	96.5
Belief in vaccine ineffectiveness	Yes	11	12.8
	No	75	87.2

The relationship between reasons for vaccine refusal and socio-demographic characteristics was analyzed. The frequency of not vaccinating due to a lack of trust in vaccine content was significantly higher in mothers with a high school education or above (73.4%) compared to those with education below high school (40.9%) (p=0.01). Similarly, the frequency of vaccine refusal due to lack of trust in vaccine content was significantly higher in fathers with a high school education or above (69.9%) compared to those with education below high school (38.5%) (p=0.01). Income and gender did not affect reasons for vaccine refusal (p>0.05). There was no observed relationship between not vaccinating other siblings, previous COVID-19 vaccination, tetanus vaccination during pregnancy, and reasons for vaccine refusal (p>0.05).

The median VHS score was 45.0 (39.3-50.0), and the median PACV score was 67.0 (57.0-73.0). A moderate positive correlation was found between the PACV score and the VHS score (r=0.55, p<0.001).

The relationship between participants' socio-demographic characteristics, reasons for vaccine refusal, and PACV and VHS scores is presented in Table 3. PACV and VHS scores were higher among individuals who did not trust the vaccine's content (p<0.001). No relationship was observed between other reasons for vaccine refusal and PACV and VHS scores.

Individuals with a score of 50 or above based on PACV score were classified as having 'vaccine hesitancy.' Vaccine hesitancy was observed in 86.0% of the participants. Those with and without vaccine hesitancy were analyzed in terms of their socio-demographic characteristics and reasons for non-vaccination. No differences were found between individuals with and without vaccine hesitancy concerning socio-demographic characteristics. There was no detected correlation between reasons for vaccine refusal and the presence of vaccine hesitancy. Additionally, no relationship was found between prior COVID-19 vaccination or tetanus vaccination during pregnancy and the presence of vaccine hesitancy (Table 4).

Table 3. Relationship between participants' PACV and VHS score, socio-demographic characteristics, and reasons for vaccine hesitancy

		PACV score		VHS score	
		Median (25p-75p)	p	Median (25p-75p)	p
Gender	Female	63.0 (57.0-73.0)	0.22	45.0 (37.0-50.0)	0.72
	Male	70.0 (63.0-77.0)		45.0 (40.0-52.0)	
Mother's education	Below high school graduation	63.0 (51.5-73.0)	0.28	45.0 (36.8-50.0)	0.53
	High school and above graduation	70.0 (57.8-74.5)		45.5 (40.0-51.0)	
Father's education	Below high school graduation	63.0 (42.0-68.5)	0.04	43.0 (30.0-48.0)	0.10
	High school and above graduation	70.0 (57.0-77.0)		46.0 (40.0-50.5)	
Income	Low	63.0 (37.0-71.5)	0.30	44.0 (30.5-47.0)	0.48
	Moderate	67.0 (57.0-73.0)		45.0 (40.0-50.0)	
	High	70.0 (61.5-77.8)		43.5 (34.0-54.5)	
Unvaccinated siblings	Yes	70.0 (60.0-77.0)	0.24	44.0 (37.0-53.0)	0.96
	No	67.0 (53.0-73.0)		46.0 (40.0-50.0)	
Pregnancy vaccination	Yes	64.0 (56.0-73.0)	0.15	45.0 (36.5-50.0)	0.38
	No	70.0 (60.0-74.5)		46.0 (40.0-51.0)	
COVID-19 vaccination	Yes	63.0 (43.0-77.0)	0.25	44.0 (31.0-49.0)	0.33
	No	70.0 (57.0-73.0)		45.0 (44.0-50.0)	
Sibling had post-vaccine side effects	Yes	63.0 (53.0-83.0)	0.79	37.0 (34.5-50.0)	0.37
	No	67.0 (57.0-73.0)		45.0 (40.0-50.0)	
Acquaintances had post-vaccine side effects	Yes	67.0 (61.5-71.5)	0.73	45.0 (41.5-48.5)	0.92
	No	67.0 (55.0-74.0)		45.0 (37.0-50.5)	
Negative articles about vaccines in the press	Yes	67.0 (60.0-75.0)	0.65	47.0 (40.0-52.0)	0.48
	No	67.0 (57.0-73.0)		45.0 (38.5-50.0)	
Negative expressions on social media about vaccines	Yes	70.0 (63.0-80.0)	0.23	48.0 (43.0-51.0)	0.20
	No	67.0 (57.0-73.0)		45.0 (37.0-50.0)	
Negative expressions in social circles about vaccines	Yes	67.0 (63.0-74.0)	0.62	47.0 (43.0-50.5)	0.61
	No	67.0 (57.0-73.0)		45.0 (37.0-50.0)	
Lack of trust in vaccine and its content	Yes	70.0 (63.0-77.0)	<0.001	47.5 (43.0-52.8)	<0.001
	No	58.5 (48.3-65.5)		37.0 (33.8-45.8)	
Religious reasons	Yes	70.0 (65.0-82.0)	0.12	47.0 (44.0-50.5)	0.40
	No	67.0 (57.0-73.0)		45.0 (37.0-50.0)	
Side effects in vaccines taken by parents	Yes	61.5 (45.5-72.3)	0.46	54.5 (37.5-58.0)	0.14
	No	67.0 (57.0-73.5)		45.0 (39.3-50.0)	
Belief that vaccines cause illness	Yes	73.0 (61.5-82.0)	0.32	48.0 (36.0-53.0)	0.57
	No	67.0 (57.0-73.0)		45.0 (40.0-50.0)	
Lack of knowledge about the need for vaccines	Yes	77.0 (63.0-)	0.19	48.0 (48.0-)	0.40
	No	67.0 (57.0-73.0)		45.0 (37.0-50.0)	
Belief in vaccine ineffectiveness	Yes	67.0 (53.0-83.0)	0.38	49.0 (43.0-53.0)	0.20
	No	67.0 (57.0-73.0)		45.0 (37.0-50.0)	

VHS: Vaccine Hesitancy Scale, PACV: parental attitudes towards childhood vaccinations; 25p-75p: 25th-75th percentiles

Table 4. Relationship between participants' vaccine hesitancy, socio-demographic characteristics, and reasons for vaccine hesitancy

		Vaccine hesitancy		P
		No n (%)	Yes n (%)	
Gender	Female	5 (10.2)	44 (89.8)	0.40
	Male	7 (18.9)	30 (81.1)	
Mother's education	Below high school graduation	5 (22.7)	17 (77.3)	0.28
	High school and above graduation	7 (10.9)	57 (89.1)	
Father's education	Below high school graduation	4 (30.8)	9 (69.2)	0.08
	High school and above graduation	8 (11.0)	65 (89.0)	
Income	Low	3 (33.3)	6 (66.7)	
	Moderate	9 (12.7)	62 (87.3)	
	High	0 (0.0)	6 (100.0)	
Unvaccinated siblings	Yes	3 (9.7)	28 (90.3)	0.52
	No	9 (16.4)	46 (83.6)	
Pregnancy vaccination	Yes	7 (20.6)	27 (79.4)	0.21
	No	5 (9.6)	47 (90.4)	
COVID-19 vaccination	Yes	4 (26.7)	11 (73.3)	0.21
	No	8 (11.3)	63 (88.7)	
Sibling had post-vaccine side effects	Yes	1 (20.0)	4 (80.0)	0.54
	No	11(13.6)	70 (86.4)	
Acquaintances had post-vaccine side effects	Yes	1 (5.9)	16 (94.1)	0.45
	No	11 (15.9)	58 (84.1)	
Negative articles about vaccines in the press	Yes	1 (7.7)	12 (92.3)	0.68
	No	11 (15.1)	62 (84.9)	
Negative expressions on social media about vaccines	Yes	1 (6.7)	14 (93.3)	0.68
	No	11 (15.5)	60 (84.5)	
Negative expressions in social circles about vaccines	Yes	1 (7.7)	12 (92.3)	0.68
	No	11 (15.1)	62 (84.9)	
Lack of trust in vaccine and its content	Yes	5 (8.9)	51 (91.1)	0.10
	No	7 (23.3)	23 (76.7)	
Religious reasons	Yes	0 (0.0)	9 (100.0)	0.35
	No	12 (15.6)	65 (84.4)	
Side effects in vaccines taken by parents	Yes	1 (25.0)	3 (75.0)	0.46
	No	11 (13.4)	71 (86.6)	
Belief that vaccines cause illness	Yes	1 (11.1)	8 (88.9)	1.00
	No	11 (14.3)	66 (85.7)	
Lack of knowledge about the need for vaccines	Yes	0 (0.0)	3 (100.0)	1.00
	No	12 (14.5)	65 (85.5)	
Belief in vaccine ineffectiveness	Yes	1 (9.1)	10 (90.9)	1.00
	No	11 (14.7)	64 (85.3)	

Discussion

Vaccine refusal has become a significant public health issue. Investigating the reasons behind vaccine refusal in society and implementing region-specific interventions and persuasion campaigns is crucial. This study conducted interviews with parents in the Malatya province who refused childhood vaccinations.

The median VHS was 45.0 (39.3-50.0), and the median PACV score was 67.0 (57.0-73.0). According to this study, vaccine hesitancy, as per the PACV, was observed in 86.0% of participants. Studies conducted in Türkiye and various other countries have shown variability in vaccine hesitancy rates, ranging from 8.9% to 58.7% [12-18]. The rate of vaccine hesitancy observed in the Malatya province is notably high compared to other studies; however, it's important to note that all participants in this study were parents who did not vaccinate their children.

Understanding the reasons for vaccine refusal and developing community-specific solutions is important. The most common reason for vaccine hesitancy in this study was a "lack of confidence in vaccine content" (65.1%). Among those who did not vaccinate due to lack of confidence in vaccine content, both the PACV score and VHS score were found to be higher compared to those who did not have concerns about vaccine content. Studies conducted in Italy, Türkiye, and Indonesia have also identified low confidence in vaccines as the most common reason for vaccine hesitancy [13,14,19-21]. In a case-control study, it was demonstrated that families with concerns about the safety of vaccines were half as likely to have their babies vaccinated compared to those without such concerns [22]. Interventions should be conducted to investigate the reasons for the lack of confidence in vaccines.

The influence of social media is significant in reducing vaccine confidence. In this study, the third most common reason for vaccine hesitancy was "exposure to negative statements about vaccines on social media" (17.4%). Anti-vaccine propaganda is frequently disseminated on social media platforms. Approximately 18% of websites that appear in internet search results for the query "should I vaccinate my child?" are anti-vaccine [23]. Furthermore, studies have shown that up to 75% of parents use the Internet as a source of information about vaccines, with 75% of these parents either not questioning the reliability of the information at all or only occasionally doing so [24]. In a study comparing families who do not vaccinate their children with those who do, regarding the sources of information related to vaccines, it was shown that there is a difference between the two groups in terms of the sources of information obtained. It was demonstrated that those who do not vaccinate their children most frequently obtain information from the Internet (70%), while those who vaccinate their children most frequently receive information from doctors (66%) [25]. These results indicate that in order to address vaccine hesitancy, healthcare professionals should first be equipped with arguments addressing the doubts about the reliability of vaccines and engage in persuasive discussions with parents. Healthcare

professionals should inform parents accurately about vaccines before they acquire misinformation from the internet. Given that anti-vaccine views are most easily accessible through the internet, measures should be taken to regulate such content, while enhancing the visibility of pro-vaccine content on the internet and social media platforms.

Parents who hesitate to vaccinate themselves or their other children may also hesitate to vaccinate their children. In this study, 36.0% of unvaccinated children had parents who did not vaccinate their other siblings either. Similarly, studies on the Measles-Mumps-Rubella (MMR) vaccine have shown that it reduces vaccination rates [19]. Additionally, 60.5% of participants in this study did not receive the mandatory tetanus vaccine during pregnancy. Studies conducted in different regions of Türkiye have reported tetanus vaccine non-compliance rates ranging from 25% to 45% among individuals with vaccine hesitancy [25,26]. During the COVID-19 pandemic, concerns and speculations about vaccines increased. Misinformation about vaccine production, changing schedules, and side effects have affected attitudes towards childhood vaccinations. In this study, 86.2% of parents did not vaccinate themselves against COVID-19. A study conducted in Türkiye showed that nearly 80% of participants expressed a negative change in their attitudes toward childhood vaccinations following the COVID-19 pandemic [18]. In another study, it was observed that 65% of parents who do not vaccinate their children also do not consider getting vaccinated against COVID-19 themselves [20]. A study conducted in Greece has shown that as the level of trust in authorities increases during the COVID-19 pandemic, the level of hesitation towards routine childhood vaccination programs decreases [16]. These findings suggest that to reduce hesitancy and refusals towards childhood vaccinations, health authorities should avoid practices and indecisions that undermine confidence in vaccines during any epidemic situation and intervene to prevent speculative approaches.

The relationship between parental education level and vaccine hesitancy varies in the literature. While this study did not find a direct correlation between parental education level and the presence of vaccine hesitancy or scale scores, it observed that as the educational level of both parents increased, vaccine refusal due to lack of confidence in vaccine content became more common. Similarly, studies have shown that an increase in parental education level can lead to an increase in vaccine hesitancy [15]. High levels of parental education may result in misinterpretation of scientific information due to increased research before decision-making, leading to vaccine hesitancy. Conversely, studies have also shown a high level of vaccine hesitancy among parents with lower levels of education [14,16,27]. In the case of individuals with lower educational levels, they may perceive vaccines as harmful without investigating their accuracy, influenced by what they hear about vaccines from their surroundings. Indeed, in this study, the second most common factor contributing to parents' unwillingness to vaccinate is "the development of side effects in those around them following vaccination.

In this study, no sociodemographic parameter associated with vaccine hesitancy could be identified. However, there are studies in the literature that demonstrate the association of income level, parental status, educational level, and number of children with vaccine hesitancy [27,28]. Nevertheless, since every society is unique and the reasons for vaccine hesitancy vary, the impact of sociodemographic parameters on vaccine hesitancy may vary depending on the population being studied. Since all the data in this study consisted of parents who refused to vaccinate all or some of the vaccines, there may not have been a relationship between the presence of hesitancy and sociodemographic data or scale scores. Evaluating groups with and without vaccine hesitancy could reveal which parameters are influential in the development of vaccine hesitancy. However, in this study, a descriptive research design was planned to identify effective interventions that could address hesitancy within the group exhibiting vaccine hesitancy.

Conclusion

The decline in vaccination rates is becoming a significant public health concern. Therefore, it is crucial to identify the presence of vaccine hesitancy and the reasons behind it in society. The main reasons for vaccine hesitancy are vaccine safety and the selection of incorrect sources of information. Increasing confidence in vaccines and preventing access to misinformation about vaccines are responsibilities that both healthcare professionals and policymakers must address and find solutions for.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects and the protocol was approved by the Ethics Committee of Malatya Turgut Özal University (Date: 28.07.2023, Meeting No: 32).

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