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# Level of hesitation of parents about childhood vaccines and affecting factors: a cross-sectional study in Turkey

Vasfiye BAYRAM DEĞER<sup>1</sup> and Gülhan YİĞİTALP<sup>2\*</sup>

## Abstract

**Background** Hesitancy rates for childhood vaccines are increasing on a global scale. It was reported in previous studies that many factors affect vaccine hesitancy. The present study was designed to determine the prevalence of childhood vaccination hesitancy in parents and to determine the factors affecting it.

**Methods** This descriptive, cross-sectional study was conducted with 350 parents who had at least one child aged two years and younger, who applied to Family Health Centers in the city of Mardin in the Southeastern Anatolia Region of Turkey, between January and March 2022. The “Parental Attitudes Towards Childhood Vaccines (PATCV) Questionnaire” was used to collect the data, which were analyzed by using the SPSS (Statistical Package for Social Sciences) for Windows 22.0 program. The Logistic Regression Analysis was used to determine the factors affecting parental attitudes toward childhood vaccines.

**Results** A total of 32.0% of the parents were found to be hesitant about vaccinations and 3.4% did not have at least one vaccination for their children. Significant relationships were detected between income status, education status, thoughts about vaccinations, parents having adult vaccinations, hesitant to have self-vaccination, considering vaccine necessary, and parental attitudes towards childhood vaccinations ( $p < 0.05$ ). According to the Regression Analysis, parents who had adult vaccinations had reduced hesitation about childhood vaccines 0.506 times ( $p = 0.032$ ; OR = 0.506; 95%CI = 0.271–0.943). Considering the vaccine necessary reduced the hesitation about childhood vaccines by 0.440 times ( $p = 0.011$ ; OR = 0.440; 95%CI = 0.234–0.828).

**Conclusions** The hesitations of parents about childhood vaccines were found to be high. The reasons for vaccine hesitancy must be examined in detail and strategies must be developed in this regard.

**Keywords** Parent, Child, Vaccination hesitancy, Vaccination attitude

\*Correspondence:

Gülhan YİĞİTALP

g.yigitalp@gmail.com

<sup>1</sup>Department of Nursing, Faculty of Health Sciences, Mardin Artuklu University, Mardin, Turkey

<sup>2</sup>Department of Nursing, Ataturk Faculty of Health Sciences, Dicle University, Diyarbakır, Turkey



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## Background

Vaccines are among the most cost-effective public health-care practices globally, saving lives by controlling or eliminating infectious diseases and protecting millions of children from diseases and disabilities each year [1]. Despite these benefits of vaccines, there is a decrease in vaccination rates in children around the world, which was reported even in developed countries such as the United States, Australia, and England [2–4].

The Extended Immunization Program (EIP) was put into practice in Turkey in 1981 and gained momentum with the “Turkey Vaccination Campaign” after 1985. Routine vaccination against 13 diseases is performed in the childhood vaccination calendar in Turkey. These are diphtheria, pertussis, tetanus, polio, Hepatitis B, Hepatitis A, H, influenza type B, tuberculosis, measles, mumps, rubella, chicken pox, and pneumococcus. These vaccines are given free of charge at Family Health Centers (FHCs) that provide primary healthcare for people. However, there is no legal obligation to vaccinate [5].

There has been a recent decrease in the general vaccination rates in Turkey. The immunization rates with measles, rubella, and mumps vaccines decreased from 98% in 2016 to 95% in 2020. Immunization rates with diphtheria, acellular pertussis, tetanus, and Hepatitis B vaccines decreased from 99% in 2019 to 98% in 2020 (6). Along with the decreased vaccination rates, there was an increase in the cases of measles, rubella, and mumps in Turkey. Although the number of measles cases was 9 in 2016, it increased to 2905 in 2019 [6] and the number of rubella cases was 1 in 2017, it increased to 44 in 2019 and in 2019, the number of mumps cases increased from 419 in 2017 to 476 [7]. One possible reason for this decrease in childhood immunization rates, and therefore, the increase in vaccine-preventable diseases is the reluctance of parents to vaccinate their children because of hesitancy [8, 9].

Vaccine hesitancy is defined as the delay in accepting or rejecting vaccines despite the availability of vaccine services. It is a complex, context-specific phenomenon that varies with time, place, and vaccines [10]. It was reported that vaccination hesitancy rates in parents vary in many countries, with rates ranging between 6.1% and 34.7% [11–18]. The lowest rate is in the USA and the highest rate is in Italy. (12,14). In a previous study that was conducted in Turkey, 28.1% of parents [19] (and 13.8% in another study) were hesitant about childhood vaccinations [20]. Many reasons for vaccine hesitancy were reported in the past. The most important of these are the lack of confidence in vaccines [21], negative considerations about vaccines, and the consideration that vaccines are unnecessary [22]. It was stated that sociodemographic factors such as income [13] and educational status also affected vaccination hesitancy in parents

[12]. For all these reasons, the World Health Organization (WHO) reported vaccine hesitancy as one of the top ten threats to global health in 2019 like air pollution and climate change as well as threats such as non-communicable diseases [23]. Vaccine hesitancy and vaccine refusal place not only unvaccinated individuals but also vaccinated individuals at increased risk for increased infection rates and negative health outcomes [24]. To increase immunization rates in children and maintain high immunization coverage, parents must understand the importance of vaccination and be willing to vaccinate their children [25].

Studies on hesitancy towards childhood vaccines among parents using the Parental Attitudes Towards Childhood Vaccines (PATCV) questionnaire in Turkey are limited. To determine the vaccination hesitancy levels and reasons of parents, it is important to prevent problems that might occur because of not being vaccinated in the early period. For this reason, the study was designed to determine the prevalence of childhood vaccination hesitancy in parents and to determine the factors affecting vaccination hesitancy.

## Methods

### Study design and population

This descriptive, cross-sectional study was conducted with parents who had at least one child aged two years and younger who applied to the Family Health Centers (FHCs) in Mardin city center in the Southeastern Anatolia Region of Turkey, between January and March 2022, and volunteered to participate in the study. The family medicine model is dominant as a health policy in Turkey, and primary healthcare services and preventive health services are provided by FHCs. There are a total of 20 FHCs affiliated with the center of Mardin and they serve a population of 186.622. Assuming that 21.0% of parents were hesitant (19,20), a sample size of 255 was calculated to obtain a representative sample of the population with a 95% Confidence Interval and 5% error ratio. A total of 370 parents were interviewed. A total of 11 parents refused to participate in the study, and nine parents were not included in the study because they left the questionnaire unfinished. The rate of those who refused to participate in the study was 5.4%. In this way, the study was completed with 350 parents. The Simple Random Sampling Technique was preferred for sample selection. Parents were selected from the FHC records using a table of random numbers, and they were invited to the FHC and data were collected with the Face-to-Face Interview Method. The data collection took about 10–15 min.

*Inclusion criteria for the study* Being registered in the FHC where the study was conducted, having at least one child aged two years and younger, having the cognitive

ability to answer the data collection tools, volunteering to participate in the study, and not having communication problems (hearing, language, comprehension, etc.).

### Data collection tools

The “Personal Information Form” and “Parental Attitudes Towards Childhood Vaccines (PATCV) Questionnaire” were used to collect the data.

**Personal Information Form:** This form was developed by researchers by reviewing the literature data. The form consisted of a demographic information form with five questions consisting of variables such as age, gender, marital status, and economic status of the participants and eight questions examining the opinions of the participants about the vaccine.

**Parental Attitudes to Childhood Vaccines (PATCV) Questionnaire.**

The PATCV questionnaire, which was developed by Opel et al., is a tool to identify vaccine-hesitant parents with inadequately vaccinated children [26]. The questionnaire consists of 15 items and has three areas; “behavior, safety and effectiveness, and general attitudes” [26, 27]. To score the PATCV, two points are given to items questioning non-demographic data answered hesitantly, one point to questions answered as “I do not know or not sure”, and 0 points to items answered without hesitation. The total raw scores are obtained by summing the item scores. The total scores to be obtained from the scale range between 0 and 30. Total raw scores of the PATCV are calculated by converting them to a 0-100 scale using simple linear transformation accounting (using the Score conversion chart). A score of 50 or more ( $\geq 50$ ) indicates vaccination hesitancy in parents, and a score of less than 50 ( $< 50$ ) indicates parents who do not hesitate (26). The Turkish adaptation of the scale was conducted by Bulun and Acuner, and Cronbach’s Alpha Reliability Value was determined as 0.84 [19]. The Cronbach’s Alpha Reliability Value of the scale was found to be 0.806 in this study.

### Study ethics

The study adhered to the principles of the Declaration of Helsinki. The study was approved by Mardin Artuklu University Non-Invasive Clinical Study Ethics Committee (13/12/2021/2021-3). Permission was obtained from the relevant institution where the study was conducted. Written informed consent was obtained from all participants before their participation. Legally Authorized Representatives of illiterate participants provided informed consent for the study.

### Statistical analysis

The data that were obtained in the study were analyzed by using the IBM SPSS (Statistical Package for Social Sciences) for Windows 22.0 program. Numbers,

percentages, mean and standard deviations were used as descriptive statistical methods in the evaluation of the data. The differences between the rates of categorical variables in independent groups were analyzed with the Chi-Square and Fisher’s Exact Tests. Logistic Regression Analysis was performed to determine the factors affecting parents’ attitudes toward childhood vaccines, and odds ratio (OR) and 95% CI were calculated. Relevant and highly representative independent variables were included in the regression model. For the dependent variable (parental attitude towards childhood vaccines), the presence of hesitation was taken as 1, and the absence of hesitation as 0. Significance was tested at  $p < 0.05$ . Categorical variables were included in the model as dummy variables.

### Results

The mean score of parental attitudes toward childhood vaccines was found to be  $39.86 \pm 14.55$  in the study. In terms of hesitation about childhood vaccines, 112 (32.0%; 95% CI (0.27–0.37)) had hesitation ( $\geq 50$  points).

A total of 22.9% of the parents were in the 20–25 age group, 72.6% were women, 95.7% were married, 37.4% had a lower income than their expenses, and 40.6% were university graduates. Also, 12.3% of parents had no idea about vaccines, 64.0% had heard of the vaccine refusal concept, 3.4% had at least one vaccination lacking in their children, 84.0% had adult vaccinations, 25.1% said that they were hesitant to have themselves vaccinated, and 78.9% said that they considered it necessary (Table 1).

No significant relationships were detected between parental attitudes towards childhood vaccinations and age, gender, marital status, hearing about the vaccination rejection concept, the idea that not being vaccinated is a parent’s right, the presence of non-vaccination in children, and obtaining negative information about vaccination (respectively  $p = 0.949$ ,  $p = 0.418$ ,  $p = 0.167$ ,  $p = 0.300$ ,  $p = 0.312$ ,  $p = 0.430$ ,  $p = 0.447$ ). Significant relationships were detected between income status, education status, thoughts about vaccinations, getting adult vaccinations, hesitant to have self-vaccination, considering vaccine necessary, and parental attitudes towards childhood vaccinations (respectively  $p = 0.028$ ,  $p = 0.004$ ,  $p = 0.010$ ,  $p = 0.002$ ,  $p = 0.015$ ,  $p < 0.001$ ). Among those with no vaccine hesitancy, 32.8%’s income was less than their expenses, 43.7%’s income was equal to their expenses, and 23.5%’s income was more than their expenses. It was determined that 47.3% of those who were hesitant had an income less than their expenses, 32.1% had an income equal to their expenses, and 20.5% had an income more than their expenses. Other data are given in Table 1.

Relevant and highly representative variables were included in the regression model that was established to determine the factors associated with parental attitudes

**Table 1** The distribution of descriptive characteristics according to parents' attitudes toward childhood vaccines

		No Hesitancy		Hesitancy		Total		<i>p</i> *
		<i>n</i>	%	<i>n</i>	%	<i>N</i>	%	
		Age	20–25	53	22.3	27	24.1	
	26–30	75	31.5	37	33.0	112	32.0	
	31–40	87	36.6	38	33.9	125	35.7	
	40>	23	9.7	10	8.9	33	9.4	
Gender	Female	174	73.1	80	71.4	254	72.6	<i>p</i> =0.418
	Male	64	26.9	32	28.6	96	27.4	
Marital status	Married	230	96.6	105	93.8	335	95.7	<i>p</i> =0.167
	Single	8	3.4	7	6.2	15	4.3	
Income status	Less income than expenses	78	32.8	53	47.3	131	37.4	<i>p</i> =0.028
	Income equal to expenses	104	43.7	36	32.1	140	40.0	
	More income than expenses	56	23.5	23	20.5	79	22.6	
Educational status	Not literate	11	4.6	15	13.4	26	7.4	<i>p</i> =0.004
	Literate	22	9.2	19	17.0	41	11.7	
	Primary school	24	10.1	8	7.1	32	9.1	
	Secondary school	31	13.0	7	6.2	38	10.9	
	High school	53	22.3	18	16.1	71	20.3	
	University	97	40.8	45	40.2	142	40.6	
Opinion on vaccines	No idea	25	10.5	18	16.1	43	12.3	<i>p</i> =0.010
	Necessary	122	51.3	69	61.6	191	54.6	
	Very necessary	91	38.2	25	22.3	116	33.1	
Hearing about vaccine refusal	No	83	34.9	43	38.4	126	36.0	<i>p</i> =0.300
	Yes	155	65.1	69	61.6	224	64.0	
The opinion that not having the vaccine is the right of parents	No	96	40.3	49	43.8	145	41.4	<i>p</i> =0.312
	Yes	142	59.7	63	56.2	205	58.6	
Presence of missing vaccines in children	No	229	96.2	109	97.3	338	96.6	<i>p</i> =0.430
	Yes	9	3.8	3	2.7	12	3.4	
Parents have adult vaccinations	No	28	11.8	28	25.0	56	16.0	<i>p</i> =0.002
	Yes	210	88.2	84	75.0	294	84.0	
Being hesitant about getting vaccinated for oneself.	No	187	78.6	75	67.0	262	74.9	<i>p</i> =0.015
	Yes	51	21.4	37	33.0	88	25.1	
Considering vaccine necessary	No	36	15.1	38	33.9	74	21.1	<i>p</i> <0.001
	Yes	202	84.9	74	66.1	276	78.9	
Having negative information on vaccination	No	67	28.2	33	29.5	100	28.6	<i>p</i> =0.447
	Yes	171	71.8	79	70.5	250	71.4	

Chi-Square Analysis

\*Chi-Square test

toward childhood vaccines. For the dependent variable (parental attitude towards childhood vaccines), the presence of hesitation was taken as 1, and the absence of hesitation as 0. The analysis that was made to determine the factors associated with parental attitudes toward childhood vaccines was found to be statistically significant ( $p=0.001$ ;  $R^2=0.123$ ). The model could just explain 12% of the variations in the dependent variable. According to the Regression Analysis, income status, education level, thoughts about vaccines, and hesitancy to have oneself vaccinated did not affect hesitancy about childhood vaccines (respectively  $p=0.288$ ,  $p=0.331$ ,  $p=0.088$ ,  $p=0.150$ ,  $p>0.05$ ). Having self-vaccinated adults reduced hesitancy about childhood vaccines 0.506 times ( $p=0.032$ ;

OR=0.506; 95%CI=0.271–0.943). Considering the vaccine necessary reduced the hesitation about childhood vaccines by 0.440 times ( $p=0.011$ ; OR=0.440; 95%CI=0.234–0.828), (Table 2).

## Discussion

In this study, the rate of hesitation of parents for childhood vaccines was found to be high (32%). The hesitation rates for childhood vaccines differ from country to country. Hesitancy rates for childhood vaccines range from 6.1 to 34.7% in many countries [11, 12, 14–16]. In a study that used the PATCV scale in Turkey, 28.1% of parents [19] and 13.8% in another study were found to be hesitant about childhood vaccinations [20]. This may pose a

**Table 2** Regression analysis for the factors on parental attitudes toward childhood vaccines

	<i>p</i>	OR	95% Confidence Interval	
			Lower	Upper
Income status (less). Ref.	0.288			
Income status (equal)	0.119	0.643	0.369	1.120
Income status (more)	0.641	0.855	0.443	1.652
Educational status	0.331	0.929	0.802	1.077
Opinions on vaccines (no idea) Ref.	0.088			
Opinions on vaccines (necessary)	0.164	1.760	0.795	3.900
Opinions on vaccines (very necessary)	0.972	1.016	0.417	2.479
Parents have adult vaccinations	0.032	0.506	0.271	0.943
Being hesitant about getting vaccinated for oneself.	0.150	1.491	0.865	2.567
Considering the vaccine necessary	0.011	0.440	0.234	0.828
(Constant)	0.481	1.363		

Cox & Snell  $R^2=0.088$ ; Nagelkerke  $R^2=0.123$   $p=0.001$

risk for the increase of preventable diseases with childhood vaccines in our country. Right at this point, it is important to know the reasons for vaccine hesitancy and to implement serious scientific and political measures for these reasons. In the present study, 3.4% of the parents said that they did not have at least one vaccination for their children. This rate was reported to be higher in two separate studies conducted in Italy [11, 12]. Consistent with our findings, only 3.2% of parents refused to be vaccinated despite their hesitancy about childhood vaccinations in Malaysia [13]. In Turkey, 4.8% of parents refused to vaccinate their children [20]. In another study, 97.1% had been routinely vaccinated under the childhood immunization program in Turkey hesitation and rejection rate of 2.9% in this study [28]. The reason for these different results may be because the studies were conducted in different countries or regions. Different cultural structures, education levels, perceptions about vaccines, etc. may affect vaccine hesitancy. In our research, although the rates of hesitancy about vaccination in parents were found to be high, the rate of those who said that their children had at least one missing vaccine was low. This shows that although parents are hesitant about vaccinations, they still decide to vaccinate. Possible reasons for this can be the lack of information, infodemic, and confusion. Interventions must be implemented to raise awareness about the safety of vaccines to reduce vaccine hesitancy and confusion among parents.

Although vaccine hesitancy is associated with both low and high socioeconomic status in terms of income [29], it was also reported that there is no such relationship [17, 30]. However, studies reporting that parents who had low household income also had higher vaccination hesitancy levels support our findings [31, 32]. The reason for these different results may be that previous studies were conducted in different sections of society. Income status, which is an important indicator of socioeconomic variables, can be effective in the search for health, as in every

field. Income status is a factor associated with many variables such as education, occupation, and sociocultural structure, and they may have affected vaccine acceptance together.

It was reported that hesitancy towards childhood vaccines in parents is associated with education level, and vaccine hesitancy increases as education level decreases [30, 32, 33]. These findings support our results. There are also studies reporting that parents with higher education levels tend to be more hesitant about vaccination [22] and that education level does not affect vaccination hesitancy [34]. Considering the relationship between education level and health literacy [35, 36], individuals may seek evidence-based information about their health as their education level increases. For this reason, the possibility of reaching more reliable sources of vaccines may also increase. The recent increase in vaccination hesitancy in individuals with a high level of education may also be because of anti-vaccine actions on social media and other platforms [37]. In the present study, it is noteworthy that the vaccination hesitancy of university graduate parents was higher than that of primary, secondary, and high school graduates.

In parents, beliefs, and thoughts that vaccination is ineffective, childhood vaccines are not important, and vaccines are not a good way to protect their children increasing vaccination hesitancy. Also, negative beliefs about vaccination increase the probability of parents having their children incompletely vaccinated [22]. Many studies reported consistent results with this finding [18, 38–41]. It was determined in the present study that parents who said that they had no idea about considering the vaccine necessary were more hesitant about childhood vaccines when compared to those who considered the vaccine necessary and very necessary. Also, those who said that they did not consider the vaccine necessary had higher hesitancy about vaccination. Considering the vaccine necessary reduces the hesitation about childhood

vaccines by 0.440 times. In this context, developing pro-vaccine attitudes in society must be one of the important targets of public healthcare, and healthcare professionals have important duties in this respect. Motivating suggestions must be developed for parents and behavioral or educational interventions must be realized so that parents can decide to vaccinate their children. It was emphasized in a limited number of intervention studies that positive behaviors toward vaccines developed in parents after the intervention [42].

In the present study, parents who hesitated to vaccinate themselves and did not have self-vaccination were more hesitant about childhood vaccination compared to those who did not hesitate and had vaccines. Also, self-vaccination reduces hesitance about childhood vaccines 0.506 times for adults. Similar results were reported in previous studies. For example, it was reported that it is more common for expectant mothers who are not hesitant about childhood vaccinations to have an annual flu vaccination compared to those who are hesitant [30], parents who have high vaccine hesitancy may refuse to have their children vaccinated against influenza than parents with low vaccination hesitations [15], and mothers who have prenatal influenza vaccination complete vaccination series at a higher rate for their children compared to non-vaccinated mothers [43]. Right at this point, it is possible to argue that positive attitudes and behaviors in parents about vaccines reduce childhood vaccine hesitancy and increase vaccine acceptance.

### Limitations and strengths

There were some limitations in the present study. Firstly, causal inferences could not be made because the study was cross-sectional. Secondly, there may have been a recall bias because of the memory factor because the parents were asked retrospective questions. Thirdly, asking parents sensitive questions about vaccine hesitancy and refusal may not reflect true views because of the potential to increase the bias of answers. Fourthly, the results cannot be generalized to the whole population because the study was conducted in a province of the Southeastern Anatolia region of Turkey. Despite these limitations, it constitutes the strength of the study because it is one of the limited studies using the PATCV (It is a valid and reliable scale measuring vaccine hesitancy) questionnaire in Turkey. It is also valuable in terms of guiding further studies on the level and causes of childhood vaccine hesitancy.

### Conclusion

In the present study, although the level of hesitancy of parents was high for childhood vaccinations, the rate of those who did not have at least one vaccination of their children was low. Low income and education levels

increase the hesitance of vaccination in parents. Considering the vaccine necessary reduces hesitation about childhood vaccines. Also, the fact that parents have adult vaccinations reduces the hesitation about childhood vaccinations. Vaccine hesitancy has a complex structure [10] and its causes must be examined in detail in all aspects. In this context, intervention studies are needed to reduce the hesitations of parents about childhood vaccines. Healthcare professionals working in the field of public health have great roles in these intervention studies. Strategies must be developed so that parents can obtain accurate and reliable information about vaccination and make conscious decisions.

### Abbreviations

EIP	The Extended Immunization Program
FHC	Family Health Centers
PATCV	Parental Attitudes Towards Childhood Vaccines
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

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### Author contributions

GY and VBD: Conceived and designed the study. VBD: Created the first draft of the manuscript. VBD: Assisted with data collection and edited the manuscript. GY: Performed data analysis and edited the manuscript. GY: Edited the manuscript. GY and VBD approved the final version of the manuscript.

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### Data availability

All data generated or analysed during this study are included in this published article.

### Declarations

#### Ethics approval and consent to participate

The study adhered to the principles of the Declaration of Helsinki. The study was approved by Mardin Artuklu University Non-Invasive Clinical Study Ethics Committee (13/12/2021/2021-3). Permission was obtained from the relevant institution where the study was conducted. Written informed consent was obtained from all participants before their participation. Legally Authorized Representatives of illiterate participants provided informed consent for the study.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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