

Investigating Vaccine Hesitancy and Refusal Among Parents of Children Under Five: A Community-based Study

Beş Yaş Altı Çocukların Ebeveynlerinde Aşı Tereddüt ve Reddinin Araştırılması: Toplum Temelli Bir Araştırma

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Abstract

Introduction: Vaccine hesitancy and refusal threaten to reverse progress made in tackling vaccine-preventable diseases. This problem is not new, and gaining an increasing importance due to the increase in its incidence. The present study aims to determine the frequency of factors related to vaccine hesitancy and refusal among parents of children under five.

Materials and Methods: A community-based study was conducted with 402 parents of children under five in a province of Turkey between October 2020 and February 2021. The number of samples to be included in the study was determined by proportional cluster sampling. Data were collected using the WHO SAGE “Vaccine Hesitancy Survey Questions” and “Vaccine Hesitancy Scale”.

Results: Of parents, 19.7% were hesitant about childhood vaccines. The rejection rate of recommended vaccines (special or free vaccines) was 18.2%. The rate of parents who refused the vaccines offered free of charge by the Ministry of Health was 0.9%. Vaccine hesitancy was higher among fathers, those with undergraduate and higher education, parents over 42 years of age, and those with a higher income economic status. Having heard or read negative information about vaccines increased the likelihood of vaccine hesitancy by 13.5 times. The parents' Vaccine Hesitancy Scale score was 1.68 ± 0.53 .

Conclusion: According to the study results, vaccine hesitancy and refusal have a structure affected by many factors. The most important of these factors is the content of knowledge about vaccines.

Öz

Giriş: Aşı tereddütü ve reddi, aşıyla önlenbilir hastalıklarla mücadelede kaydedilen ilerlemeyi tersine çevirmekle tehdit etmektedir. Bu sorun yeni değildir ve görülme sıklığının artması nedeniyle önemi giderek artmaktadır. Bu çalışma, beş yaş altı çocuğu olan ebeveynlerin aşı tereddüt ve aşı reddi ile ilişkili faktörlerle sıklığını belirlemeyi amaçlamaktadır.

Gereç ve Yöntem: Ekim 2020 ile Şubat 2021 tarihleri arasında Türkiye'nin bir ilinde beş yaş altı çocuğu olan 402 ebeveyn ile toplum temelli bir araştırma yapılmıştır. Araştırmaya dahil edilecek örneklem sayısı orantılı küme örnekleme ile belirlenmiştir. Veriler, WHO SAGE “Aşı Tereddüt Anketi Soruları” ve “Aşı Tereddüt Ölçeği” kullanılarak toplanmıştır.

Bulgular: Ebeveynlerin %19,7'si çocukluk aşıları konusunda tereddütlüydü. Önerilen aşıların (özel veya ücretsiz aşılar) reddedilme oranı %18,2 idi. Sağlık Bakanlığı'nın ücretsiz olarak sunduğu aşıları reddeden ebeveyn oranı %0,9'dur.

Keywords

Vaccine hesitancy, vaccine refusal, children under five, parents

Anahtar kelimeler

Aşı tereddütü, aşı reddi, beş yaş altı çocuk, ebeveynler

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Babalarda, lisans ve üzeri eğitimlilerde, 42 yaş üstü ebeveynlerde ve ekonomik durumu yüksek olanlarda aşı tereddütü daha yüksekti. Aşılar hakkında olumsuz bilgi duymak veya okumak, aşı tereddüt olasılığını 13,5 kat artırmaktadır. Ebeveynlerin Aşı Tereddüt Ölçeği puanı $1,68 \pm 0,53$ idi.

Sonuç: Araştırma sonuçlarına göre aşı tereddütü ve reddi pek çok faktörden etkilenen bir yapıya sahiptir. Bu faktörlerden en önemlisi aşılarla ilgili bilginin içeriğidir.

Introduction

Immunization is one of the most successful and cost-effective health interventions worldwide (1). Despite the proven success in saving the lives of millions of children and preventing diseases and disabilities every year, vaccine hesitancy and refusal have been increasingly on the agenda in recent years. Vaccine hesitancy and refusal threaten to reverse progress made in tackling vaccine-preventable diseases (2).

Vaccine hesitancy is defined as the delay or refusal to accept vaccines despite the availability of vaccination services. Individuals who are hesitant about vaccination may accept all vaccinations but continue to be concerned about vaccinations. Some people may reject or delay some vaccines while accepting other vaccines. Some individuals may also refuse all vaccines (3,4). Therefore, vaccine hesitancy may cause people to refuse the vaccine by affecting their motivation to vaccinate themselves or their children. According to the results of the analysis of the three-year data available in the Joint Report Form in 2017, which was prepared by the WHO and UNICEF (United Nations International Children's Emergency Fund) to reveal global vaccine hesitancy and its change over the years, vaccine hesitancy was reported in more than ninety percent of 184 countries. Furthermore, it was observed for three years that most reasons stated for vaccine hesitancy were not based on an evaluation but opinion. As a result of the evaluation, the rate of countries stating reasons for vaccine hesitancy was only 38% (5).

Considering that vaccine hesitancy among parents of children under five may result in vaccine refusal, it is necessary to know the frequency of vaccine hesitancy in society, question the concerns and reasons of those who are hesitant, and understand what increases their hesitancy. The success of health services depends on the cooperation and full participation of individuals in that community. Therefore, it is of great importance for public health services to evaluate vaccine hesitancy in society with appropriate measurement tools.

This study aims to determine the frequency of vaccine hesitancy and refusal among parents of children under five and the factors associated with them.

Materials and Methods

The presents research is a descriptive cross-sectional study. A community-based study was conducted with 402 parents of children under five in province Tokat of Turkey between November 2020 and January 2021. The current study was approved by Başkent University Non-Interventional Clinical Research Ethics Committee (Project no: KA20/332) and supported by Başkent University Research Fund. Furthermore, institutional permission was received from the Provincial Governor's Office with the letter numbered 20286032-492-E.6166 on 30.07.2020 to carry out the fieldwork.

Sampling and Study Procedure

The sample size of the study was calculated as 402 parents of children under five, by considering at least a 95% confidence interval, 0.05 deviation, and 20% loss rate, using the Open Epi program (6). Intensive vaccination is carried out in the first five years of life to protect children from vaccine-preventable infectious diseases. Vaccine hesitancy among parents of children under five adversely affects vaccine acceptance. Therefore, this study was conducted on parents of children under five. Sample selection was made in two stages. At the first stage, the proportional cluster sampling method was employed to determine the number of parents to be included in the study in the neighborhoods of the city center (7). There are 42 neighborhoods affiliated with the municipality in the city center. Each neighborhood was taken as a cluster, and the number of samples to fall into each cluster was calculated proportionally according to the cluster weight. At the second stage, a household with children under five was randomly selected as the starting point in each neighborhood with purposive

sampling. Participants must be over the age of 18 and have children under five to participate in the study. If a child had a chronic disease or was born prematurely and was of a foreign nationality, we did not include the parents of these children in the study. Only one parent in a household who had a child under five and volunteered to participate in the study was interviewed, and priority was given to interviewing mothers. If there was more than one child under five in a household, parents were asked to answer the survey questions considering the child with the youngest age in months.

Data Collection

The “Vaccine Hesitancy Survey Questions (VHSQ)” and “Vaccine Hesitancy Scale (VHS)” developed by the WHO SAGE Vaccine Hesitancy Working Group were used as data collection tools. One more descriptive survey created by the researchers was done to obtain information about the family. Permission was received from Heidi J. Larson on behalf of the SAGE Vaccine Hesitancy Working Group who developed the questionnaire and scale to use the VHSQ and VHS (8). The VHSQ consists of 11 closed and open-ended questions, including parents’ hesitations, rejections, and opinions about childhood vaccinations. The VHS consists of a five-point Likert-type scale containing 10 propositions about vaccines: 1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, and 5= strongly agree. The VHS was developed by Larson et al. (8) in 2015, whereas Shapiro et al. (9) tested its validity and reliability. Prior to this research, the researchers conducted the validity and reliability study of the VHS. According to the research results, a structure consisting of 7 items (L1-L4 and L6-L8) with a single factor was valid and reliable. Cronbach’s α value was 0.83 (10).

Statistical Analysis

As descriptive statistics, quantitative data were expressed as mean (M) and standard deviation (SD), and qualitative data were presented as number (n) and percentage (%). Pearson’s chi-squared test or Fisher’s Exact test was used in 2x2 crosstabs to compare qualitative data, while Pearson’s chi-squared test was used in r x c crosstabs. Multivariate logistic regression analysis was conducted to determine the risk factors influencing vaccine hesitancy.

Whether the research sample represented the universe according to some characteristics (mother’s age group, child’s gender, and child’s age group) was evaluated with the one-sample t-test for universe ratio. According to the analysis results, the research sample represented the universe and showed similarities with Turkey. Statistical analyses were conducted in SPSS (Statistical Package for Social Sciences) for Windows 20.0 program. The value of $p < 0.05$ was considered significant.

Results

Of the interviewed parents, 389 (96.8%) were mothers, and 13 (3.2%) were fathers. The parents’ socio-demographic characteristics are summarized in Table 1.

While 19.7% of the interviewed parents were hesitant to vaccinate their children, the rate of those who rejected at least one of the vaccines (private and free vaccines) recommended for their children was 18.2% (Table 2). Among the vaccines about which parents were hesitant (n=79), the highest hesitancy of 83.5% was experienced in the measles, mumps, and rubella (MMR) vaccine. Among the rejected vaccines (n=73), the MMR vaccine was the most rejected among free vaccines at a rate of 5.5%, while the rotavirus vaccine was the most rejected among paid vaccines at a rate of 98.6%.

Of the participants, 33.6% had negative information about vaccines, and among the negative information obtained, it was mostly reported that the vaccine was harmful at a rate of 53.4%. The number of the participants who took their children to vaccination after receiving negative information was 96.3% (Table 3).

Vaccine hesitancy was higher among fathers, those with undergraduate and higher education, parents over 42 years of age, and those with a higher income economic status. Vaccine refusal was higher among fathers and parents with undergraduate or higher education ($p < 0.05$) (Table 4).

Among the interviewed parents, fathers were 11.79 times more likely to experience vaccine hesitancy than mothers [OR=11.79, (95% CI=2.01-60.12)]. Having heard or read negative information about vaccines increased the risk of vaccine hesitancy by 13.58 times [OR=13.58, (95% CI=6.55-28.13)] (Table 5).

In the responses of the participants to the WHO SAGE VHS items, it was seen that they agreed with the statement “Getting vaccinated is a good way to protect my child from the disease” and “I usually follow the recommendations of my doctor or healthcare professional regarding vaccinations for my child” (Figure 1).

Upon examining the VHS mean score of the interviewed parents, the mean score of vaccine insecurity, the general structure (items L1-L4, L6-L8) of the scale, was 1.86 ± 0.53 (It is reverse coded

Table 1. Socio-demographic characteristics of parents (n=402)

Demographic variables	Categories	n (%)
Interviewed parent	Mother	389 (96.8)
	Father	13 (3.2)
Interviewed parent age (years)	18-25	70 (17.4)
	26-33	200 (49.8)
	34-41	114 (28.3)
	42 or older	18 (4.5)
Mother's education	Primary education	124 (30.8)
	High school	160 (39.8)
	Associate degree	52 (12.9)
	Bachelor's	61 (15.2)
	Master's degree	5 (1.2)
Father's education	Primary education	102 (25.4)
	High school	141 (35.1)
	Associate degree	34 (8.5)
	Bachelor's	108 (26.9)
	Master's degree	17 (4.2)
Economic situation	High income	85 (21.2)
	Middle income	296 (73.6)
	Low income	21 (5.2)
Number of children	1	114 (28.4)
	2	166 (41.3)
	3	81 (20.1)
	4 or above	41 (10.2)
Youngest child's gender	Boy	193 (48.0)
	Girl	209 (52.0)
Youngest child age (months) M \pm SD	26.2 \pm 15.4	
Interviewed parent age (years) M \pm SD	31.2 \pm 5.7	
SD: Standard deviation		

according to the original range of the scale). A low score on the WHO SAGE VHS indicates a low level of vaccine hesitancy, while a high score indicates

Table 2. Distribution of participants' responses to the some WHO SAGE "Vaccine Hesitancy Survey Questions"

Questions and answers	n (%)
Do you believe that vaccines can protect children from serious diseases?	
Yes	367 (91.3)
No	35 (8.7)
Do you think that most parents like you have their children vaccinated with all the recommended vaccines?	
Yes	285 (70.9)
No	117 (29.1)
Have you ever been reluctant or hesitated to get a vaccination for your child?	
Yes	79 (19.7)
No	323 (80.3)
Have you ever refused a vaccination for your child?*	
Yes	73 (18.2)
No	329 (81.8)
Have you ever refused a vaccine offered free of charge by the Ministry of Health for your child?	
Yes	4 (0.9)
No	398 (99.1)
Reasons for vaccine hesitation and refusal**	
Did not think it was needed	83 (64.3)
Did not think the vaccine was safe/concerned about side effects	58 (45.0)
Heard or read negative media	54 (41.9)
Did not think the vaccine was effective	49 (38.0)
Someone else told me that the vaccine was not safe	37 (28.7)
Special childhood vaccines are not mandatory	28 (21.7)
Did not know where to get good/reliable information	26 (20.2)
High cost of special childhood vaccines	15 (11.6)
Fear of needles	14 (10.9)
Someone else told me they/their child had a bad reaction	13 (10.1)
Had a bad experience or reaction with previous vaccination	5 (3.9)
Had a bad experience with previous vaccinator/health clinic	4 (3.1)
Religious reasons	4 (3.1)
*Those who refuse at least one childhood vaccination (free or special childhood vaccines)	
**More than one option was marked	

a high level of vaccine hesitancy. According to the scale’s general structure, the vaccine hesitancy level of the participants was low. Furthermore, Cronbach’s α value was 0.92 in the data set of 398 participants [Those (n=4) who refuse free vaccines offered by the Ministry of Health are excluded]. The highest mean score among the items (L5, L9, and L10) removed in the confirmatory factor analysis was 3.01 ± 1.01 , and L9 was “Concerns about side effects”. Item L5 (New vaccines risky) was mean of score 2.68 ± 0.65 . Item L10 (Some vaccines no longer needed) was mean of score 2.53 ± 0.79 (Table 6).

Discussion

Vaccine hesitancy and refusal are public health problems affected by many complex factors, are not new, and are gaining increasing importance due to the increase in their incidence. Therefore, the WHO recommends that the factors triggering vaccine hesitancy and refusal in countries’ environments should be evaluated with appropriate measurement tools (5). This is the first community-based study in Turkey conducted on parents of children under five, using the VHSQ and the VHS developed by the WHO SAGE.

While 19.7% of the parents interviewed in this study were hesitant to have their children vaccinated, the rate of those who refused at least one of the recommended vaccines (private or free vaccines) was 18.2%. In studies conducted in Italy, vaccine hesitancy rates ranged from 15.6% to 24.6% (11-13). In the study by Dube et al. (14) the rate of vaccine hesitancy in Canada was 16.1%. In the study conducted by Migriño et al. (15) in the Philippines, 31% of the parents were hesitant about vaccination, while 23.7% refused at

least one vaccine. The vaccine hesitancy rate was 83% in the study carried out by Dasgupta et al. (16) in India. The results of some studies conducted on parents of children under five are similar to those obtained in our study. Many studies have shown that the incidence of vaccine hesitancy and refusal varies because there are numerous factors affecting vaccine hesitancy and refusal. For example, since a new vaccine was added to the vaccine program during the study conducted in India, the rate of vaccine hesitancy may have been high (16).

In the present study, the vaccine about which parents were hesitant the most was the MMR vaccine (83.5%), while the most rejected vaccine was the MMR vaccine (5.5%) among free vaccines and the rotavirus vaccine (98.6%) among paid vaccines. In the study conducted by Campbell et al. (17) in England, parents rejected influenza and MMR vaccines most frequently. A study by Taiwo et al. (18) showed that the most widely rejected vaccine was the polio vaccine. The highest rejection rate for the rotavirus vaccine among private vaccines can be explained by parents’ financial difficulties and not regarding it as necessary. On the other hand, historical events increase vaccine hesitancy and refusal, e.g., the Trovan case in Nigeria in 1996. Considering the reasons for vaccine hesitancy and refusal in the current study, not regarding the vaccine as necessary, insecurity/side effects of the vaccine, and hearing/reading negative news in the media are the first three leading causes. Miko et al. (19) found the reason for vaccine hesitancy as negative news in the media. However, in our study, not regarding the vaccine as “necessary” was the main reason because people who refuse the vaccine are also those who refuse special childhood vaccines. Therefore, this situation originates

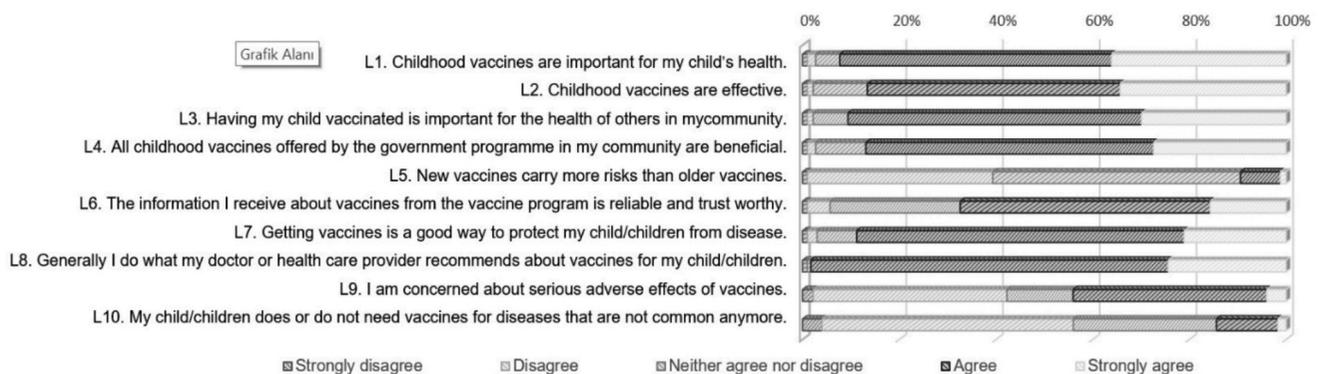


Figure 1. Distribution of responses to each item of the Vaccine Hesitancy Scale.

Table 3. Distribution of participants' responses to the WHO SAGE "Vaccine Hesitancy Survey Questions" continued	
Questions and answers	n (%)
Are there any reasons you can think of why children should not be vaccinated?	
Yes	15 (3.7)
No	387 (96.3)
Reasons cited for not vaccinating children (n=15)	
Not finding vaccines safe	5 (33.3)
Thinking that it causes other diseases for which it does not strengthen immunity	3 (20.0)
Thinking that children who are not necessary are already healthy	2 (13.3)
New vaccines are not healthy and safe	1 (6.7)
Thinking that more germs are taken into the body with the vaccine	1 (6.7)
Do not vaccinate if not required	1 (6.7)
Do not vaccinate if the child is sick	1 (6.7)
To be in favor of natural immunity to strengthen the body	1 (6.7)
Do you think that it is difficult for some ethnic or religious groups in your community/region to get vaccinations for their children?	
Yes	133 (33.1)
No	269 (66.9)
What do you think are the reason(s)? (n=133)*	
They choose not to vaccinate	130 (97.7)
They do not feel welcome at the health service	22 (16.5)
Health services do not reach them	2 (1.5)
Have you ever received or heard negative information about vaccinations?	
Yes	135 (33.6)
No	267 (66.4)
Negative information about the vaccine (n=135)**	
The vaccine is harmful	74 (53.4)
Vaccines have bad side effects	14 (10.4)
The fact that the vaccine is not native makes it genetically modified sterile	10 (7.4)
No vaccine needed	9 (6.7)
Vaccines cause autism	9 (6.7)
Vaccines cause stroke	4 (3.0)
Special vaccines are unnecessary	4 (3.0)
Vaccines cause restlessness in children	3 (2.2)
Animal genes are produced from the fetus	2 (1.5)
Causes mental retardation in children	2 (1.5)
The use of pork gelatin in the content of the vaccine	1 (0.7)
Your close friend's child has autism	1 (0.7)
Friend's child has muscle disease	1 (0.7)
Produced by pharmaceutical companies for commercial profit	1 (0.7)
Measles vaccine causing disability	1 (0.7)
Harms of wrong vaccine	1 (0.7)
Did you still take your child to get vaccinated after you heard the negative information?	
Yes	130 (96.3)
No	5 (3.7)
*More than one option was marked	
**In the interview, the participants were asked to give an example and data were obtained according to thematic coding.	

from the fact that, as stated by parents, “if it was very necessary and compulsory, the state would have done it anyway.”

The interviewed parents answered “yes” to the question, “Do you think that most of the parents like you have their children get all the recommended vaccines?” at a rate of 70.9%. In studies conducted using the VHSQ in different countries, this rate varies between 40.8% and 84.6% (16,20).

In the study, fathers were more hesitant about vaccination than mothers at a statistically significant level. The results obtained by Ren et al. (20) and Giambi et al. (11) are similar to those obtained in this study. In contrast, in a study by Campell et al. (17) mothers were more likely to delay and reject a vaccine

than fathers. The lowest vaccine hesitancy rate among the participants was in the age group of 18-25, while the highest hesitancy rate was in the age group of 42 years and older. Contrary to our study, Brown et al. (21) found that a high parental age was associated with high vaccine confidence.

Among the parents, those with undergraduate or higher education were more likely to experience vaccine hesitancy. Likewise, in a study by Giambi et al. (11) vaccine hesitancy was higher in those with university or higher education. On the other hand, some studies indicate high vaccine hesitancy in individuals with low parental education (16,22). The SAGE Vaccine Hesitancy Working Group reports that education level can both encourage and

Table 4. Comparison of the participants' hesitations and refusal of vaccination according to some variables

Characteristics	Vaccine hesitation		Vaccination refusal	
	n (%)	Test/p	n (%)	Test/p
Interviewed parent				
Mother	68 (17.5)	Fisher's Exact	67 (17.2)	Fisher's Exact
Father	11 (84.6)	Test, p<0.001	6 (46.2)	Test, p=0.017
Interviewed parent age (years)				
18-25	5 (7.1)*	-	10 (14.3)	-
26-33	47 (23.5)	$\chi^2=16.463$	39 (19.5)	$\chi^2=0.981$
34-41	19 (16.7)	p=0.001	21 (18.4)	p=0.806
42 or older	8 (44.4)*	-	3 (16.7)	-
Interviewed parent's educational status				
Primary education	9 (7.2)*	$\chi^2=41.359$	9 (7.2)*	-
High school	25 (15.5)	p<0.001	28 (17.4)	$\chi^2=2.325$
Associate degree	18 (36.0)	-	13 (26.0)	p=0.313
Bachelor's degree/ higher	27 (40.9)*	-	23 (34.8)*	-
Economic situation				
High income	27 (31.8)*	$\chi^2=10.080$	21 (24.7)	$\chi^2=3.825$
Middle income	49 (16.6)	p=0.006	50 (16.9)	p=0.148
Low income	3 (14.3)	-	2 (9.5)	-
Number of children				
1	23 (20.2)	-	24 (21.1)	-
2	36 (21.7)	$\chi^2=2.998$	35 (21.1)	$\chi^2=5.388$
3	16 (19.8)	p=0.392	10 (12.3)	p=0.145
4 or above	4 (9.8)	-	4 (9.8)	-
Child's gender				
Boy	35 (18.1)	$\chi^2=0.541$	35 (18.1)	$\chi^2=0.000$
Girls	44 (21.1)	p=0.462	38 (18.2)	p=0.990
*It differs from other groups.				

Characteristics	β	OR	95% CI	p value
Constant	-3.873	0.03	-	<0.001
Interviewed parent				
Mother	Ref	-	-	-
Father	2.468	11.798	2.014-60.121	0.006
Development of side effects after vaccination in the child				
Yes	0.681	1.977	1.032-3.788	0.040
No	Ref	-	-	-
Believe that vaccines can protect children from serious diseases				
Yes	Ref	-	-	-
No	1.545	4.690	1.841-11.944	0.001
Having heard or read negative information about childhood vaccines				
Yes	2.609	13.584	6.558-28.136	<0.001
No	Ref	-	-	-

β : β coefficient, OR: Odds ratio, CI: Confidence interval, Ref: Reference, Not vaccine hesitation = 0, Vaccine hesitation = 1

General Structure Lack of confidence (items L1-L4*, L6-L8*)	New vaccines risky (item L5)	Concerns about side effects (item L9)	Some vaccines no longer needed (item L10)
M \pm SD**	M \pm SD	M \pm SD	M \pm SD
1.86 \pm 0.53	2.68 \pm 0.65	3.01 \pm 1.01	2.53 \pm 0.79

*It is reverse coded according to the original range of the scale.
**M: Mean, SD: Standard deviation
Note: Those who refuse free vaccines offered by the Ministry of Health are excluded (n=4). The single-factor general structure of the Vaccine Hesitancy Scale consists of seven items M1-M4 and M6-M8 in total. The remaining items (M5, M9 and M10) are given for use in national and international comparisons.

hinder vaccine acceptance, depending on current circumstances (23).

In this study, vaccine hesitancy was higher among parents with a higher income. The study findings obtained by Dasgupta et al. (16) and Özceylan et al. (24) support our results. A study by Migriño et al. (15) found that parental income was not associated with vaccine refusal. According to these results, vaccine hesitancy and refusal are not only a problem in high-income countries, but they also have a complex structure that can be seen in middle and low-income countries (25).

Vaccine hesitancy and refusal may develop in individuals who develop side effects after vaccination (3). In a study conducted in Italy, encountering parents whose children developed serious side effects after vaccination was identified as one of the main factors associated with vaccine hesitancy (11). In our study,

in line with the literature, each unit increase in post-vaccine side effects in the participants' children increased the risk of vaccine hesitancy by 1.9 times.

In the present study, the parents who did not believe that vaccines would protect their children from serious diseases were 4.6 times more hesitant to get vaccination than those who believed. Similar to the findings of our study, there are studies in which this rate is low in both high vaccine hesitancy and high vaccine refusal (15,26). In our study, hearing or reading negative information about vaccines by parents increased the probability of vaccine hesitancy by 13.5 times, and vaccine refusal was high. In a study by Giambi et al. (11), obtaining negative information about vaccines in the media resulted in parents rejecting at least one vaccine. Khattak et al. (26) found vaccine refusal to be higher in parents who heard and read negative information about the vaccine. Hearing

and reading negative information about the vaccine increase vaccine hesitancy and refusal, which can be explained by the fact that parents who receive negative information about the vaccine tend to be more sensitive to media news, whether confirmed or not, and often refer to the internet as a source of vaccine information.

In the VHS items, most participants agreed on the importance of the vaccine, its effectiveness, and its benefits for society. The parents' VHS score in this study was 1.68 ± 0.53 , which is similar to that in the study by Wagner et al. (27) conducted in five countries.

Conclusion

As a result, approximately one-fifth of parents of children under five experience vaccine hesitancy or refusal. The most important factor in parents' vaccine hesitancy and refusal is negative information about childhood vaccinations. Therefore, more comprehensive and regular research should be done using the VHSQ and VHS in order to determine these factors in society. To overcome vaccine hesitancy and refusal, appropriate strategies should be determined in light of scientific data.

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Ethics

Ethics Committee Approval: This study was approved by Başkent University Non-Interventional Clinical Research Ethics Committee (project no: KA20/332).

Conflict of Interest: No conflict of interest was declared by the authors.

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References

- World Health Organization (WHO). Immunization coverage [Internet]. [cited 05.07.2021]. Available from: <https://www.who.int/news-room/fact-sheets/detail/immunization-coverage>
- World Health Organization (WHO). Ten threats to global health in 2019 [Internet]. [cited 26.02.2021]. Available from: <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>
- World Health Organization (WHO). Summary WHO SAGE conclusions and recommendations on Vaccine Hesitancy. [cited 26.02.2021]. Available from: https://cdn.who.int/media/docs/default-source/immunization/demand/summary-of-sage-vaccinehesitancy-en.pdf?sfvrsn=abafd5c8_2
- SAGE Vaccine Hesitancy Working Group. What Influences Vaccine Acceptance: A Model of Determinants of Vaccine Hesitancy [Internet]. [cited 26.02.2021]. Available from: <https://www.canvax.ca/what-influences-vaccine-acceptance-model-determinants-vaccine-hesitancy>
- Lane S, MacDonald NE, Marti M, Dumolard L. Vaccine hesitancy around the globe: Analysis of three years of WHO/UNICEF Joint Reporting Form data-2015-2017. *Vaccine* 2018;36:3861-7.
- OpenEpi. Open Source Epidemiologic Statistics for Public Health, Version [Internet]. [26.08.2021 cited]. Available from: http://www.openepi.com/Menu/OE_Menu.htm
- Akdur R. Sağlık Bilimlerinde Araştırma ve Tez Yapma Rehberi (Projelendirme, Uygulama, Rapor Yazma). Genişletilmiş İkinci Baskı. Ankara: Başkent Üniversitesi Yayınları; 2019.
- Larson HJ, Jarrett C, Schulz WS, Chaudhuri M, Zhou Y, Dube E, et al. Measuring vaccine hesitancy: The development of a survey tool. *Vaccine* 2015;33:4165-75.
- Shapiro GK, Tatar O, Dube E, Amsel R, Knauper B, Naz A, et al. The vaccine hesitancy scale: Psychometric properties and validation. *Vaccine* 2018;36:660-7.
- Soysal G, Akdur R, Yöntem MK. Beş yaş altı çocukların ebeveynlerinde: Aşı Tereddüt Ölçeğinin geçerlilik ve güvenilirliği. 5. Uluslararası ve 23. Ulusal Halk Sağlığı Kongresi, 13-18 Aralık 2021, Kongre Kitabı, s.784. 2021.
- Giambi C, Fabiani M, D'Ancona F, Ferrara L, Fiacchini D, Gallo T, et al. Parental vaccine hesitancy in Italy - Results from a national survey. *Vaccine* 2018;36:779-87.
- Mereu N, Mereu A, Murgia A, Liori A, Piga M, Argiolas F, et al. Vaccination Attitude and Communication in Early Settings: An Exploratory Study. *Vaccines (Basel)* 2020;8:701.
- Bianco A, Mascaro V, Zucco R, Pavia M. Parent perspectives on childhood vaccination: How to deal with vaccine hesitancy and refusal? *Vaccine* 2019;37:984-90.
- Dubé É, Farrands A, Lemaitre T, Boulianne N, Sauvageau C, Boucher FD, et al. Overview of knowledge, attitudes, beliefs, vaccine hesitancy and vaccine acceptance among mothers of infants in Quebec, Canada. *Hum Vaccin Immunother* 2019;15:113-20.
- Migriño J, Gayados B, Birol KRJ, De Jesus L, Lopez CW, Mercado WC, et al. Factors affecting vaccine hesitancy among families with children 2 years old and younger in two urban communities in Manila, Philippines. *Western Pac Surveill Response J* 2020;11:20-6.
- Dasgupta P, Bhattacharjee S, Mukherjee A, Dasgupta S. Vaccine hesitancy for childhood vaccinations in slum areas of Siliguri, India. *Indian J Public Health* 2018;62:253-8.
- Campbell H, Edwards A, Letley L, Bedford H, Ramsay M, Yarwood J. Changing attitudes to childhood immunisation in English parents. *Vaccine* 2017;35:2979-85.
- Taiwo L, Idris S, Abubakar A, Nguku P, Nsubuga P, Gidado S, et al. Factors affecting access to information on routine immunization among mothers of under 5 children in Kaduna State Nigeria, 2015. *Pan Afr Med J* 2017;27:186.
- Miko D, Costache C, Colosi HA, Neculicioiu V, Colosi IA. Qualitative Assessment of Vaccine Hesitancy in Romania. *Med Kaunas Lith* 2019;55:E282.

20. Ren J, Wagner AL, Zheng A, Sun X, Boulton ML, Huang Z, et al. The demographics of vaccine hesitancy in Shanghai, China. *PLoS One* 2018;13:e0209117.
21. Brown AL, Sperandio M, Turssi CP, Leite RMA, Berton VF, Succi RM, et al. Vaccine confidence and hesitancy in Brazil. *Cad Saude Publica* 2018;34:e00011618.
22. Topçu S, Almış H, Başkan S, Turgut M, Orhon FŞ, Ulukol B. Evaluation of Childhood Vaccine Refusal and Hesitancy Intentions in Turkey. *Indian J Pediatr* 2019;86:38-43.
23. SAGE Working Group on Vaccine Hesitancy. Report of the SAGE Working Group on Vaccine Hesitancy 2014 [Internet]. [cited 12.07.2021]. Available from: https://www.asset-scienceinsociety.eu/sites/default/files/sage_working_group_revised_report_vaccine_hesitancy.pdf
24. Özceylan G, Toprak D, Esen ES. Vaccine rejection and hesitation in Turkey. *Hum Vaccin Immunother* 2020;16:1034-9.
25. World Health Organization (WHO). Vaccine hesitancy: A growing challenge for immunization programmes [Internet]. [cited 12.07.2021]. Available from: <https://www.who.int/news/item/18-08-2015-vaccine-hesitancy-a-growing-challenge-for-immunization-programmes>
26. Khattak FA, Rehman K, Shahzad M, Arif N, Ullah N, Kibria Z, et al. Prevalence of Parental refusal rate and its associated factors in routine immunization by using WHO Vaccine Hesitancy tool: A Cross sectional study at district Bannu, KP, Pakistan. *Int J Infect Dis* 2021;104:117-24.
27. Wagner AL, Masters NB, Domek GJ, Mathew JL, Sun X, Asturias EJ, et al. Comparisons of Vaccine Hesitancy across Five Low- and Middle-Income Countries. *Vaccines* 2019;7:155.