

Vaccination Indecision in Mothers with Children Aged 0-5 Years

0-5 Yaş Arası Çocuğu Olan Annelerde Aşı Kararsızlığı

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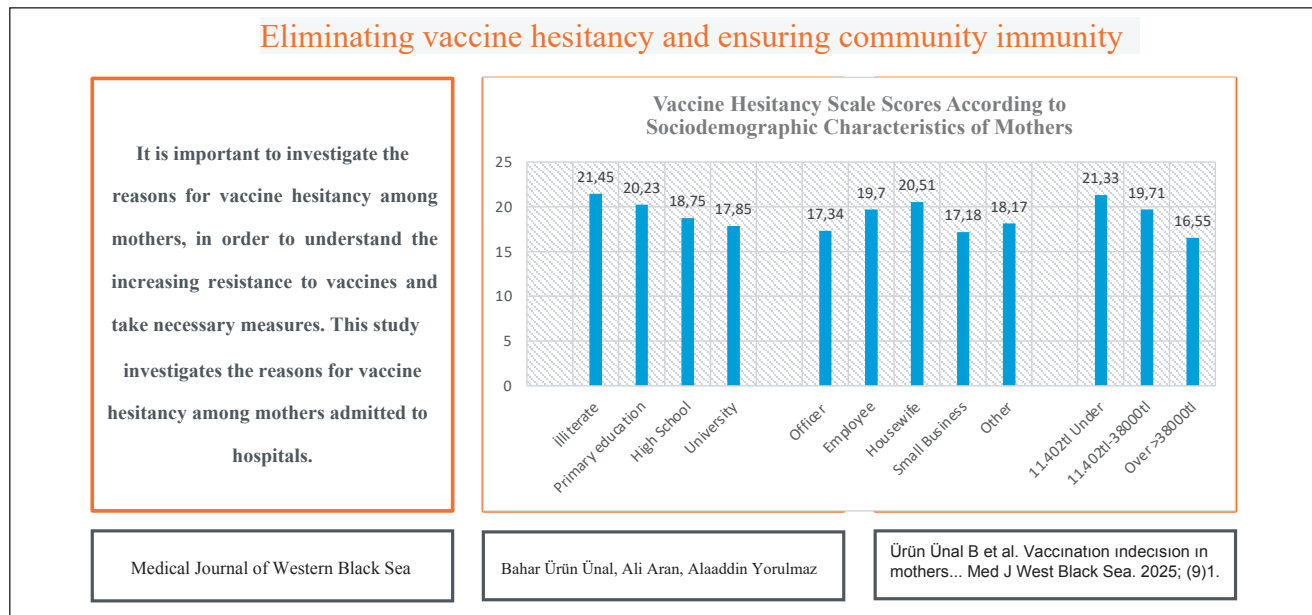
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GRAPHICAL ABSTRACT



ABSTRACT

Aim: Vaccines are one of the most effective methods against diseases today. Vaccine hesitancy, defined as a delay in the acceptance or rejection of vaccines despite the availability of vaccination services, is increasing rapidly worldwide. It is important to investigate the reasons for vaccine hesitancy among mothers, in order to understand the increasing resistance to vaccines and take necessary measures. This study investigates the reasons for vaccine hesitancy among mothers admitted to hospitals.

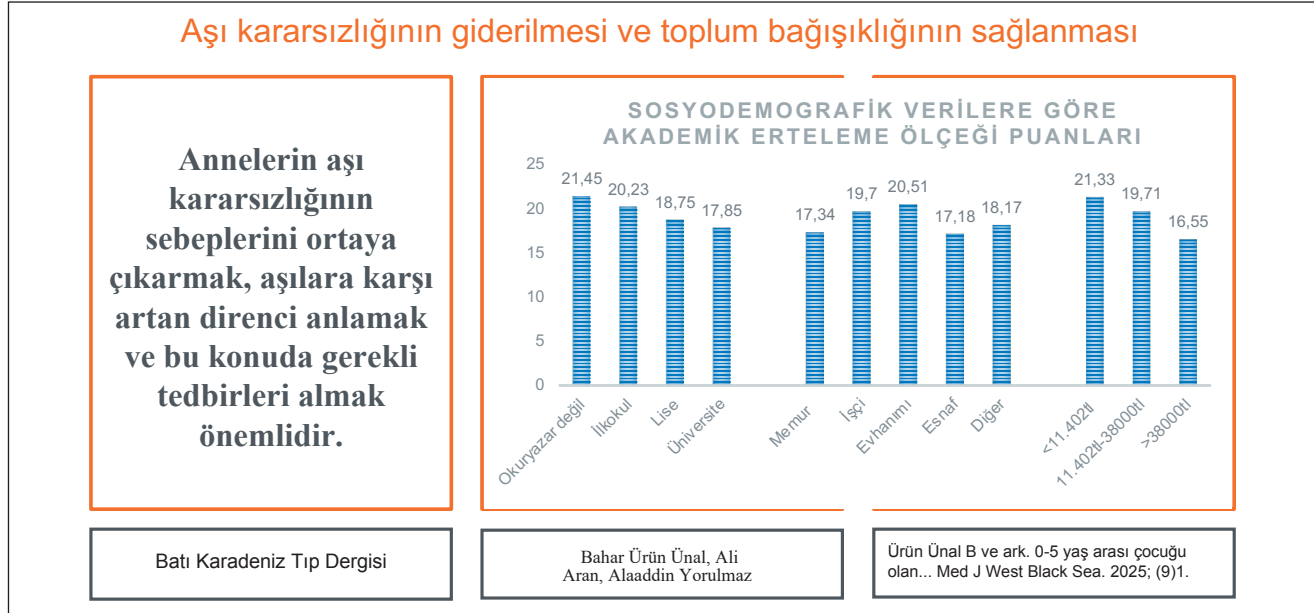
Material and Methods: The Faculty of Medicine Hospital included 250 mothers with children aged 0-5 years, which increased between October-December 2023. The cross-sectional descriptive study literature was scanned and the 10-question survey formula presented was exhausted. In addition, vaccine hesitancy was measured using the 9 question Vaccine Hesitancy Scale.

Results: The study found that the score on the Vaccine Hesitancy Scale increased as the mother's educational status decreased 21.45 ± 8.45 ($p=0.012$). Additionally, the score was higher for mothers who were housewives 20.51 ± 7.09 ($p=0.001$) and for those with lower income levels 21.33 ± 3.72 ($p=0.001$).

Conclusion: It has been determined that vaccine hesitancy may decrease with an increase in the income and educational status of mothers, as well as directing them towards work. These factors may have an impact on the number of unvaccinated individuals in the community.

Keywords: Vaccine hesitation, behavior, attitude

GRAFİKSEL ÖZET



ÖZ

Amaç: Aşılar günümüzde hastalıklara karşı en etkili yöntemlerden birisidir. Aşı hizmetlerinin mevcut olmasına rağmen aşıların kabulünde veya reddinde gecikme olarak tanımlanan aşı kararsızlığı dünya genelinde büyük bir hızla artmaktadır. Annelerin aşı kararsızlığının sebeplerini ortaya çıkarmak, aşılarla karşı artan direnci anlamak ve bu konuda gerekli tedbirleri almak önemlidir. Bu çalışmada hastanelere başvuran annelerin aşı kararsızlığı nedenlerini araştırmak amaçlandı.

Gereç ve Yöntemler: Tıp Fakültesi Hastanesine Ekim-Aralık 2023 tarihlerinde başvuran 0-5 yaş arası çocuğu olan 250 anne dahil edildiği kesitsel tanımlayıcı tipte olan çalışmaya literatür taranarak hazırlanan 10 soruluk anket formu kullanıldı. Ayrıca aşı kararsızlığı, 9 soruluk Aşı Kararsızlığı Ölçeği kullanılarak ölçülmüştür.

Bulgular: Annenin eğitim durumu azaldıkça aşı kararsızlığı ölçeği puanının arttığı 21.45 ± 8.45 ($p=0,012$), ev hanımı annelerin puanının daha yüksek olduğu 20.51 ± 7.09 ($p=0,001$), annenin gelir seviyesi azaldıkça aşı kararsızlığı ölçeği puanının daha yüksek olduğu saptandı 21.33 ± 3.72 ($p=0,001$).

Sonuç: Annelerin gelirinin artırılması, eğitim durumunun yükseltilmesi, çalışma hayatına yönlendirilmesi ile aşı kararsızlığının azalacağı belirlendi. Bu etmenlerin toplumda aşı olmayan kişi sayısına etkili olabileceğini düşünmekteyiz.

Anahtar Sözcükler: Aşı kararsızlığı, davranış, tutum

INTRODUCTION

Vaccines play a crucial role in promoting child health and creating healthy societies. Vaccination programmes are designed to prevent infectious diseases, provide immunisation against them, and reduce mortality and morbidity rates. Public health services strive to achieve individual and social immunity through vaccination, with the goal of maintaining a vaccination rate of at least 95% in the community. Immu-

nisation services are crucial in preventing vaccine-preventable diseases and related disabilities and deaths. They are among the most important and cost-effective public health interventions, both globally and in our country (1).

Childhood immunisation programmes have led to significant reductions in morbidity and mortality among children under 5 years of age. The benefits of immunisation at the community level can only be achieved if a high proportion of children are immunised. Inadequate vaccination in the

community has often been thought to be due to barriers to access to vaccines, but these barriers have now been partially removed. Vaccine instability is recognised as a more important risk factor than access to vaccination (2).

A study analysed the economic impact of vaccines in 73 low- and middle-income countries. The study found that vaccination against 10 vaccine-preventable infectious diseases could prevent approximately 20 million child deaths between 2001 and 2020 and save US\$ 350 billion (3).

In recent years, a movement opposing vaccination has emerged in our country. The number of cases of vaccine refusal, which had previously been insignificant, increased significantly in 2015 following a ruling on the issue of "obtaining parental consent for vaccination". Furthermore, anti-vaccine discourses were frequently featured in the media. The number of families who do not wish for their children to be vaccinated has increased significantly in recent years. While there were 183 such families in 2011, this figure had risen to 980 by 2013, 5,400 by 2015 and 12,000 by 2016. By 2018, the number of cases related to vaccine rejection had reached 23,000. The vaccination rate in Turkey, which was 98% in 2016, decreased to 95.2% in 2012. In 2017, 85 cases of measles were reported across the country, with the number of cases reaching 44 in the first three months of 2018. Consequently, while the incidence of measles was 0.01 per hundred thousand population in 2016, it has increased to 0.10 per hundred thousand today. It would appear that the number of individuals refusing vaccination rises in correlation with the number of measles cases (4).

Although vaccines have been successful, there is a growing trend among some individuals to view vaccination as unsafe and unnecessary. The number of unvaccinated children is increasing due to mothers who are undecided about vaccination. This reluctance to vaccinate is beginning to jeopardise the progress made in eliminating and reducing the impact of many infectious diseases (5).

It is a well-established fact that the number of mothers who are undecided about vaccination is significantly higher than the number of mothers who refuse vaccines altogether. This group of mothers is more likely to change their behaviour as they tend to actively seek information about vaccines. Therefore, it is crucial to have a better understanding of how to effectively communicate with undecided mothers and address their concerns. This is essential for translating the scientific benefits of vaccines into practice. In this study, it is important to determine the basic problems and needs of the target audience before communicating with families. Communication should be based on these factors to increase effectiveness (6). The aim of this study is to examine and evaluate the factors that contribute to the indecision of mothers who are undecided about vaccination.

MATERIALS and METHODS

This cross-sectional study included mothers with children aged 0-5 years who applied to Faculty of Medicine, Pediatrics Outpatient Clinic between October and December 2023 and agreed to participate. In calculating the sample size of the study, a national study examining the knowledge and attitudes of parents towards vaccines was used. 486 patients applied to the outpatient clinic in 3 months. 236 patients who refused to participate in the study and did not meet the conditions were not included. The sample size required to eliminate this situation with vaccine advocacy was calculated as a total of 215 people in the Gpower program at 0.05 alpha and 80% power level. Considering the sample losses, the sample size of 215 was increased by 15% (32.2 people ~ 33 people). The study was planned to include at least 248 people and was completed with 250 people.

A questionnaire was administered through face-to-face interviews to assess mothers' knowledge and attitudes towards childhood vaccines. The questionnaire was developed based on a literature review (7). The participants were asked seven questions regarding their sociodemographic characteristics and non-routine vaccines, including the Rotavirus vaccine, Conjugated Meningococcal vaccine, and Haemophilus influenzae Type b vaccine. Additionally, The Vaccine Hesitancy Scale, A nineteen-question survey was administered.

The criteria for inclusion in the study were determined as: residing in the city center, having at least a high school graduate education level, having a child between the ages of 0-5, being able to speak Turkish, being literate, being 18 years old and over, and being willing to participate in the study. When selecting parents to participate in the study, age, number of children, income level, etc. were not taken into consideration. Mothers who did not agree to participate in the study were not included in the study.

At the time of the study, 1 dollar was equivalent to approximately 28.90 Turkish lira. In Turkey, the minimum wage was determined as 11402 liras at the time of the study. This corresponds to approximately 393 dollars.

The Vaccine Hesitancy Scale was developed by Larson and colleagues in 2015 to compare vaccine hesitancy across countries and to assess the development of this situation over time (8). The validity and reliability study of the scale was conducted by Shapiro et al. (9). The validity and reliability study of the Turkish language was conducted by Önal et al. Önal et al. conducted a study on mothers and fathers with children aged 9-16 and suggested that studies be conducted on other age groups(2). Soysal et al. stated in their study that this scale could also be used on mothers and fathers with children under the five age (10).

The scale consists of 9 items. The scale consists of a five-point Likert type (strongly agree/agree/undecided/disagree/strongly disagree) and two sub-dimensions (lack of trust (items 1,2,3,4,6,7,8) and risks (items 5,9). The lowest score that can be obtained is 9, the highest score is 45. The scale score is calculated by reversing the scores in the lack of confidence (1,2,3,4,6,7,8) sub-dimension, which consists of positive propositions, and the risks (5,9), consisting of negative propositions.) sub-dimension is calculated by adding them directly. It is recommended that the evaluation of the scale be made based on the total score. There is no cut-off point in the scale. An increase in the score obtained from the scale indicates an increase in vaccine hesitancy. The Cronbach's alpha values obtained for the sub-dimensions and the entire scale are 0.892 for lack of confidence, risks and the entire scale, respectively; 0.632 and 0.874 were obtained. In the reliability analysis of the scale, which was conducted according to the test-retest method, the correlation coefficient between the first and last measurement was found to be 0.879.

The study was discussed at the Local Ethics Committee Meeting dated 24.10.2023 and was approved by the local ethics committee (Decision no: 2023/504). All data were evaluated with the SPSS (Statistical Package for Social Sciences) for Windows 21.0 statistical package program. Before the analyses, the suitability of the variables to normal distribution was examined using Q-Q plot and Kolmogorov-Smirnov/shapiro-Wilk tests.

Descriptive statistics were given as frequency, percentages, mean and standard deviation. For variables that meet parametric test assumptions, t-test is used to compare scales between two groups, One Way Anova test is used to compare more than two groups, Mann-Whitney U test is used to compare scales between two groups for variables that do not meet parametric conditions, and Kruskal-U test is used to compare more than two groups. The results were evaluated at the 95% confidence interval.

RESULTS

Table 1 presents the sociodemographic characteristics of the participants. The research found that 152 out of 250 mothers with children aged 0-5 who participated in the study were between the ages of 25-35, accounting for 60.8%. Additionally, 59 mothers (23.6%) were primary school graduates, 60 (24%) were high school graduates, and 120 (48%) were university graduates. The study found that 35.2% (n=88) of the participants were civil servants, while 30.8% (n=77) were housewives. Additionally, 78.4% (n=196) of the participants belonged to nuclear families. The study also revealed that 67.2% (n=168) of the participants had an income between 11,402-38000 TL. Furthermore, 55.6% (n=139) of the participants were mothers or fathers, while 34% (n=85) were mothers or grandmothers who took care of their children.

Table 2 compares the responses given by mothers to the Vaccine Hesitancy Scale. Childhood vaccines are effective for my child's health. Of the 250 mothers with children aged 0-5 who participated in the study, 70% of them strongly agree to the question "Childhood vaccines are important for my child's health." 64% strongly agree to the question "Childhood vaccines are effective." 57.6% of them responded that getting my child vaccinated is important for the health of others in my society. 50.8% of the mothers said that all childhood vaccines provided to our society by the state are beneficial. 33.6% said that they are undecided because new vaccines carry more risks than old vaccines. 35.6% strongly agree to the question "Is the information I receive about vaccines from the vaccination program reliable?" 44.8% of the mothers responded that getting vaccinated is a good way to protect my children from diseases. 38.8% of

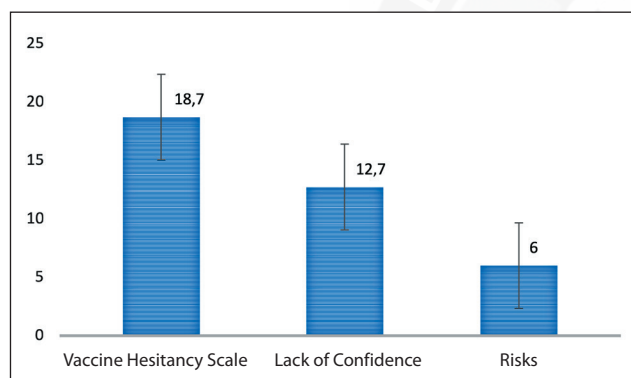
Table 1. Sociodemographic characteristics of participants

Variables *	Findings (n=250)	
Mothers Age		
<25	31	(12.4)
25-35	152	(60.8)
>35	67	(26.8)
Educational status of the mother		
Illiterate	11	(4.4)
Primary Education	59	(23.6)
High School	60	(24)
University	120	(48)
Mothers profession		
Officer	88	(35.2)
Employee	41	(16.4)
Housewife	77	(30.8)
Small Business	16	(6.4)
Other	28	(11.2)
Family type		
Extended Family	196	(78.4)
Nuclear Family	48	(19.2)
Divorced Family	6	(2.4)
Mothers income level		
Under 11.402 TL	6	(2.4)
11.402TL-38000 TL	168	(67.2)
Over >38000 TL	76	(30.4)
Person taking care of the child		
Mother or Father	139	(55.6)
Grandmother or grandfather	85	(34)
Caregiver	18	(7.2)
Other	8	(3.2)

*Data were shown as n (%).

Table 2. Mothers' Responses to the Vaccine Hesitancy Scale (n=250)

Mothers' Responses *	I Totally Disagree	I Disagree	I'm Undecided	I Agree	I Totally Agree
Childhood vaccinations are important for my child's health	6 (2.4)	5 (2.0)	25 (10.0)	39 (15.6)	175 (70.0)
Childhood vaccines are effective	5 (2.0)	7 (2.8)	21 (8.4)	57 (22.8)	160 (64.0)
Getting my child vaccinated is important for the health of others in my community	7 (2.8)	5 (2.0)	37 (14.8)	57 (22.8)	144 (57.6)
All childhood vaccines provided to our society by the government are beneficial	8 (3.2)	13 (5.2)	41 (16.4)	61 (24.4)	127 (50.8)
New vaccines carry more risks than old ones	39 (15.6)	46 (18.4)	84 (33.6)	39 (15.6)	42 (16.8)
The information I receive about vaccines from the vaccination program is reliable	8 (3.2)	21 (8.4)	51 (20.4)	81 (32.4)	89 (35.6)
Getting vaccinated is a good way to protect my children from diseases.	4 (1.6)	15 (6.0)	43 (17.2)	76 (30.4)	112 (44.8)
I usually do whatever my doctor or healthcare professional (midwife, nurse, etc.) recommends about vaccinations for my children.	13 (5.2)	17 (6.8)	46 (18.4)	77 (30.8)	97 (38.8)
I am concerned about serious side effects of vaccines	32 (12.8)	58 (23.2)	73 (29.2)	32 (12.8)	55 (22.0)


Figure 1: Vaccine Hesitancy Scale

*The scale two sub-dimensions lack of confidence and risks. The mean scores of the subscales were found to be lack of confidence=12.7±4.7 and 6.0±2. The median value of lack of confidence is 12.0 and risks is 6.0.

them strongly agreed that I usually do whatever my doctor or auxiliary health personnel (midwife, nurse, etc.) recommend about vaccines for my children. 73% of them stated that they were worried about the serious side effects of vaccines.

Table 3 compares The Vaccine Hesitancy Scale scores based on participants' sociodemographic characteristics. The results show that as the mother's educational level decreases, The Vaccine Hesitancy Scale score increases significantly ($p=0.012$). Mothers with primary education had higher Vaccine Hesitancy scores than those with university education. Additionally, a significant relationship was found between mothers' occupation and vaccine hesitancy score

($p=0.001$). The study found that mothers who were housewives had a higher vaccine hesitancy score compared to mothers who were civil servants. Additionally, the study found a significant relationship between mothers' income level and vaccine hesitancy score ($p=0.001$). Specifically, those with an income level of 11.402-38.000 TL had a higher vaccine hesitancy score than those with an income level greater than 38.000 TL ($p<0.001$). No significant difference was found between the person caring for the child, the mother's age, family type, and vaccine hesitancy score ($p>0.05$).

Figure 1, the average The Vaccine Hesitancy Scale score of the participants was evaluated as 18.7 ± 5.3 . The mean scores of the subscales were found to be lack of confidence = 12.7 ± 4.7 and risks = 6.0 ± 2 . The median value of lack of confidence is 12.0 and risks is 6.0. The minimum and maximum value of Lack of Confidence is between 7-35. The risks were in the range of 2-10. The first quarter of the lack of confidence was 10 and the third quarter was 17. The first quarter of the risks was 5 and the third quarter was 7.

DISCUSSION

Childhood vaccines are crucial in preventing infectious diseases in children. Studies have shown that families often lack sufficient knowledge about childhood vaccines (11), which can lead to delayed or incomplete immunisations (5). This puts children at risk of contracting infectious diseases. Families should be informed about the screening programme and vaccines and should be followed up by relevant healthcare institutions.

Table 3. Vaccine hesitancy scale scores according to sociodemographic characteristics of mothers

Variables	Findings (n=250)	p ^{**}
Mothers age (year±SD)		
<25 years	22.29±6.07	0.231
25-35 years	18.51±5.48	
>35 years	18.73±4.51	
Educational status of the mother		
Illiterate	21.45±8.45	0.012
Primary education ^a	20.23±5.63	
High School	18.75±5.24	
University ^b	17.85±4.66	
Mothers profession		
Officer ^a	17.34±4.38	0.001
Employee	19.70±3.16	
Housewife ^b	20.51±7.09	
Small Business	17.18±3.72	
Other	18.17±4.11	
Family type		
Extended Family	18.68±5.46	0.760
Nuclear Family	19.29±5.02	
Divorced Family	18.33±2.80	
Mother's income level*		
11.402 TL Under	21.33±3.72	0.001
11.402 TL-38000 TL ^a	19.71±5.56	
Over >38000 TL ^b	16.55±4.11	
Person taking care of the child		
Mother or Father	19.38±5.72	0.261
Grandmother or grandfather	17.98±4.97	
Caregiver	18.61±3.75	
Other	17.50±4.00	

* The lower limit and upper limit were determined based on the Turkish Statistical Institute's 2023 minimum wage and average poverty line. **SD**: Standart Deviation, **X**: Mean

******One-way ANOVA, *Post hoc* analysis

In our study, it was observed that vaccine hesitancy increased as the education rate of mothers decreased. There are many studies in the literature similar to our results (5,6,12). In a study conducted by Onsomu et al. in Kenya, it was found that the rate of vaccination increased as the level of education increased in the relationship between the level of education of mothers and completion of vaccination of children.⁵ In a study conducted by Gust et al. in the United States of America in 2001, a positive correlation was found between the increase in the education level of mothers and the completion of immunisations.⁶ In a study conducted by Hadjipanayis et al. in 18 European countries

evaluating the vaccination safety of families, it was found that mothers and fathers with high school graduates and less than high school graduates had higher vaccination instability compared to families with university graduates (12). In contrast to our study, in the study conducted by Gentile et al. on 600 participants in Argentina in 2019, the relationship between vaccine hesitancy and educational status was evaluated significantly. It was concluded that parents with higher education levels had higher vaccine hesitancy (13). It was found that increasing the education level of mothers decreased their ambivalence towards vaccines. Wei et al. found that individuals with low income had a low vaccination rate. However, a study conducted in the United States of America found a correlation between vaccine acceptance and income level, indicating that those with higher incomes may have more difficulty accepting vaccines and may delay vaccination (14,15).

A study conducted in 16 countries, including Turkey, reported that individuals who opposed vaccination were more prevalent in countries with higher income (16). Our study found that ambivalence towards vaccines increased as income level decreased. As with other studies, we observed that difficulties in accessing vaccines may arise, in addition to ambivalence towards vaccines. Increasing income levels can facilitate access to vaccines and decrease ambivalence towards vaccines in direct proportion (17-19).

There may be an inverse relationship between socioeconomic status and vaccine hesitancy, as observed in a study of 614 volunteers in Turkey (17). Difficulties in accessing vaccines, particularly in low- and middle-income countries, have been identified in a publication evaluating 19 studies. This has led to decreased acceptance of vaccination, with some individuals having to wait years to be vaccinated (18). A study evaluating concerns about vaccination in low- or middle-income countries reported concerns about the costs of immunisation services provided by vaccination (19).

According to the results of our study, the Vaccine Hesitancy Scale score was 18,7±5,3. In the study prepared by Aygün and Tortop the mean score of the scale calculated by using all 10 items in the original scale was 2.10±0.36 (20). Due to the limited number of studies conducted with the Vaccine Hesitancy Scale in Turkey, different adaptations, and different number of questions, comparing the mean scores may not show meaningful results. In the study conducted by Çebi and Mandıracıoğlu, The Vaccine Hesitancy Scale was employed to assess vaccine hesitancy among students of vocational schools of health. The resulting vaccine hesitancy score was 32.29 ± 5.1 (21). The findings of the study indicate that students exhibit vaccine hesitancy. In the study conducted with the participation of university students in Mersin, the vaccine hesitancy scores were found to be 21.10 ± 5.3 (22). The results of the study indicated that

the vaccine hesitancy scale scores were lower than those observed in previous studies. The lower scores observed in our study can be attributed to several factors. Firstly, the medical faculty hospital in question is located in the city centre, which may have influenced the results. Secondly, the study was conducted in a single centre, which may have introduced a degree of bias. Thirdly, families may have social, cultural and personal differences, which could have affected the results.

In a similar study, 4.2% of the participants he answered the question "vaccinations are important for his health" by saying "I strongly disagree." In our study, it was 4.4%. It is seen that 5% of the participants stated that getting vaccinated is not important for the health of other people in the society. It is seen that it is 4.8% in our study. It was understood that 18.1% of the participants thought that all vaccines in the vaccination program offered to the society by the state were beneficial. It was determined that 75.2 in our study. 25.8% of the students stated that the new vaccines were more risky than the old vaccines. It was evaluated as 34.2 in our study. 38.1% of the participants reported that they found the information they received about vaccines credible and reliable. This rate was evaluated as 68% in our study. It was determined that 63.4% of the participants saw getting vaccinated as a good way to protect themselves from disease. It was evaluated as 75.2 in our study. 65.7% of the participants reported that they generally followed the recommendations of their doctor or health institution about vaccines. It was 69.6 in our study. It was understood that 31.2% of the students thought that vaccines had serious side effects. It was observed that it was 34.8 in our study (23).

The small number of studies conducted in Turkey made it difficult to compare the scale score. Furthermore, it should be noted that one of the limitations of the study is that the data is based on personal declarations. The routine vaccination schedule of the Ministry of Health was not included. Therefore, no information was provided about non-routine vaccination. Since the mothers' ages were asked in categories, the mean or median was not determined.

This study evaluates the factors that contribute to mothers' hesitancy towards childhood vaccines and their willingness to receive non-routine childhood vaccines. The importance of full childhood vaccinations in protecting children against infectious diseases is well-established. The study findings indicate that vaccine hesitancy increases as the education level of mothers decreases. Increasing the education level of mothers can reduce vaccine hesitancy and increase vaccination rates in society. However, vaccine hesitancy is more common among housewives than civil servants. Additionally, a mother's income level can also be a factor in vaccine hesitancy. As income levels decrease, mothers

become more hesitant towards vaccines. However, increasing their income and creating employment opportunities for housewives can reduce this hesitancy and increase demand for vaccines. Access to vaccines has also improved in recent years, leading to higher vaccination rates in society. It is important to investigate the reasons for mothers' hesitancy and offer solutions to improve herd immunity. Solution suggestions in the form of advertisements and banners can be created to raise awareness among families about non-routine vaccinations. Solution suggestions in the form of advertisements and banners can be created to raise awareness among families about non-routine vaccinations. Contacting families and providing them with information can also be helpful. This will increase the vaccination rate and ensure community immunity against infectious diseases.

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Author Contributions

Concept: **Bahar Ürün Ünal, Ali Aran, Alaaddin Yorulmaz**, Design: **Bahar Ürün Ünal, Ali Aran, Alaaddin Yorulmaz**, Data Collection or Processing: **Bahar Ürün Ünal, Ali Aran, Alaaddin Yorulmaz**, Analysis or Interpretation: **Bahar Ürün Ünal, Ali Aran, Alaaddin Yorulmaz**, Literature search: **Bahar Ürün Ünal, Ali Aran, Alaaddin Yorulmaz**, Writing: **Bahar Ürün Ünal, Ali Aran, Alaaddin Yorulmaz**, Approval: **Bahar Ürün Ünal, Ali Aran, Alaaddin Yorulmaz**.

Conflicts of Interest

The authors declare that there is no conflict of interest.

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Ethical Approval

The study has been approved by Selçuk University Ethics Committee (approval number: 2023/504).

Review Process

Extremely and externally peer-reviewed and accepted.

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