# VACCINE-HESITANT FAMILIES ARE MORE SUSCEPTIBLE TO VERBAL COMMUNICATION MESSAGING

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**SUMMARY**

*Objectives:* Our survey aims to highlight parents' and healthcare workers' opinions and hesitations regarding children's vaccination, identify the main factors influencing these opinions, and assess the impact of hesitations on immunisation for children, included in the National Immunisation Programme in Lithuania.

*Methods*: We used the questionnaire developed by the European Academy of Paediatrics Research in Ambulatory Settings Network (EAPRASnet). This questionnaire is designed to assess attitudes toward vaccination. The study involved parents raising children aged 1–4 years and primary healthcare providers (paediatricians, family doctors and nurses).

*Results:* We analysed the completed questionnaires from a total of 329 parents (142 fathers, 187 mothers) and 386 medical personnel (150 physicians, 236 nurses). Most parents expressed positive opinions about vaccines (> 8 points out of 10 possible), with older parents exhibiting more favourable attitudes. Compared to mothers, fathers showed more criticism regarding the information provided by physicians ($p = 0.04$). Family doctors and paediatricians were more supportive of vaccination than nurses and homoeopaths ($p < 0.001$). Parents and healthcare providers with higher education showed statistically significantly stronger opinions about the benefits of vaccines than those with lower education levels ($p = 0.01$ for parents, $p < 0.001$ for physicians and nurses). The Internet was identified as the primary source of negative information for both parents (69.6%) and healthcare providers (86%). However, verbal information received from medical staff during patient consultations or informal conversations among colleagues had the greatest impact on parents' opinions (17.3%) and medical personnel (35.5%).

*Conclusions:* Confidential conversations with physicians and nurses remain the most trustworthy sources of information and influential factors shaping opinions. The Internet serves as the primary source of inaccurate information about vaccinations for both parents and medical professionals, although verbal information from primary healthcare providers has a more significant impact on vaccination attitudes. Discrepancies in basic education and specific knowledge about vaccination within the same family can pose additional obstacles to child vaccination.

*Key words:* vaccines, vaccination rate, children, parents, primary health care, EAPRASnet, Lithuania

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## INTRODUCTION

For a considerable period, Lithuania maintained consistent and satisfactory immunisation rates. However, since 2010, there has been a decline in immunisation rates. This pattern has also been observed throughout Europe (1). Although the decline may be relatively small, it has the potential to significantly impact the prevalence of vaccine-preventable diseases and, in the long run, lead to outbreaks of invasive *Haemophilus influenzae* type b disease, measles, pertussis, varicella, and pneumococcal disease (2). To prevent outbreaks, it is necessary to achieve a vaccination coverage rate of at least 95% (3). Lithuania has the highest vaccination rate for vaccines administered in hospitals after childbirth. However, other vaccinations are often delayed or not administered at all. The *Meningococcus B* (MenB) vaccine (74.2%) and the human papillomavirus (HPV) vaccine (77.2%) have the lowest vaccination rates (4). Both vaccines were recently added to the immunisation schedule in 2015 and 2018, respectively.

Ensuring timely vaccination is not only crucial, but it is also essential for preventing certain diseases that can be particularly deadly or easily contracted at specific ages. For example, early immunisation prevents two to three million infant deaths worldwide annually (5). Unfortunately, in 2018, children and newborns did not receive adequate vaccine coverage to effectively combat

infectious diseases. According to the World Health Organization, an estimated 19.4 million infants and toddlers did not receive the recommended immunisations in 2018 (6). Vaccines have become victims of their own success as the benefits they provide have become less tangible. Some vaccine-preventable diseases have become so rare that parents are unaware of their potential dangers or long-term effects (7). Vaccine hesitancy manifests as delays in vaccination, partial rejection, or outright immunisation refusal (3). Understanding the impact on hesitant parents is crucial. Rather than completely rejecting all vaccinations, many parents in this group opt for partial vaccination for their children. This group is significantly larger than those who outright reject vaccinations (8).

It is challenging to expect parents to fully vaccinate their children when even healthcare specialists have doubts about the necessity and effectiveness of vaccinations. In countries like the United States, Canada, Israel, Japan, Spain, and Switzerland, only 65% of healthcare specialists would choose to vaccinate their children against COVID-19 (9).

This article aims to examine the beliefs and concerns held by parents and healthcare professionals regarding the immunisation of children and to identify the key factors that influence these beliefs. Additionally, this study aims to compare vaccination-related hesitancy between mothers and fathers and between doctors and nurses, providing insight into potential discrepancies for the first time.

## MATERIALS AND METHODS

This research project consists of two parts. The initial phase was conducted between December 2017 and May 2018. A total of 550 questionnaires were distributed to parents in Vilnius, the capital of Lithuania, and Kaisiadorys, a rural district centre, who were raising children between the ages of 1 and 4 years. Of these, 376 (68.4%) questionnaires were returned, while 47 (8.5%) were rejected due to missing information. Ultimately, 329 (59.8%) questionnaires were included in the analysis. We used the questionnaire developed by the European Academy of Paediatrics Research in Ambulatory Settings Network (EAPRASnet) in order to collect data on various aspects, such as the age, gender, level of education of family members, the number of children in the household, and attitudes towards immunisation (10).

The study's second phase took place in Vilnius from January to March 2020. A total of 386 primary healthcare providers, including paediatricians, family doctors, and nurses, were surveyed. They were asked questions about their occupation, age, gender, and primary sources of vaccine information, including negative ones, using a modified version of the EAPRASnet questionnaire.

All the gathered information was analysed. A significance level of $p \leq 0.05$ was used to determine the significance of differences between the compared groups. Statistical analysis was performed using SPSS 22.0 software. The data were analysed using various techniques, including descriptive statistics, linear and logistic regression, correlation analysis, multiple comparisons, and analysis of variance (ANOVA) tests.

## RESULTS

The survey sample of parents consisted of 187 women (56.8%) and 142 men (43.2%). Among them, 284 (86.3%) were married and 45 (13.7%) were single. The average age of the parents was 34.45 years.

Most parents expressed a positive attitude towards vaccination, rating it an average of 8.15 out of 10 points (SD±2.25). They rated vaccination as highly useful, scoring 8 points or higher out of possible 10 points. Furthermore, they did not refuse vaccination for reasons other than illness and expressed a willingness to have their future child vaccinated according to the national calendar. Almost all parents sought advice from a family doctor or paediatrician regarding their child's health (Table 1).

After conducting the statistical analysis, we found that parents with different levels of education held diverse viewpoints. The majority of parents, 237 (72%), had a higher education, whether they attended a university or a non-university institution. Table 2 presents the statistically significant differences. According to the survey findings, individuals with lower levels of education were more inclined to believe that vaccinations are unnecessary for diseases that are not currently widespread. Additionally, they preferred children to develop immunity through illness rather than vaccination.

A considerable proportion of parents, both with higher education (one-third) and without higher education (half), question the advantages of vaccination in statistically significant numbers. Interestingly, parents with higher education exhibit a lower tendency to trust the advice of medical professionals while simultaneously expressing a stronger belief in the vital role of vaccinations for their child's health. They prioritise vaccinating their children for reasons beyond simply enabling them to attend kindergarten.

There were disagreements among parents regarding their viewpoints. However, it is noteworthy that both parents generally follow the recommendations of medical professionals ($p = 0.044$). While most fathers assert that not all vaccinations listed on the national immunisation schedule are vital, most mothers believe that all vaccines included in the calendar are crucial. However, mothers are more inclined to believe that their children do not

***Table 1.*** *Parents' answers to questions that help evaluate their approach to vaccination*

| Issues related to trust in vaccines | Parents | |
|---|---|---|
| | n | % |
| Parents whose approach towards the usefulness of vaccination is positive (8 points and more out of 10 possible points) | 250 | 76.0 |
| Parents who, after having another child, would like to have him/her vaccinated according to the national calendar | 295 | 89.7 |
| Parents who have not refused vaccination for a reason other than illness | 296 | 90.0 |
| Parents who have applied to a family doctor or paediatrician regarding their child's health | 328 | 99.7 |

***Table 2.*** *Parents' answers to questions evaluating their approach to vaccination depending on education (N = 329)*

| Questionnaire questions | With higher education: answered "yes" n (%) | Without higher education: answered "yes" n (%) | p-value |
|---|---|---|---|
| I would like children to be vaccinated at an older age | 36 (15.2) | 14 (15.2) | 0.014 |
| My child does not need vaccination against diseases that are not common today | 46 (19.4) | 19 (20.7) | 0.002 |
| It is better for my child to gain immunity after being sick than to get vaccinated | 38 (16.0) | 14 (15.2) | 0.002 |
| Vaccination of my child/children is important for the health of other members of the community | 155 (65.4) | 24 (26.1) | 0.003 |
| Do you doubt the benefits of vaccination? | 108 (45.6) | 15 (16.3) | 0.023 |
| Vaccines are important to my child's health | 162 (68.4) | 31 (33.7) | 0.013 |
| The only reason I vaccinate my child is for him/her to be able to attend a kindergarten or school | 18 (7.6) | 13 (14.1) | 0.001 |

need to be immunised against illnesses that are currently not widespread.

Parents who have chosen not to immunise their children at least once tend to assess the advantages of vaccination less favourably than other parents. Table 3 presents the statistically significant differences.

Parents over 25 years old tend to rate the effectiveness of vaccination the highest, while parents under 25 tend to assess it less favourably. Additionally, parents with only one child tend to rank the effectiveness of vaccination lower compared to parents with two or more children.

The evaluation of vaccines was found to be significantly influenced by visits to specialists: parents who have sought the advice of a homoeopath at least once tend to rate the effectiveness of vaccination particularly poorly, whereas parents who have not sought such advice tend to assess the advantages of vaccines considerably more favourably. Moreover, parents who consulted a paediatrician for advice on their child's health tended to rate vaccinations favourably (Fig. 1).

Nearly all parents have encountered negative remarks about vaccinations at some point. The Internet serves as the primary source of this misinformation, with very few parents having heard it directly from a healthcare provider. Interestingly, respondents who have received unfavourable comments from medical professionals tend to rate the effectiveness of vaccination significantly lower than those who have encountered such information online.

***Table 3.*** *Parental approach to vaccination depending on their refusal of children's vaccination without any medical reason (N = 329)*

| Questionnaire questions | Refused vaccination without medical reason: answered "yes" n (%) | Not refused vaccination without medical reason: answered "yes" n (%) | p-value |
|---|---|---|---|
| If you had another child today, would you like him/her to be vaccinated according to the national vaccination plan? | 2 (7.4) | 241 (81.1) | 0.001 |
| I would like children to be vaccinated at an older age | 14 (51.9) | 54 (18.2) | 0.001 |
| My child does not need vaccination against diseases that are not common today | 17 (63.0) | 67 (22.6) | 0.001 |
| It is better for my child to gain immunity after being sick than to get vaccinated | 20 (74.0) | 60 (20.2) | 0.001 |
| It is better for my child to have fewer vaccines during one visit | 24 (88.9) | 165 (55.6) | 0.027 |
| Vaccination of my child/children is important for the health of other members of the community | 8 (29.6) | 234 (78.8) | 0.001 |
| The information I receive about vaccines in the national vaccination calendar is reliable | 3 (11.1) | 184 (62.0) | 0.001 |
| Do you doubt the benefits of vaccination? | 25 (92.6) | 92 (31.0) | 0.001 |
| I usually do not do what my healthcare professional recommends to me | 4 (14.8) | 247 (83.2) | 0.001 |
| Vaccines are important to my child's health | 10 (37.0) | 245 (82.5) | 0.001 |
| The only reason I vaccinate my child is for him/her to be able to attend a kindergarten or school | 6 (25.0) | 39 (13.2) | 0.001 |
| All vaccines in the national vaccination calendar are important | 2 (7.4) | 208 (70.0) | 0.001 |
| Have you ever read or heard negative information about vaccination? | 27 (100.0) | 266 (89.9) | 0.017 |

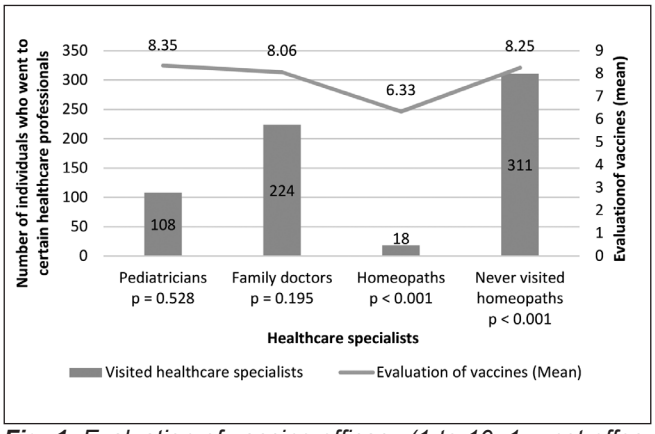


***Fig. 1.*** *Evaluation of vaccine efficacy (1 to 10, 1 – not effective, 10 – very effective) depending on the visited healthcare specialist.*

P-value is used to compare groups who have visited a certain healthcare professional to those who have never visited him.

Consequently, consultations with medical professionals remain the primary sources of reliable information and opinion leaders (Fig. 2).

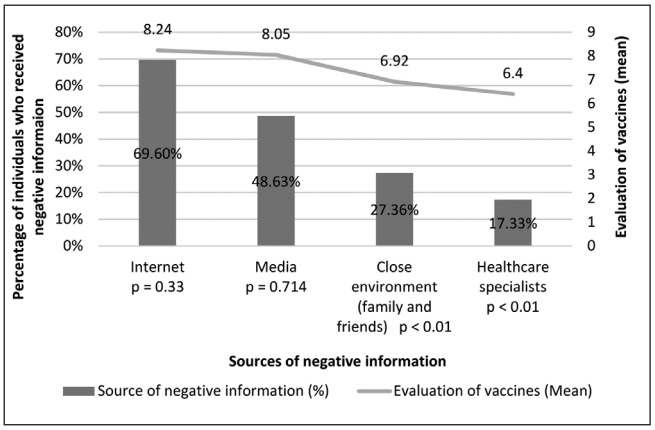


***Fig. 2.*** *Evaluation of vaccine efficacy (1 to 10, 1 – not effective, 10 – very effective) between parents depending on the source of negative information on vaccination.*

P-value is used to compare groups who have received negative information from this source to those who have never received negative information from this source.

The group of medical workers consisted of 380 (98.5%) females and six (1.6%) males. The age range of medical professionals varied from 20 to 65 years (mean 36 ± 10.28 years). Of the respondents, 236 (61.1%) were nurses, 106 were paediatricians, and 44 were general practitioners. Doctors were more likely than nurses to recommend paid vaccines, which are not mandatory – 123 (82%) doctors, 124 (52.5%) nurses, p = 0.022. The majority of doctors, 65 (69.1%) out of 94, had their own children vaccinated against the flu regularly or irregularly. In contrast, a larger percentage of nurses, 77 (48.1%) out of 160, did not vaccinate their children against the flu (p = 0.001). Nurses had a higher tendency to express agitation against vaccination – 2 (1.3%) doctors, 19 (8.1%) nurses, p = 0.004, and to voice opposition to mandatory immunisation – 7 (4.7%) doctors, 20 (8.5%) nurses, p = 0.153.

On at least one occasion, 87 (58%) doctors and 108 (45.8%) nurses had discussions with parents who strongly opposed vaccinations. Doctors are more inclined to acknowledge the advantages of vaccination and the safety, efficacy and importance of all the vaccinations included in the national vaccination schedule. They are also more likely to recognise the critical role of vaccination in maintaining the community's overall health. Table 4 presents the statistically significant comparisons.

Respondents who received negative information about vaccination from their colleagues, whether doctors or nurses, tended to rate the effectiveness of vaccines the lowest. Similarly to the parental opinion survey, the immediate surroundings of the respondents (such as family, friends, and relatives) served as the second source of unfavourable information, although not in terms of quantity but rather the impact on their opinions. Healthcare professionals who encountered negative information about vaccination from their colleagues displayed lower opinions regarding the effectiveness of vaccines and the value of the national immunisation programme (Fig. 3).

## DISCUSSION

In European countries, healthcare specialists significantly influence parents' opinions regarding immunisation. We administered the same validated questionnaire from the EAP that we used in the first phase of our study to parents raising children between the ages of 1 and 4 in 18 different European countries.

***Table 4.*** *Medical professionals' responses to questions reveal how they view vaccinations based on their occupation (N = 386)*

| Questionnaire questions | Nurses answered "yes" n (%) | Doctors answered "yes" n (%) | p-value |
|---|---|---|---|
| If you had another child today, would you like him/her to be vaccinated according to the national vaccination plan? | 199 (84.3) | 143 (95.3) | 0.01 |
| I would like children to be vaccinated at an older age | 40 (16.9) | 9 (6.0) | 0.001 |
| My child does not need vaccination against diseases that are not common today | 33 (14.0) | 4 (2.7) | 0.001 |
| It is better for my child to gain immunity after being sick than to get vaccinated | 37 (15.7) | 5 (3.3) | 0.001 |
| It is better for my child to have fewer vaccines during one visit | 143 (60.6) | 51 (34.0) | 0.001 |
| Vaccination of my child/children is important for the health of other members of the community | 221 (93.6) | 149 (99.3) | 0.018 |
| Do you doubt the benefits of vaccination? | 0 (0.0) | 0 (0.0) | 0.001 |
| All vaccines in the national vaccination calendar are important | 205 (86.9) | 146 (97.3) | 0.002 |

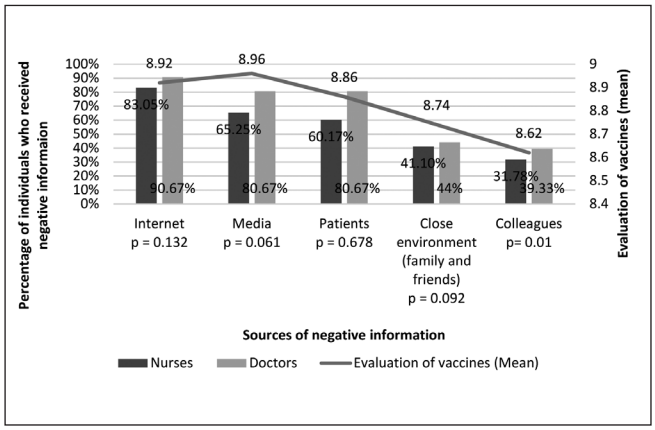


***Fig. 3.*** *Evaluation of vaccine efficacy (1 to 10, 1 – not effective, 10 – very effective) between healthcare specialists depending on sources of negative information.*

P-value is used to compare groups who have received negative information from this source to those who have never received negative information from this source.

Incorporating our survey findings, the overall statistics revealed that approximately 56% (N=3,212) of parents have no doubts about the advantages of vaccinations (in Lithuania, this percentage is 63.8%). Portugal and Cyprus exhibit the highest vaccination confidence among European countries, while Bulgaria and Poland have the lowest. A healthcare professional's advice on vaccination is a key factor in determining whether a vaccine will be accepted (3). Compared to parents whose child's doctor is paediatrician, parents consulted by family doctor express greater reservations about the value of immunisation ($p<0.05$). However, the significantly highest level of mistrust is associated with consultation of homoeopaths as a main source for decision making (10).

Furthermore, a Lithuanian study found that healthcare professionals significantly influence the perception of vaccine usefulness: those who consult homoeopaths rate the utility of vaccines at 6.33 out of 10, compared to 8.25 for those who have never sought homoeopathy and 8.35 for parents who visit paediatricians for their child's health issues. While doctors have a significant impact on parental views and play a crucial role in shaping attitudes towards vaccines, another study shows that the influence of internet media on these sentiments is also noteworthy (11). Hence, the availability and quality of information provided by medical professionals are crucial factors in determining whether a child will be vaccinated or not (12). The majority of respondents (77.8%) from the first phase of the study indicate that they trust healthcare professionals regarding vaccines.

However, virtually all parents have encountered false information on vaccinations, mostly online, in the media, from friends or family, and at least once from a medical expert. It is important to note that when information from social media sources is critically evaluated, individuals who have heard it tend to rate vaccinations favourably (8.24 out of 10), but when they receive unfavourable information from healthcare specialists, their rating of the vaccine decreases (6.40 out of 10). Thus, the role of healthcare professionals is undeniable in Lithuania and throughout Europe, as research underscores their significant influence on parents' attitudes towards vaccinations. According to the respondents in the study, a considerable percentage of parents (17%) immunise their children solely to meet the requirements for kindergarten admission. One could argue that immunising children due to their attendance at preschool educational facilities benefit the health of the entire Lithuanian community, as increased immunisation rates prevent the spread of infectious diseases and associated outbreaks. Currently, there are nine vaccines in the Lithuanian preventive vaccination calendar for children under the age of 4 (13, 14). The findings indicate a lack of knowledge in our community about the benefits of vaccinations and the potential problems that can arise without immunisation. Nineteen percent of parents mentioned that they do not believe their children need vaccinations against uncommon diseases. However, at least 95% of the population must be immunised to effectively eliminate the disease and halt its transmission. This prevents the disease from spreading and ensures that the virus does not mutate, thus preventing illness in those who have received vaccinations (15). For example, data from the Lithuanian Centre for Communicable Diseases and AIDS shows that measles vaccination rates in Lithuania were approximately 95% from 2003 to 2010. Since 2003, only sporadic measles cases have been reported, with an estimated annual incidence of 0.25 cases per 100,000 people in 2012. However, the immunisation rate has decreased to 93% since 2011, and measles outbreaks have been observed in Lithuania, with a total of 35 cases in 2013, 50 cases in 2015, and 834 cases in 2019 (16). In Lithuania, the pertussis vaccination rate dropped below 95% in 2010, and more cases of the disease were reported in 2012 and 2013 (0.51 and 0.22 cases per 10,000 people, respectively). The first death from pertussis infection in Lithuania in the past ten years occurred in 2012; the infant was six months old and had not received a single shot of the pertussis vaccine (17).

Unfortunately, the findings of our study demonstrate that visible outbreaks of infectious diseases caused by parental attitudes against vaccination are not unexpected; up to 24.6% of respondents believed that their children's immune system response was stronger after contracting the disease than after vaccination, and up to 21% of respondents would prefer their children to receive vaccinations at an older age. However, it is crucial to remember that some diseases, such as poliomyelitis, pertussis, tuberculosis, hepatitis B, and diphtheria, become extremely hazardous at a young age since the risk of complications increases with early infection, and the possibility of fatal outcomes also rises (18). It is essential to educate parents about the immunisation schedule and vaccination dates to prevent any gaps in knowledge. Parents should also be adequately convinced of the importance of their child receiving the recommended immunisations on time. There is a critical need for evidence-based information among parents of preschoolers in Lithuania. The influence of parental education on children's opinions about vaccination is significant. More than half of parents with lower education (55.7%) and over a third (38.8%) of parents with higher education have doubts about the benefits of vaccination. More educated individuals tend to be more interested in evidence-based information, critically examine the facts they come across, and are less inclined to read or trust non-evidence-based material or misconceptions. Additionally, respondents with higher education tend to rate the benefits of vaccinations more favourably (8.25 out of 10) than those with lower education (7.89 points). However, parents with higher education are almost twice as likely to admit that they resist a healthcare professional's advice. Therefore, it is important to consider the level of understanding of parents and choose the most effective

methods for helping them process the information when discussing vaccination with them.

When examining the perspectives of physicians and nurses on vaccines, it becomes evident that doctors are dedicated to improving the population's immunisation rate. They are more inclined than nurses to recommend additional vaccinations, particularly those that are not mandatory (82% always advise additional vaccinations, 14.7% advise but not always, and only 3.3% advise against it). In comparison, nurses percentages are 52.5%, 40.7%, and 6.8%, respectively. Consequently, most physicians strive to achieve the widest possible immunisation coverage, going beyond the vaccines listed on the National Immunization Calendar. These proactive measures taken by medical professionals play a crucial role in reducing the incidence of preventable infectious diseases, minimising morbidity and mortality rates, and enhancing overall public health standards.

In addition to promoting immunisations for their patients, doctors are more likely to lead by example. A larger percentage of doctors regularly or occasionally vaccinate their children against influenza, although a quarter of them still choose not to (51.7%, 23% and 25.3%, respectively). Regrettably, only a small percentage of nurses (approximately a third) frequently vaccinate their children, fewer sporadically, and the majority do not vaccinate their children (30%, 18.1% and 51.9%, respectively). For instance, the Lithuanian Centre for Communicable Diseases and AIDS reports a high incidence of influenza, which could potentially be reduced by expanding vaccination coverage. It is crucial, particularly for healthcare professionals, to set an example for the public by vaccinating their own children, as the first part of the study revealed that the opinions of healthcare professionals play a significant role in parents' decisions regarding vaccination. Therefore, incentives and evidence-based information are necessary to encourage medical professionals to vaccinate their children against influenza. To promote influenza vaccination among both medical professionals and the general population, incentives and evidence-based information are essential.

One of the most notable findings of the study is that when negative information about vaccinations originates from medical experts rather than from the media or the Internet, all respondents – nurses, physicians, and parents – tend to overestimate its significance. Therefore, it is crucial to focus on providing physicians and nurses with specialised training not only on the benefits of immunization, but also on the ability to communicate with the families on this rather hot topic. Ensuring the dissemination of high-quality research, as emphasised in a publication by the EAP, is of utmost importance. Bias can undermine the validity of treatment findings, breach ethical standards, and waste time, money, and resources in research (19).

## CONCLUSIONS

Confidential conversations with medical professionals remain the most trustworthy sources of information and influential factors shaping opinions. The Internet serves as the primary source of inaccurate information about vaccinations for both parents and medical professionals, although verbal information from primary healthcare providers has a more significant impact on vaccination attitudes. The differences in perceived vaccination benefits between mothers and fathers with varying levels of education can build additional obstacles in the way to family consensus on vaccination issues.

**Conflicts of Interest**
None declared

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