

## ORIGINAL STUDY

DOI: <https://doi.org/10.17816/KMJ656082> EDN: RKVKRK

# Vaccination Adherence Among Parents of Preschool-Aged Children

Nadezhda A. Gerasimova<sup>1</sup>, Gulshat R. Khasanova<sup>2</sup>, Nikolay V. Saperkin<sup>3</sup>,  
Lyudmila P. Mamchits<sup>4</sup>, Sabiyat G. Magomedalieva<sup>5</sup>

<sup>1</sup>Office of Rospotrebnadzor for the Nizhny Novgorod region, Nizhny Novgorod, Russia;

<sup>2</sup>Kazan State Medical University, Kazan, Russia;

<sup>3</sup>Privolzhsky Research Medical University, Nizhny Novgorod, Russia;

<sup>4</sup>Gomel State Medical University, Gomel, Belarus;

<sup>5</sup>Dagestan State Medical University, Makhachkala, Russia

## ABSTRACT

**BACKGROUND:** Nonadherence to vaccination in the general population poses a major obstacle to achieving epidemiological well-being.

**AIM:** To assess vaccination adherence among parents of preschool-aged children in selected cities in Russia and Belarus.

**MATERIAL AND METHODS:** A cross-sectional descriptive study was conducted using an anonymous online survey administered to parents whose children attended preschool institutions in Almetyevsk, Kazan, Makhachkala, Nizhny Novgorod, and Rybnoye in Russia and Gomel in Belarus. The questionnaire included 16 items with single or multiple response options. Overall, 801 participants were surveyed. Statistical analysis was performed using R 4.3.1 (RStudio). Proportions with 95% confidence intervals and standard errors ( $P \pm p$ ) were calculated. The independent-sample t-test was used for normally distributed variables and the Mann–Whitney U test and Kruskal–Wallis test for asymmetrically distributed variables.

**RESULTS:** A positive attitude toward vaccination was reported by  $76.2 \pm 11.7\%$  of respondents (range across cities: 56%–91%). The main motivations for vaccinating children were protection against serious infections ( $68.8\% \pm 7.3\%$ ), concern about access to educational institutions ( $16.2\% \pm 9.6\%$ ), and recommendations from healthcare providers ( $9.1\% \pm 5.8\%$ ). Negative attitudes were identified in some parents, including fear of adverse reactions (13.5%), concerns about vaccine safety (8.3%), and the belief that children should only be vaccinated against the most dangerous diseases (9.1%). Furthermore, 47.6% of the respondents expressed interest in receiving additional information about vaccination. The preferred sources of information were consultations with pediatricians (78.3%), printed educational materials (28.3%), dedicated websites (23.2%), lectures on clinic websites (17.2%), and hotline consultations (15%). Only 11.9% of the respondents favored information obtained through social media.

**CONCLUSION:** Some parents of preschool-aged children in Russia and Belarus demonstrate negative attitudes toward vaccination. Parents show a strong willingness to receive information from healthcare professionals.

**Keywords:** vaccination adherence; vaccine hesitancy; health education; infectious disease prevention.

## To cite this article:

Gerasimova NA, Khasanova GR, Saperkin NV, Mamchits LP, Magomedalieva SG. Vaccination adherence among parents of preschool-aged children. *Kazan Medical Journal*. 2025;106(3):465–473. DOI: 10.17816/KMJ656082 EDN: RKVKRK

ОРИГИНАЛЬНОЕ ИССЛЕДОВАНИЕ

DOI: <https://doi.org/10.17816/KMJ656082> EDN: RKVKRK

## Приверженность вакцинации у родителей детей дошкольного возраста

Н.А. Герасимова<sup>1</sup>, Г.Р. Хасанова<sup>2</sup>, Н.В. Саперкин<sup>3</sup>, Л.П. Мамчиц<sup>4</sup>, С.Г. Магомедалиева<sup>5</sup><sup>1</sup> Управление Роспотребнадзора по Нижегородской области, г. Нижний Новгород, Россия;<sup>2</sup> Казанский государственный медицинский университет, г. Казань, Россия;<sup>3</sup> Приволжский исследовательский медицинский университет, г. Нижний Новгород, Россия;<sup>4</sup> Гомельский государственный медицинский университет, г. Гомель, Беларусь;<sup>5</sup> Дагестанский государственный медицинский университет, Махачкала, Россия

### АННОТАЦИЯ

**Актуальность.** Недостаточная приверженность населения вакцинации — серьёзное препятствие в достижении эпидемиологического благополучия.

**Цель.** Изучение приверженности родителей детей дошкольного возраста к вакцинации в городах России и Беларуси.

**Материал и методы.** Проведено поперечное описательное исследование с использованием анонимного онлайн-анкетирования родителей, чьи дети посещают дошкольные образовательные учреждения в городах Альметьевск, Казань, Махачкала, Нижний Новгород, Рыбное (Российская Федерация) и Гомель (Республика Беларусь). Анкета включала 16 вопросов с одним или несколькими вариантами ответов. Опрошен 801 человек. Статистический анализ проведён в среде R 4.3.1 (RStudio). Рассчитывали интенсивные показатели (доли) с 95% доверительным интервалом и стандартные ошибки долей ( $P \pm p$ ). Для сравнений использовали  $t$ -критерий для независимых выборок при условии нормального распределения, критерии Манна–Уитни и Краскела–Уоллиса применяли в независимых выборках с асимметричным распределением.

**Результаты.** Положительное отношение к вакцинации демонстрируют 76,2±11,7% опрошенных (от 56 до 91% родителей в разных городах). Мотивами для вакцинации детей являются: защита от опасных инфекций (68,8±7,3%), боязнь не быть принятыми в образовательные учреждения (16,2±9,6%), требование медицинских работников (9,1±5,8%). У части родителей выявлены негативные установки: страх побочных реакций (13,5%) и неуверенность в безопасности вакцин (8,3%); убеждение в том, что достаточно прививать ребенка «только от опасных инфекций» (9,1%) и др. В получении дополнительной информации о прививках высказали желание 47,6% опрошенных. Среди предпочтительных источников информации 78,3% респондентов назвали беседу с врачом-педиатром, 28,3% — информационные памятки, 23,2% — специальные сайты, 17,2% — лекции на сайте поликлиники, 15% — общение по горячей линии. Лишь 11,9% опрошенных хотели бы получать информацию из социальных сетей.

**Заключение.** Несмотря на положительное отношение к вакцинации большинства опрошенных, у части респондентов выявлены негативные установки. Родители демонстрируют высокую степень готовности к получению информации о вакцинации от профессионалов.

**Ключевые слова:** приверженность вакцинопрофилактике; отказ от вакцинации; санитарное просвещение; профилактика инфекционных заболеваний.

### Как цитировать:

Герасимова Н.А., Хасанова Г.Р., Саперкин Н.В., Мамчиц Л.П., Магомедалиева С.Г. Приверженность вакцинации у родителей детей дошкольного возраста // Казанский медицинский журнал. 2025. Т. 106, № 3. С. 465–473. DOI: 10.17816/KMJ656082 EDN: RKVKRK

## BACKGROUND

An increasing number of people who refuse or delay vaccination could pose a serious obstacle for achieving epidemiological well-being.<sup>1</sup> As of 2024, global immunization coverage remained unchanged since 2022 and has not returned to the levels observed in 2019. In 2023, 84% of children received three doses of the diphtheria, tetanus, and pertussis vaccine, which is a key indicator of immunization status. Concurrently, the number of children who had not received a single dose of the vaccine increased from 13.9 million in 2022 to 14.5 million in 2023.<sup>1</sup> This reflects persistent problems related to the adherence of the population to vaccination.<sup>1</sup>

Several examples demonstrate the serious consequences of neglecting vaccination. For instance, in 2019, over 1200 measles cases were reported in the United States, marking the highest number since the disease was eliminated in the country in 2000. This epidemiological setback occurred because of a decrease in vaccination rates among the population. The Orthodox Jewish community in New York City was among the most adversely affected groups, exhibiting the lowest vaccination coverage rates. From 2001 to 2019, 160 measles outbreaks were reported in the United States, with an average of 6 each year [1].

The 2017 measles outbreak in Italy was one of the most significant in recent history. The outbreak attracted attention to the issue of vaccination worldwide. Deaths from complications associated with measles have been recorded, most of which occurred among infants [2]. Epidemiological investigation revealed that increased tourism, an influx of migrants, and insufficient immunization coverage were the main factors that contributed to the outbreak. Overall, Italy's immunization coverage was 85.3%; however, it was lower in the 7 most affected regions, where 4015 (90%) of the reported measles cases occurred [2].

Low vaccination adherence is a critical and multifaceted social phenomenon continually studied by foreign and Russian researchers [3–5]. In 2019, the World Health Organization identified lack of confidence in vaccination as among the global threats to humanity, together with air pollution, climate change, and antimicrobial resistance. Attitudes toward immunization and reasons for low vaccination compliance vary by region, vaccine type, and change over time.<sup>2</sup>

**This study aimed** to assess vaccination adherence among parents of preschool-aged children in selected cities in Russia and Belarus.

## MATERIAL AND METHODS

A descriptive, cross-sectional study was performed using anonymous online questionnaires. The respondents were parents of children attending preschool educational institutions. The study was conducted from April 2023 to October 2024.

The study included adults from five cities in the Russian Federation and one city in the Republic of Belarus. Overall, 801 individuals were surveyed: 161 from Kazan, 111 from Almet'yevsk (Republic of Tatarstan), 230 from Nizhny Novgorod (Nizhny Novgorod region), 76 from Makhachkala (Republic of Dagestan), 114 from Rybnoye (Ryazan region), and 109 from Gomel (Republic of Belarus).

The 16-question survey was developed using the Google platform. It included single-choice questions to obtain sociodemographic data, such as age, education level, number of children in the family, and income level, and multiple-choice questions to assess parents' awareness of and attitudes toward vaccination aspects. The introductory section of the questionnaire provided parents with information about the purpose of the study and its anonymity. The collected information did not contain personal data. Before administering the survey in the participating cities, a pilot survey was conducted to confirm the validity of the questionnaire.

Statistical analysis was performed within the R 4.3.1 environment (RStudio).<sup>3</sup> The type of distribution was determined using the Shapiro–Wilk criterion and QQ plots. Absolute values were presented as means with standard deviations ( $M \pm \sigma$ ) and relative values as intensive indices with a 95% binomial confidence interval (95% CI) or as a proportion with its standard error ( $P \pm p$ ). The mean was compared using a *t*-test for independent samples under the condition of normal distribution and the Mann–Whitney and Kruskal–Wallis criteria for independent samples with asymmetric distribution. Differences were considered significant at  $p < 0.05$ . All charts were plotted using Microsoft Excel.

## Characteristics of respondents

The parents who participated in the survey were predominantly women. The majority (85%) of respondents were aged 25–44 years. More than half of the respondents had higher education (50.5%–80.2%). Parents' assessments of their income levels differed between cities. The largest percentage of high-income earners was among respondents from Kazan and Almet'yevsk, whereas the largest percentage of low-income earners was among respondents from Makhachkala (61%). Overall, 70%

<sup>1</sup> United Nations [Internet]. New WHO Immunization Data: 35 Million Children Worldwide Are Unprotected Against Measles. Available at <https://news.un.org/ru/story/2024/07/1454221> Accessed on February 16, 2025.

<sup>2</sup> who.int [Internet]. Ten threats to global health in 2019. [cited 16 February 2025]. Available at <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>

<sup>3</sup> The R Foundation [Internet]. Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Available online: <https://www.r-project.org>

**Table 1.** Characteristics of the respondent groups

Characteristics of respondents	City of residence						
	Almetyevsk, n = 111 (%)	Gomel, n = 109 (%)	Kazan, n = 161 (%)	Makhachkala, n = 76 (%)	Nizhny Novgorod, n = 230 (%)	Rybnoye, n = 114 (%)	Total, n = 801 (%)
Women	111 (100)	108 (99)	137 (85)	75 (97)	219 (95)	114 (100)	728 (91)
Age							
18–24 years old	20 (18)	2 (2)	42 (26)	4 (5)	3 (1)	3 (3)	74 (9)
25–34 years old	46 (41)	59 (54)	51 (32)	32 (42)	111 (48)	60 (53)	359 (45)
35–44 years old	44 (40)	46 (42)	45 (28)	34 (45)	105 (46)	48 (42)	322 (40)
≥45 years	1 (1)	2 (2)	23 (14)	6 (8)	11 (5)	3 (3)	46 (6)
M ± σ (years old)	33.4 ± 4.5	34.9 ± 5.6	33.8 ± 9.8	36.0 ± 7.1	29.6 ± 11.3	34.2 ± 5.8	33.7 ± 7.1
Education							
Higher	89 (80)	55 (51)	126 (78)	51 (67)	183 (80)	71 (62)	575 (72)
Secondary vocational	22 (20)	36 (33)	34 (21)	9 (12)	32 (14)	33 (29)	166 (21)
Secondary	0	18 (17)	1 (1)	16 (21)	15 (7)	10 (9)	60 (7)
Income level							
High	53 (48)	1 (1)	91 (57)	3 (4)	55 (24)	29 (25)	232 (29)
Upper-middle	45 (41)	11 (10)	57 (35)	23 (30)	81 (35)	37 (32)	254 (32)
Average	12 (11)	48 (44)	11 (7)	41 (54)	86 (37)	45 (39)	243 (30)
Lower-middle	1 (1)	8 (7)	2 (1)	5 (7)	5 (2)	2 (2)	23 (3)
Not specified	0	40 (38)	0	4 (5)	3 (1)	1 (1)	49 (6)
Number of children in the family							
1	37 (33)	33 (30)	46 (29)	7 (9)	88 (38)	34 (30)	245 (31)
2	30 (27)	46 (42)	44 (27)	26 (34)	110 (48)	59 (52)	315 (39)
3	44 (40)	28 (26)	50 (32)	34 (43)	27 (12)	13 (11)	196 (24)
≥4	0 (0)	2 (2)	21 (13)	9 (12)	5 (2)	8 (7)	45 (6)

Note: M ± σ, mean ± standard deviation.

of the families had 1–2 children. The largest number of families with ≥3 children was found in Makhachkala, Kazan, and Almetyevsk (Table 1).

RESULTS

Parents play a critical role in deciding whether to vaccinate their children. Therefore, epidemiologists have focused on identifying factors that influence adults’ attitudes toward vaccination [6].

The majority of survey participants had a positive attitude regarding vaccination. The proportion of positive responses ranged from 56% in Makhachkala to 91% in Kazan, averaging 76.17% ± 11.7%. However, some respondents expressed a “distrustful,” “negative,” or, in a few cases, “strongly negative” attitude concerning vaccination (Fig. 1).

Parents’ adherence to specific immunoprophylaxis was assessed by the proportion of responses, “I vaccinate my child with all vaccines in due time.” This indicator exhibited a significant variation, ranging from 22.5% ± 4.0% among respondents

from Almetyevsk to 60.6% ± 4.7% among parents from Gomel. The ranking slightly changed when delays in vaccination were adjusted, such as when a child was temporarily withdrawn because of an illness. For example, the percentage of parents who responded to the relevant question ranged from 22.4% ± 4.8% in Makhachkala to 64.0% ± 4.5% in Almetyevsk.

The reasons that motivated parents to have their children prophylactically vaccinated varied (Fig. 2). The majority of parents (68.8% ± 7.3%) stated that they chose vaccination to prevent their children from contracting virulent infections. This was the most common response among respondents from Nizhny Novgorod (79.5% ± 2.7%). Some respondents (16.2% ± 9.6%) demonstrated a passive and unconscious attitude. They consented to vaccination because they feared that without it, their children would be denied admission to an educational institution. Compared to respondents from other cities, Kazan residents were the most likely to provide this response (28.6% ± 3.6%). Persistent recommendation from healthcare providers motivated 9.1% ± 5.8% of parents to vaccinate their children. Makhachkala residents were more likely to choose

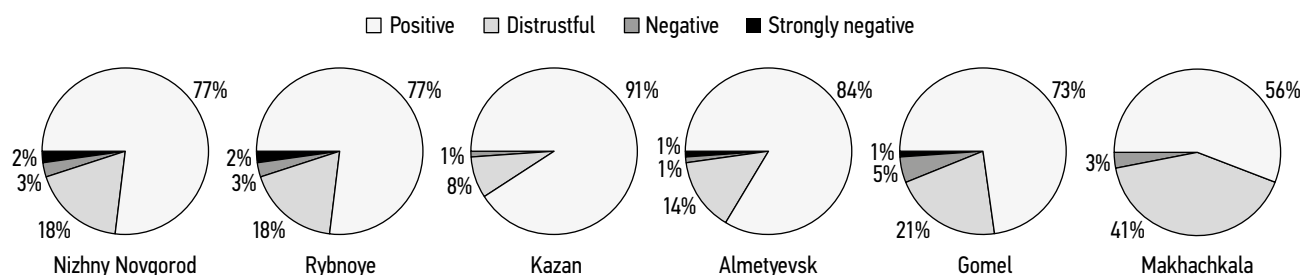


Fig. 1. Parental attitudes toward childhood vaccination in different cities.

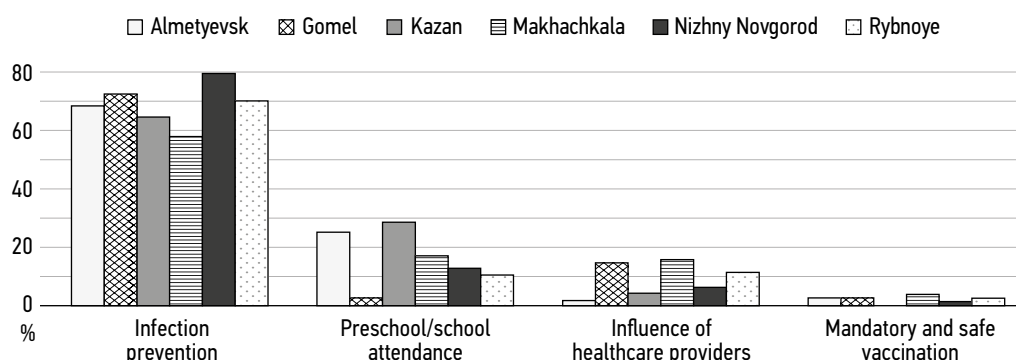


Fig. 2. Factors motivating parents to vaccinate their children.

this response than those in other cities ( $15.8\% \pm 4.2\%$ ). The least prevalent response was “I vaccinate because vaccinations are compulsory and free,” chosen by  $2.2\% \pm 1.3\%$  of respondents (although it was chosen more frequently by residents of all other cities included in the study,  $p < 0.05$ ). It was also selected by  $3.9\% \pm 1.1\%$  of Makhachkala respondents.

Generally,  $19.1\% \pm 1.4\%$  of parents recognized the benefits of vaccination. However, the parents did not administer all age-appropriate vaccines to their children. The reasons for refusing individual vaccines among all respondents were as follows:

- “Afraid of adverse reactions to certain vaccines” (108 respondents, 13.5%)
- “It is possible to vaccinate a child against only dangerous infections” (73 respondents, 9.1%)
- “Not all vaccines are safe for children” (66 respondents, 8.3%)
- “Medical contraindications to vaccination” (47 respondents, 5.9%)
- “It is not necessary to vaccinate a child until a certain age” (33 respondents, 4.1%)

The study involved parents assigning a score to each vaccination, with 1 point for the least important and 5 points for the most important, according to their opinion. Considering

Table 2. Prevalence of the response “very important” regarding measles and pertussis vaccination among parents across different cities

City	Measles vaccination, % (95% CI)	Pertussis vaccination, (95% CI)
Almet'yevsk	75 (66.3; 83.7)	73.7 (64.8; 82.5)
Gomel	66 (53.2; 78.8)	62.3 (49.2; 75.3)
Kazan	31.7 (23.6; 45.1)	21.7 (15.4; 28.1)
Makhachkala	34.2 (28.8; 39.6)	34.6 (23.9; 45)
Nizhny Novgorod	73.7 (68.0; 79.4)	68.4 (62.4; 74.4)
Rybnoye	71.4 (59.6; 83.2)	70.9 (58.9; 82.9)

Note: CI, confidence interval. For measles and pertussis,  $p < 0.05$  for Makhachkala compared with Nizhny Novgorod, Rybnoye, Almet'yevsk, and Gomel and  $p < 0.04$  for Kazan compared with Nizhny Novgorod, Rybnoye, Almet'yevsk, and Gomel, respectively.

the challenging epidemiological situation of pertussis and measles in both countries<sup>4,5</sup> to date [7], the results of a survey on parents' perceptions of the importance of vaccines for these diseases were examined (Table 2).

Significant differences were noted in attitudes toward these preventive vaccinations depending on the place

<sup>4</sup> On the Sanitary and Epidemiological Well-Being of the Population in the Russian Federation in 2023. State Report. Moscow: Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing, 2024. Available at [https://rospotrebnadzor.ru/documents/details.php?ELEMENT\\_ID=27779](https://rospotrebnadzor.ru/documents/details.php?ELEMENT_ID=27779). Accessed on March 1, 2024.

<sup>5</sup> sputnik.by [Internet]. Rada Speaker: Preparations for Ukraine's election have already started. Available at <https://sputnik.by/20240422/minzdrav-v-belarusi-otmechaetsya-rost-chisla-zabolevaniy-koryu-i-koklyushem-1085664653.html>. Accessed on March 1, 2024.



of residence of the surveyed parents. The majority of parents from Almetyevsk, Rybnoye, and Nizhny Novgorod considered the measles and pertussis vaccines “very important,” whereas respondents from Kazan and Makhachkala underestimated the importance of protection against these infections.

Among the participants interviewed, 66.2% were informed about the possibility of additional vaccines not included in the vaccination calendar. The highest proportion of informed parents was found among those from Almetyevsk (93 respondents, 84%;  $p < 0.05$  compared with the other cities), and the lowest was found among those from Makhachkala (32 respondents, 42%;  $p = 0.031$ ).

Of the parents surveyed, 47.6% demonstrated the need for more information about preventive vaccinations. The highest proportion of these parents was found in Nizhny Novgorod (221 respondents, 61.8%), followed by Kazan (85 respondents, 52.8%;  $p < 0.05$  compared with the other cities), and the lowest proportion in Gomel (37 respondents, 33.9%).

Another set of questions aimed to identify the most crucial and desirable sources of information on vaccination. The most common response regarding the source of basic information about vaccination (e.g., vaccine composition, indications, contraindications, adverse reactions, and complications) was a primary care pediatrician. This was selected by 76.5% of respondents (95% CI: 73.71–79.29) in all the cities and was considered the most trustworthy source. Internet resources, including forums and social networks, were ranked second, with a significant margin of 37.12% (95% CI: 33.95–40.3), followed by scientific literature at 25.25% (95% CI: 22.39–28.11) and acquaintances/relatives at 22.5% (95% CI: 19.75–25.25). The least frequent responses regarding information sources on vaccination were mass media (e.g., television, radio, and newspapers) at 7.62% (95% CI: 5.88–9.37) and religious literature (religion not specified) at 0.87% (95% CI: 0.26–1.49). The importance of different information sources varied across cities. The highest proportion of people who chose a primary care pediatrician as their source of information was reported in Kazan (143 respondents, 88%) and Almetyevsk (97 respondents, 87.4%). The Internet was the most popular source of information in Almetyevsk (55 respondents, 49.6%), Kazan (75 respondents, 46.6%), and Nizhny Novgorod (83 respondents, 35.9%). In Almetyevsk, scientific literature was the dominant choice (51 respondents, 46%). Additionally, acquaintances and relatives were asked more often in this city (51 respondents, 46%). Parents from Almetyevsk, Nizhny Novgorod, and Kazan more likely used mass media (12 respondents, 10.9%; 23 respondents, 10%; and 15 respondents, 9.3%, respectively).

Regarding the preferred sources for information about future vaccination, the majority (78.3%) of respondents indicated conversations with physicians. A significant proportion of parents revealed a preference for receiving information through leaflets (28.3%) or specialized websites (23.2%). Additionally, 17.2% preferred online lectures, 15% wanted a hotline to address vaccination-related issues, and 11.9% opted to receive information through social networks (Fig. 3).

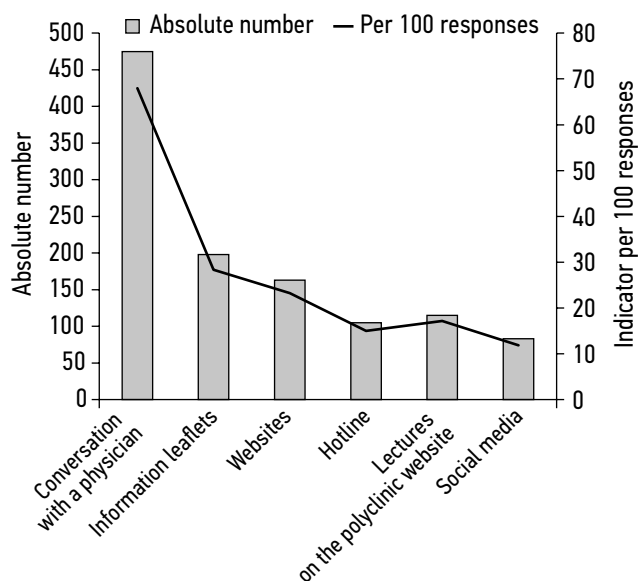


Fig. 3. Preferred sources of vaccination information (summarized across all study cities).

## DISCUSSION

The majority of parents in all cities included in the study demonstrated a positive and informed attitude toward the vaccination of children. Most of the respondents were women, which may be a study limitation. Data obtained by other researchers showed that women were more uncertain about vaccination than men [4]. A significant proportion of respondents (21.8%) expressed distrust in vaccination, owing to concerns about potential adverse effects and harm to children's health. Awareness and trust in myths concerning the risks of vaccination are inadequate. Thus, 9.1% of parents believed that vaccination against only a few diseases is sufficient. However, parents generally do not place much importance on vaccines for diseases such as measles and whooping cough, which are currently the most significant from an epidemiological perspective. Notably, 76.5% of the respondents identified a pediatrician as their primary source of vaccination information, and most preferred to receive future information from a pediatrician. These figures exceed those obtained by other researchers, which ranged from 67% to 70% [6, 8]. However, medical practitioners often lack the persuasiveness and persistence for effective vaccination promotion. In a study by Briko et al., only 80% of physicians had a positive attitude toward vaccination [3]. Another study by Timoshkova et al. showed that 36% of outpatient pediatric physicians expressed concerns about the safety of vaccines, 26.5% doubted their effectiveness, and 62% responded that they lacked compelling and evidence-based information about vaccination [9]. Insufficient information about the safety of vaccination procedures may lead to frequent, unjustified withdrawals from vaccination. This may result in lower vaccination coverage and worsening of the epidemic situation [10, 11].

A high level of interest in medical information was demonstrated by the parents, especially in specialized medical

websites, information leaflets, and lectures available on the polyclinic website. Approximately half of the respondents indicated that they obtain information from non-scientific sources, such as social networks and relatives/acquaintances, but only 11.9% of respondents expressed a desire to continue receiving information from social networks. These findings emphasize the crucial role of pediatricians in parents' decisions regarding vaccination of their children. This fact imposes a high degree of responsibility. Conversely, it provides hope that, with reliable information, pediatricians will be able to effectively work with parents to increase vaccination compliance, which contributes to population health.

The differences revealed in the residents' questionnaires may indicate the influence of various factors on the population's attitude toward vaccination, including living standards, education, and availability of medical personnel. Further studies are required to understand these differences.

## CONCLUSION

A positive attitude toward vaccination was demonstrated by 76% of the respondents.

The most common reasons for refusing vaccination were fear of adverse effects and underestimation of the importance of receiving scheduled vaccines on time.

For most respondents, the main source of information about vaccination was a physician. Parents showed a high degree of readiness to receive information about vaccination from specialists. Therefore, all available information and educational resources, such as informational websites, special leaflets, lectures, and hotlines, should be used by medical professionals.

## ADDITIONAL INFORMATION

**Author contributions:** G.N.A.: study design, data curation; Kh.G.R.: data curation, writing—original draft, writing—review & editing; S.N.V.: project administration, data curation, writing—original draft, writing—review & editing; M.L.P.: data curation, formal analysis; M.S.G.: data curation, formal analysis. All authors approved the version of the manuscript to be published and agree to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

**Acknowledgments:** The authors express their gratitude to A.A. Ryabinin, sixth-year medical student at Kazan State Medical University; M.S. Kolesnikova, epidemiologist at Rybnoe District Hospital; and R.Kh. Isaeva, assistant at the Department of Epidemiology at Dagestan State Medical University, for their assistance in conducting the parental survey.

**Ethics approval:** The study was conducted in the form of an anonymous online survey. No personal data or organizational information were collected. Therefore, approval from an ethics committee was not required. The study was not registered.

**Informed consent:** Not applicable.

**Funding sources:** No funding.

**Disclosure of interests:** The authors have no relationships, activities, or interests for the last three years related to for-profit or not-for-profit third parties whose interests may be affected by the content of the article.

**Statement of originality:** No previously published material (text, images, or data) was used in this work.

**Data availability statement:** The data are under embargo until December 31, 2025. The database includes materials related to aspects of the studied problem that were not addressed in the present article. These data are planned to be analyzed and presented in future publications.

**Generative AI:** No generative artificial intelligence technologies were used to prepare this paper.

**Provenance and peer review:** This paper was submitted unsolicited and reviewed following the standard procedure. The review process involved three external reviewers, a member of the editorial board, and an in-house scientific editor.

## ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

**Вклад авторов.** Г.Н.А. — разработка и детализация плана исследования, сбор данных; Х.Г.Р. — работа с данными, написание черновика, пересмотр и редактирование рукописи; С.Н.В. — координация исследования, работа с данными, написание черновика, пересмотр и редактирование рукописи; М.Л.П. — сбор и анализ данных; М.С.Г. — сбор и анализ данных. Все авторы одобрили рукопись (версию для публикации), а также согласились нести ответственность за все разделы работы, гарантируя надлежащее рассмотрение и решение вопросов, связанных с точностью и добросовестностью в любой её части.

**Благодарности.** Авторы выражают благодарность: А.А. Рябинину — студенту VI курса Казанского ГМУ, М.С. Колесниковой — врачу-эпидемиологу Рыбновской районной больницы, Р.Х. Исaeвой — ассистенту кафедры эпидемиологии ДГМУ за помощь при проведении анкетирования родителей.

**Этическая экспертиза.** Исследование проведено в виде анонимного онлайн-анкетирования. Персональные данные и данные организаций не собирались. В связи с этим одобрение этического комитета не требовалось. Исследование не регистрировали.

**Согласие на публикацию.** Не требовалось.

**Источники финансирования.** Отсутствуют.

**Раскрытие интересов.** Авторы заявляют об отсутствии отношений, деятельности и интересов за последние три года, связанных с третьими лицами (коммерческими и некоммерческими), интересы которых могут быть затронуты содержанием статьи.

**Оригинальность.** При создании настоящей работы авторы не использовали ранее опубликованные сведения (текст, иллюстрации, данные).

**Доступ к данным.** Эмбарго до 31.12.2025. База данных содержит материалы относительно аспектов изучаемой проблемы, которые не рассматривались в данной статье; планируется анализ этих данных с представлением результатов в последующих публикациях.

**Генеративный искусственный интеллект.** При создании настоящей статьи технологии генеративного искусственного интеллекта не использовались.

**Рассмотрение и рецензирование.** Настоящая работа подана в журнал в инициативном порядке и рассмотрена по обычной процедуре. В рецензировании участвовали три внешних рецензента, член редакционной коллегии и научный редактор издания.

## REFERENCES

1. Dimala CA, Kadia BM, Nji MAM, Bechem NN. Factors associated with measles resurgence in the United States in the post-elimination era. *Sci Rep*. 2021;11(1):51. doi: 10.1038/s41598-020-80214-3 EDN: XTABAR
2. Filia A, Bella A, Del Manso M, et al. Ongoing outbreak with well over 4,000 measles cases in Italy from January to end August 2017 — what is making elimination so difficult? *Euro Surveill*. 2017;22(37):pii=30614. doi: 10.2807/1560-7917.ES.2017.22.37.30614
3. Briko NI, Mindlina AYa, Galina NP, et al. Adherence to immunoprevention: how to change the situation? *Fundamental and clinical medicine*. 2019;4(4):8–18. doi: 10.23946/2500-0764-2019-4-4-8-18 EDN: TVPLLH
4. Plakida AV, Briko NI, Namazova-Baranova LS, et al. Increasing population adherence to vaccination: evaluation and a systematic approach to implementation. *Epidemiology and Vaccinal Prevention*. 2022;21(3):4–26. doi: 10.31631/2073-3046-2022-21-3-4-26 EDN: FAJXOX
5. Ta'an WF, Al-rashdan RA, Shatnawi RM, et al. Determinants of maternal adherence to child vaccination in Jordan: A cross-sectional study. *Sci Rep*. 2024;14(1):24635. doi: 10.1038/s41598-024-74183-0 EDN: KNJEAB
6. Shishova AV, Zhdanova LA, Rusova TV, Ivanova IV. Vaccination adherence: views of parents and health professionals at children's polyclinics (example of the Ivanovo region). *Public Health and Life Environment — PH&LE*. 2023;31(11):42–49. doi: 10.35627/2219-5238/2023-31-11-42-49 EDN: BXGVSY
7. Fedorova IV, Sergienko EN, Vysockaja VS, Rybak NA. Clinical and epidemiological features of pertussis in the Republic of Belarus and modern strategy of vaccination (part 1). *Pediatrics. Eastern Europe*. 2022;10(3):311–318. doi: 10.34883/PI.2022.10.3.002 EDN: HUQIIT
8. Burlutskaya AV, Savelyeva NV, Tereshina YuA, Serkina AA. Vaccination of children: opinions and awareness of parents. *International research journal*. 2021;7(109):57–61. doi: 10.23670/IRJ.2021.109.7.044 EDN: ZHTTNW
9. Timoshkova SD, Fedoseenko MV, Rusinova DS, et al. Assessment of vaccination adherence among outpatient clinicians. *Pediatric pharmacology*. 2024;21(1):15–23. doi: 10.15690/pf.v21i1.2719 EDN: ERSJWF
10. Chernova TM, Timchenko VN, Myskina NA, et al. Causes of violation of the vaccination schedule for young children. *Pediatrician*. 2019;10(3):31–36. doi: 10.17816/PED10331-36 EDN: FACWBW
11. Girina AA, Petrovsky FI, Zaplatnikov AL. Adherence of pediatricians to immunoprophylaxis of infectious diseases: current state of the problem. *Russian journal of woman and child health*. 2020;3(4):290–294. doi: 10.32364/2618-8430-2020-3-4-290-294 EDN: CGNLPS

## AUTHORS' INFO

\* **Gulshat R. Khasanova**, MD, Dr. Sci. (Medicine), Professor, Head of Depart., Depart of Epidemiology and Evidence-based-medicine; address: 49 Butlerova St, Kazan, Russia, 420012; ORCID: 0000-0002-1733-2576; eLibrary SPIN: 6704-2840; e-mail: gulshat.hasanova@kazangmu.ru

**Nadezhda A. Gerasimova**, Leading specialist-expert, Depart. of Supervision of Hygiene of Children and Adolescents; ORCID: 0000-0002-4932-0000; e-mail: nivanova-00@mail.ru

**Nikolay V. Saperkin**, MD, Cand. Sci. (Medicine), Assistant Professor, Depart. of Epidemiology and Evidence-Based Medicine; ORCID: 0000-0002-3629-4712; eLibrary SPIN: 3318-6323; e-mail: saperkin\_nv@pimunn.net

**Lyudmila P. Mamchits**, MD, Cand. Sci. (Medicine), Assistant Professor, Depart. of Epidemiology and Evidence-Based Medicine; ORCID: 0000-0003-3660-030X; eLibrary SPIN: 1649-2051; e-mail: epidem@gsmu.by

**Sabiyat G. Magomedalieva**, Assistant Lecturer, Depart. of Epidemiology; ORCID: 0000-0002-1369-8001; eLibrary SPIN: 7145-1292; e-mail: magomedalieva.s@yandex.ru

## ОБ АВТОРАХ

\* **Хасанова Гульшат Рашатовна**, д-р мед. наук, профессор, зав. каф., каф. эпидемиологии и доказательной медицины; адрес: Россия, 420012, г. Казань, ул. Бутлерова, д. 49; ORCID: 0000-0002-1733-2576; eLibrary SPIN: 6704-2840; e-mail: gulshat.hasanova@kazangmu.ru

**Герасимова Надежда Алексеевна**, ведущий специалист-эксперт, отдел надзора по гигиене детей и подростков; ORCID: 0000-0002-4932-0000; e-mail: nivanova-00@mail.ru

**Саперкин Николай Валентинович**, канд. мед. наук, доцент, каф. эпидемиологии и доказательной медицины; ORCID: 0000-0002-3629-4712; eLibrary SPIN: 3318-6323; e-mail: saperkin\_nv@pimunn.net

**Мамчиц Людмила Павловна**, канд. мед. наук, доцент, зав. каф., каф. эпидемиологии и доказательной медицины; ORCID: 0000-0003-3660-030X; eLibrary SPIN: 1649-2051; e-mail: epidem@gsmu.by

**Магомедалиева Сабият Гизбуллаевна**, ассистент, каф. эпидемиологии; ORCID: 0000-0002-1369-8001; eLibrary SPIN: 7145-1292; e-mail: magomedalieva.s@yandex.ru

\* Corresponding author / Автор, ответственный за переписку