

Эмпирические исследования | Empirical research

What Do Nurses Think About the Immunization Campaign in Russia and the Prospects for the COVID-19 Pandemic Development?

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Prevention and vaccination against COVID-19 are not unanimously accepted in international practice. The effectiveness of the COVID-19 vaccination campaign depends on both population and medical staff attitudes towards immunoprophylaxis. We carried out an empirical study of nurses' opinions about the COVID-19 vaccination campaign in Russia and compared the results with those obtained from surveys of Russian controls. The level of vaccination coverage in the population in mid-January 2022 was assessed by surveying nurses living in different regions of Russia and directly involved in the COVID-19 vaccination campaign. We also measured nurses' attitudes to some aspects of vaccination. 376 nurses took part in the online survey. For comparison, we used data from a sample of Russians we surveyed (N=1214). According to the nurses, on average just over 40% of Russians are vaccinated against COVID-19 (compared to the 53% officially). This subjective estimate is half the mass immunity goal (80%). In addition, the nurses living in the different regions of Russia are significantly more confident in expressing a position on mandatory mass vaccination than were the participants in an earlier sample survey of the entire Russian population. More nurses than in the quota sample of Russians believe in conspiracy theories about the coronavirus having arisen artificially to regulate the number of the poor. Most of the nurses surveyed believe that COVID-19 will never go away and that the media will support the epidemiological panic as it benefits the authorities and pharmaceutical companies.

Keywords: mass vaccination against COVID-19, vaccination campaign in Russia, herd immunity, nurses, attitudes.

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Что медицинские сестры думают о кампании иммунизации в России и о перспективах развития пандемии, вызванной COVID-19

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Международная практика показывает, что профилактика COVID-19 и вакцинация против него не получили единодушного одобрения. Эффективность кампании по вакцинации против COVID-19 зависит от отношения к иммунопрофилактике как населения, так и медицинского персонала. Было проведено эмпирическое исследование отношения медицинских сестер к кампании вакцинации против COVID-19 в России; его результаты сравнивались с опросами контрольных случайных выборок россиян. На основе опроса медицинских сестер, проживающих в разных регионах России и принимающих непосредственное участие в кампании по вакцинации против COVID-19, дана оценка степени охвата вакцинацией населения по состоянию на середину января 2022 года. Также измерялись установки медицинских сестер к некоторым аспектам вакцинации. В онлайн-опросе приняли участие 376 медицинских сестер. Для сравнения использовались данные опроса квотной выборки россиян ($n=1214$). По мнению медсестер, в среднем чуть более 40% россиян привиты от COVID-19 (по сравнению с официально заявленными 53%). Эта субъективная оценка составляет половину целевого показателя, при котором работает массовый иммунитет (80%). Кроме того, медицинские сестры, проживающие в разных регионах России, значимо более уверенно выражают позицию в отношении обязательных массовых прививок, чем участники более раннего опроса на квотной выборке россиян. По сравнению с квотной выборкой россиян, большее число медсестер верят в теории заговора, связанные с искусственным происхождением коронавируса для регулирования численности бедных. Большинство опрошенных медсестер считают, что COVID-19 никогда не исчезнет, а СМИ будут поддерживать эпидемиологическую панику, так как это выгодно властям и фармакологическим компаниям.

Ключевые слова: массовая вакцинация против COVID-19, вакцинопрофилактика в России, коллективный иммунитет, медицинские сестры, установки.

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Introduction

Studies of trust/distrust in vaccines among medical professionals are appropriate, since the opinion about COVID-19 vaccines may influence the vaccination rates in the general population [2]. Establishing herd immunity during pandemics is difficult [23]. According to Russian Deputy Prime Minister Tatyana Golikova, 76.6 million Russians were vaccinated against COVID-19 by 14 January 2022, or 63% of the total population (briefing by Tatyana Golikova, Minister of Health Mikhail Murashko and Head of Rospotrebnadzor Anna Popova. URL: <http://government.ru/news/44336/>). In parallel, the media, especially online, have been reporting worrying information about cases of unvaccinated people with vaccination certificates (specific examples can be found here: <https://rg.ru/2021/11/25/torgovlia-sertifikatami-o-privivkah-ugrozhaet-zhizni-ne-prichastnyh-k-obmanu-liudej.html>) and acts of lobbying, as in Germany (<https://www.tagesschau.de/thema/investigativ/>). Nurses were surveyed to verify the vaccination campaign's coverage of the Russian population.

Many of them work in red zones, on the frontlines of coronavirus outbreaks, literally standing between the refrigerator with frozen vials of vaccine material and the public. The vaccination campaign, the results of which are reported at different levels of the medical bureaucratic hierarchy, definitely cannot do without them. Nurses are not only active participants in the mass vaccination, but also witnesses to the unfolding process of discussing, agreeing to vaccination and avoiding it. Moreover, their arguments and the judgments of their colleagues (including Russian vaccine's pros and cons) largely determine the pace at which the country gets vaccinated. In this regard, their opinions are not bureaucratic and not only of scientific interest, but can also provide feedback on the pace and coverage of vaccination, and on the achievement of mass immunity – the minimum target set by the Russian Ministry of Health of 80%. In this context, it is advisable to investigate how nurses feel about vaccinating against COVID-19.

Background

Healthcare Workers as COVID-19 Vaccine Recipients

Even before COVID-19 vaccines became available, social groups with higher or lower psychological fears of vaccination against COVID-19 (fear of the coronavirus itself and risk perceptions) were identified in a study conducted in France in March 2020 [8] using an online survey (N=3259). Older people, men and healthcare workers were more likely to opt for vaccination.

At the same time, it should be taken into account that health professionals view new vaccines differently (in particular, general practitioners are more suspicious than pediatricians) and have concerns about vaccine safety [4]. In Hong Kong, 806 nurses were interviewed regarding their willingness to vaccinate against influenza (February 26, 2020) and to vaccinate against influenza and COVID-19 (March 31, 2020) [51]. 40% of participants intended to get the COVID-19 vaccine. Nurses with chronic illnesses working with patients suspected or confirmed to have COVID-19 were significantly more likely to agree to receive the COVID-19 vaccine in 2019. The reasons for refusal and hesitation to vaccinate against COVID-19 were as follows: “there are suspicions about the effectiveness, efficacy and safety of the vaccine”, “I consider it unnecessary”, and “there is no time to do it”. Thus, medical professionals, as well as other professionals [29; 49], expressed doubts about vaccine safety.

The results of the analysis of anti-vaccination content on Twitter in Turkish for the period from December 09, 2020 to December 8, 2021 [21], covering 1,041 vaccine-related tweets, showed that anti-vaccination sentiments (22% of tweets dedicated to the subject of vaccination) were associated with the topics: “bad scientific processes” (21.7%), “conspiracy theories” (16.4%), “suspicions about vaccine manufacturers” (15.5%). It was found that ethnic minorities tend to distrust vaccination [22]. Polish immigrants in Norway are less positive about COVID-19 vaccination than Norwegians, who also treated vaccination as Poles living in Poland. Polish immigrants in Norway also trusted the Norwegian healthcare system less than Norwegians. In the regression analysis, trust in the values of the healthcare system emerged as the most important predictor of attitudes towards vaccination against COVID-19.

One of the few studies involving nurses [37] measured nurses’ factors for taking the COVID-19 vaccine, as well as their fears and secret anxieties. 639 nurses were surveyed, of whom only 40% planned to receive the vaccine if it were available, 41% were going to be vaccinated if adequate protection and safety measures for the vaccine were presented, and 18% said they would never accept it. Lack of knowledge about the vaccine, concern about long-term side effects, fear of injection, preference for natural immunity, media bias and receiving COVID-19 disease from the vaccine were cited as reasons for anxiety and refusal of vaccination.

In April 2020, to investigate the intention to receive the SARS-CoV-2 vaccine when it becomes available, a telephone survey was launched (using landlines and mobile phones) among Hong Kong residents on a random sample of 1,501 respondents aged 18 years and older (53.6% female) [25]. The questionnaire also included questions on knowledge and attitudes regarding COVID-19, smoking, alcohol consumption and socio-demographic parameters. Overall, 45.3% of participants intended to be vaccinated against SARS-CoV-2 when it becomes available, while 29.2% were undecided and 25.5% had no intention. The most common reason for hesitation about the vaccine was concern about its safety (56.5%). Analysis of the data obtained showed that the indecision regarding vaccination was more common among young men without chronic diseases and among non-drinking smokers.

Another study was conducted in France in July 2020 on a representative sample controlling for gender, age, education, area of residence and household size [42]. The

online survey included 1,942 non-SARS-COV-2 respondents aged 18-64 years. It was found that 28.8% of the respondents had completely refused the vaccination, while 71.2% had agreed to it. Vaccine refusal and indecision were strongly associated with female gender, age (with an inverted U-shaped relationship), lower educational level, and previous noncompliance with recommended vaccinations. Total vaccine refusal was also associated with a lower perceived severity of COVID-19. Conversely, mistrust of vaccination was lower when the benefits of collective immunity were reported in workers compared to non-workers, as well as in those with COVID-19 experience (experiencing symptoms or communicating with someone with confirmed COVID-19).

Gender and age have been identified as factors in many studies on attitudes, hesitancy and indecisiveness [17; 18; 32; 35; 42]. The relationship between age and vaccine uptake is non-linear, and gender has been confirmed in several studies: women have greater vaccine uncertainty [6; 13]. If the relationship between age and willingness to be vaccinated is nonlinear, then gender has been more frequently confirmed in several studies, with women showing more uncertainty when it comes to deciding whether or not to get vaccinated. It should be remembered that most junior doctors are female.

M. Manning's study [26] showed that nurses' attitudinal beliefs about refusing immunization were related to their lack of knowledge about vaccine development. Greater knowledge and positive attitudes towards influenza vaccination among nurses were positively associated with vaccination coverage among nurses in an analysis of 12 studies examining the relationship between knowledge and attitudes towards influenza vaccination and vaccination practice among nurses published between 2003 and 2010 [53]. Nurses are more indecisive about vaccination according to their beliefs, as shown by a comparative analysis of data from a survey of primary care physicians and nurses in Croatia [48]. Multiple logistic regression showed that nurses' uncertainty was higher among those who experienced serious adverse events.

A three-year survey (2016–2018) of health workers in Peru [46] found that those who were frequently vaccinated believed that vaccination was effective, were more aware of influenza and vaccination, and believed that vaccination had emotional benefits, such as reducing regret or anger if they got the flu. Health workers who reported barriers to immunization, such as lack of time or a convenient place to get vaccinated, were less likely to want to be vaccinated often than health workers who reported no barriers.

Nurses/midwives and health workers from Hungary, Italy, Romania and Switzerland were the least confident about the safety, importance and effectiveness of vaccines in general, according to an online survey (N=1504) conducted in 15 countries to identify barriers to vaccination. Moroccan (35%), Turkish (53%) and Greek (69%) experts reported the lowest influenza vaccine coverage among healthcare professionals. They also reported the lowest 'very likely' vaccination rates. Over one third of health workers said that they were not confident in the health authorities and the information given by them. The thematic analysis showed that concerns about the risk of vaccine side effects, a preference for relying on natural immunity, the need for annual influenza vaccination, the presence of chronic diseases and vaccination prescriptions were the main barriers to influenza and COVID-19 vaccination [3].

A mixed-methods survey conducted by the Pan American Health Organization in 2021 to assess attitudes to vaccination among 1,197 health workers in 14 Caribbean countries [36] found that fewer nurses (62%) wanted to be vaccinated as soon as possible than doctors (85%). Younger respondents were also less likely to want to be vaccinated than older respondents (64% vs. 85%). In a study of vaccination intentions against COVID-19 among health care workers in France in 2021, the following factors were identified: perception of the risk-benefit ratio in favor of vaccination, lack of fear of serious side effects, various incentives from the employer perceived as motivating, the idea that vaccination is a collective response to the crisis, favorable opinion of the family and fear of severe COVID-19 [30].

The following was found in a study of 52 Italian nurses who refused to be vaccinated against COVID-19: 26.2% were involved in treating COVID-19 and 40.4% had a history of COVID-19. None had ever been vaccinated against influenza or pneumococcus. Knowledge of vaccination recommendations for health care workers was high – between 75% and 98%. Simultaneously, all nurses opposed any policy of mandatory vaccination for all healthcare workers. The majority of health workers questioned the expected benefits and safety of vaccines, and expressed mistrust of the information provided to the authorities and of health workers' adherence to vaccine recommendations. Thus, the study showed extensive knowledge about vaccination but also strong anti-vaccination beliefs among Italian health workers who refused COVID-19 vaccination and were suspended from work [24].

A Russian study [1] showed that doctors statistically considered vaccination as a necessary preventive measure more than nurses. US researchers [2] chose to test the hypothesis that nurses are significantly more indecisive about vaccination than doctors by analyzing social network data rather than questionnaires. The study looked at doctors' and nurses' user profiles on Twitter. It was found that doctors are generally more positive about vaccines against COVID-19. The focus of negative vaccine discussions differed between doctors and nurses. Doctors are more concerned about the effectiveness of the vaccine, while nurses are more concerned about the potential side effects, especially in children. Based on the data, the authors suggest using different strategies when communicating with different health professional groups.

Trust in Government, Science and Medical Workers

In a pandemic, social and political trust and confidence in the public health system in general and medical professionals in particular, and compliance with government COVID-19 recommendations are important. Anti-vaccination beliefs have been shown to be negatively correlated with political trust, political knowledge and educational attainment, and positively correlated with authoritarianism, as part of the psychological predisposition to believe in conspiracies [15].

Another study provides evidence that anti-vaccine and pro-vaccine attitudes can be attributed to the political polarization of the population to the left and right, respectively [10]. Australians with populist views and higher religiosity were more likely to delay or refuse vaccination, and those who trusted their state or territory government or hospitals were more likely to intend to be vaccinated [11].

J. Khubchandani and colleagues [19] attempted to find out what Americans think about getting vaccinated against COVID-19. An online survey via the MTurk social network of 1,878 people (52% female, 77% with a bachelor's degree or higher) showed that the sample studied was heterogeneous in terms of likelihood to be vaccinated against COVID-19: 52% would probably be vaccinated, 27% probably, 15% unlikely and 7% definitely not. People with lower education, income or perceived risk of infection said they definitely would not be vaccinated. African Americans, those living in rural and northeastern US, as well as those who identified themselves as Republican, were also more likely to distrust the vaccine. Many studies provide compelling evidence that conspiracism poses real and inherent threats to health and welfare, democracy and public understanding of science [12; 47].

An extensive survey was conducted with 13,426 people across 19 countries [23] to identify potential acceptability indicators and factors that influence vaccine uptake. Over two-thirds of respondents (71.5%) said they were very likely to receive the COVID-19 vaccine, and 48.1% said they would accept their employer's recommendation. Acceptance rates ranged from 90% in China to 55% in Russia. People who said they trusted information from government sources were more likely to get vaccinated.

Worldview parameters were investigated in an online experiment (N=702) where the authors attempted to study the impact of messages promoting the COVID-19 vaccine at 3 levels – individual, community and country [52]. Drawing on cultural risk theory, the authors examined how people's individualism/collectivism and hierarchical/equal social structure appraisals influenced their response to vaccine messages. An online experiment was conducted with four video messaging conditions: individual, collective, country, and no messaging. Participants were randomly presented with a message to watch, after being asked about their cultural worldview. Participants in the experiment also reported willingness to be vaccinated against COVID-19 and support for a vaccine passport. Respondents who valued individualism were more likely to respond positively to human-centered messages, but those who believed more in the value of communitarianism were less likely to appreciate such a message. The results thus suggest the importance of understanding the audience's worldview, and that people are motivated to respond selectively to messages consistent with their worldview, and therefore respond differently to the benefits of vaccination.

People who support promoting vaccination among the population and imposing sanctions for refusing vaccination are in many ways the same people who have positive attitudes towards vaccines and trust in health professionals and health authorities [43]. A European study [28] compared six nations (Danish, Israeli, Italian, French, German and Swiss) which have introduced certification (April 2020–August 2021) with 19 control nations. The researchers used daily mortality data, immunization data and country information to try to understand what might have happened in similar situations in the absence of immunization certificates. COVID-19 certification led to an increase in vaccination coverage 20 days before its introduction and a sustained effect for 40 days after. Countries with below-average coverage before the intervention had greater increases in daily doses than those with average or high coverage. The increase in coverage after certification was highest for people under 30 years of age.

Participants in a US study (N=2006) were more likely to be vaccinated if their healthcare provider recommended it, or if their political views ranged from moderate to liberal [39]. In French Guiana, trust in pharmaceutical companies and the authorities increased the likelihood of vaccination among both nurses and non-health professionals [50]. The opinions of family, friends and health care providers have a positive effect on vaccination uptake [7].

There is no doubt that social networks play a role in shaping public opinion on vaccination against COVID-19 and citizens' attitudes towards the healthcare system [5]. Furthermore, the authors showed how specific events and their discussion on social networks shape attitudes that influence the willingness to vaccinate against COVID-19. Involvement in social networks [9] and susceptibility to the infodemic [14; 20; 38; 40; 41] correlated with the level of mistrust in vaccine immunoprophylaxis against COVID-19. The most common rhetoric of suspicion formed on social networks related to attitudinal narratives of corrupt elites, the weakness of children [16], and the economic benefits of pharmaceutical companies [34].

The paucity of studies on attitudes towards coronavirus vaccination among Russian healthcare workers, particularly nurses, prompted us to conduct an empirical research. The study set two **empirical tasks**: 1) to study nurses' attitudes towards the COVID-19 vaccination campaign in Russia; 2) to compare our findings on health professionals with our findings on Russian control samples.

The hypothesis of the study was that nurses would be more supportive of mass immunization than respondents in a control sample of Russian citizens, and that their assessment of immunization coverage would be lower than that of officials.

Method

Organization of research. Data were collected by posting an information message on a Russian Nurses Association group offering to respond to an anonymous online survey. Contrary to the original statement, participants were not paid. Only the Russian Nursing Federation website (<https://vk.com/medsestre>) received funding. The authors felt that this would be useful, as the 40,300 people who have subscribed to the mailing list have access to useful industry information relating to training, accreditation, finding sideline work, etc. The group administrator's response rate is very high (over 200 likes and comments). The information post included a link to an online questionnaire on the portal anketolog.ru. 376 respondents answered the questionnaire between 20 and 30 January. The authors, experienced in recruiting other audiences for online surveys, were satisfied with this conversion.

Instruments. The research program included questionnaires on nurses' subjective perceptions of population coverage by the vaccination campaign to establish herd immunity and the prospects for COVID-19 pandemic development.

The main tool used was a 9-point *Questionnaire of Attitudes to the Vaccine* with a 5-point response scale, which measured (1) belief in the effectiveness of vaccination and the need for its mass distribution; and (2) belief in conspiracy theories, whipping up panic

and excessive hysteria around COVID-19, suspicions of abuse in connection with material allowances in red zones. The questionnaire contained such statements as "I trust vaccines against COVID-19", "Most people around me do not believe in the safety of vaccination against COVID-19", "Mass vaccination of Russians against COVID-19 is necessary" and others (see Table 2). The constructive (factorial) validity of the questionnaire was verified using exploratory factor analysis. Reliability was confirmed by a high value according to the Cronbach's alpha criterion ($\alpha=0.87$ for the Confidence scale 0.87; $\alpha=0.80$ for the Distrust scale).

Two different age groups of citizens (under 45 and over 45) were also asked to give their subjective opinion on which influencers they trust when it comes to vaccination. For this purpose, a four-item questionnaire (see Table 3) was used to assess the *level of trust* in representatives of state medical organizations, representatives of regional and federal authorities and bloggers. Cronbach's alpha internal consistency was 0.89.

Additionally, respondents were asked to answer three *provocative sociological questions*: 1) "When do you think the epidemic caused by COVID-19 will end?" with multiple answers: 2022, 2023, 2024, COVID-19 will not go away; 2) In your opinion, when will the infodemic ("infection" with rumors, fakes and informational provocations that sow panic in social networks and the media around COVID-19 pandemic) end? with multiple answers: 2022, 2023, 2024, Panic in the media will be supported and this topic will not be released; 3) According to the Deputy Prime Minister of the Government of Russia Tatyana Golikova, as of January 14, 2022, 76.7 million Russians were vaccinated against COVID-19 in the country, which is 53% of the total population. However, there is a lot of information in the media about cases when a person has a certificate of vaccination, but he did not get vaccinated against COVID-19. What percentage of Russians do you think actually got vaccinated against COVID-19? (enter any number from 0 to 100%).

Respondents' gender, age, subjective income level, degree of urbanization and seed status were also taken into account.

Sample. The core study population comprises 376 nurses from different Russian regions. It was homogeneous in professional affiliation (doctors) and status (middle medical staff), which allows limiting the number taken. Demographic indicators were also included. The respondents' age ranged from 20 to 69 years ($M = 43$, $SD = 9.68$). 95.5% were women. The quantitative distribution of respondents by methods is given in Appendix 1. The characteristics of the samples covered by the empirical study are given in Appendix 2.

Data from two control surveys conducted by the authors were used to compare nurses' and Russians' attitudes to vaccination. The first survey was conducted from October 23 to November 12, 2021 (a more complete analysis of the results of the quota sample of Russians is given in the monograph, which is now being proofread and is being prepared for publication), $n=1214$ (54.7% women), aged 16 to 90 years ($M=29.68$, $SD=9.71$) with the geography of the survey: the capital – 8.9%, other metropolitan areas – 22.7%, regional centers – 32.6%, district centers – 35.8%. The second survey carried out on February 4, 2022, involved 388 people (53.4% of them women, $M=42.16$ years), geographically distributed as follows: the capital – 10.8%, metropolitan areas – 26.3%,

regional centers – 33.2%, district centers – 29.6%. The Yandex-Toloka service was used for both surveys (two control samples).

Analytic strategy. Data processing included exploratory factor analysis with Varimax rotation and Kaiser normalization, correlation analysis using Spearman's coefficient, and Mann–Whitney mean comparison test. All calculations were performed via SPSS v. 20.0.

Results

Methodological testing of the vaccination attitudes questionnaire confirmed its validity and reliability. Table 1 shows the data factor analysis results.

Table 1

The Results of the Exploratory Factor Analysis of the Questionnaire Data and Descriptive Statistics (n=376)

Statements	Components		M (SD)
	F1	F 2	
1. Mass vaccination of the Russians against COVID-19 is necessary	0.826	-0.345	3.37 (1.33)
2. I trust in COVID-19 vaccines	0.827	-0.367	3.33 (1.29)
3. Most of the people around me do not believe that COVID-19 vaccine is safe.	-0.360	0.392	3.32 (1.11)
4. Financial bonuses to doctors working in red zones corrupt them	0.164	0.701	2.45 (1.38)
5. I do not believe that COVID-19 vaccines are effective	-0.760	0.407	2.55 (1.31)
6. Viruses like COVID-19 are artificially created for a purpose	-0.345	0.560	3.57 (1.08)
7. Epidemics help the rich control the population of the poor	-0.251	0.682	2.89 (1.24)
8. The danger of epidemics like COVID-19 is clearly exaggerated	-0.297	0.565	2.80 (1.25)
9. I am annoyed that the WHO still has not approved (registered) a high-quality domestic vaccine Sputnik V	0.666	0.304	3.29 (1.13)
Factor weight (%)	42.2	19.3	

Note: the table shows the factor loadings of the variables after rotation. The most significant factor loadings are highlighted in bold.

Exploratory factor analysis on the attitudinal questionnaire data identified two factors: F1 – the factor of adherence to vaccination and trust in vaccines, and F2 – the factor of distrust in doctors, vaccines, combined with belief in conspiracy theories. The first factor was formed by the degree of agreement with statements confirming the belief in the effectiveness of vaccination and the need to distribute it widely, as well as disappointment that the Russian Sputnik V vaccine has not yet been approved by the WHO. The reverse was true for disbelief in the vaccine's efficacy against COVID-19. The

second factor combined mistrusting doctors, conspiracy theories, downplaying the biogenic threat and disbelief in the effectiveness of COVID-19 vaccines. Vaccine Attitudes Questionnaire's factor structure confirmed its factorial validity. The Vaccination Adherence Scale (1, 2, 5, 9 items) and the Vaccination Distrust Scale (4, 6, 7, 8 items), 3rd item – neutral. The reliability test according to Cronbach α also showed high values for both scales (for the Confidence scale $\alpha=0.87$; for the Distrust scale $\alpha=0.80$). As shown in the descriptive statistics, the nurses dominated in vaccinating.

Table 2 shows that nurses are more supportive of compulsory mass vaccination than the general population sample. The fact that the high-quality domestic vaccine Sputnik V has still not been registered by the WHO is of greater concern to nurses. Disappointment about the lack of global acceptance of Sputnik V is highest among nurses who trust vaccines against COVID-19 ($r=0.34$, $\rho<0.001$) and consider mass vaccination necessary ($r=0.31$, $\rho<0.001$). Significantly more nurses believe in conspiracy theories, such as: "The rich use epidemics to regulate the number of poor" and "Viruses like COVID-19 are artificially created for some purpose". Medical professionals are thought to be more aware of pathogens that can be studied in special laboratories, including bioweapons laboratories.

Table 2

Results of Comparative Analysis of Adherence to COVID-19 Immunoprophylaxis (Five-Point Response Scale)

Statements	Nurses (n=376)		Quota sample of Russians (n=1214)		p
	M	SD	M	SD	
1. Mass vaccination of the Russians against COVID-19 is necessary	3.37	1.33	2.98	1.34	<0.001
2. I trust in COVID-19 vaccines	3.33	1.29	-	-	-
3. Most of the people around me do not believe that COVID-19 vaccine is safe	3.32	1.11	3.49	1.16	-
4. Financial bonuses to doctors working in red zones corrupt them	2.45	1.38	-	-	-
5. I do not believe that COVID-19 vaccines are effective	2.55	1.31	-	-	-
6. Viruses like COVID-19 are artificially created for a purpose	3.57	1.08	2.95	1.23	<0.001
7. Epidemics help the rich control the population of the poor	2.89	1.24	2.43	1.22	<0.001
8. The danger of epidemics like COVID-19 is clearly exaggerated	2.80	1.25	2.81	1.15	-
9. I am annoyed that the WHO still has not approved (registered) a high-quality domestic vaccine Sputnik V	3.29	1.13	3.08	1.19	<0.010

Note: M – mean value, SD – standard deviation, p – error probability. Mean values are given in points, where 1 – completely disagree, and 5 – absolutely agree. Omissions indicate that not all statements offered to nurses were included in the control sample questionnaire.

Table 3 shows the results for the nursing and Russian control samples. Respondents answered the question “Who is more trusted by the population of different ages in connection with the need to be vaccinated against COVID-19?” Nurses and respondents in the Russian sample believe that young people have a special trust structure formed by media consumption through social networks. Younger people tend to trust bloggers more, while younger people's trust in government medical organisations is almost double that of the over-45s (silver and gold), who are less involved in communicating on social networks. In addition, older people usually have an established system of moral values and communication etiquette that is easier to transfer to the digital environment than younger people, protecting them from manipulative, 'toxic' information. Also, a study of Moscow doctors' adaptation characteristics found that doctors between 50 and 60 years of age had lower anxiety than those between 30 and 40 years of age [33]. This finding is consistent with other authors' findings on celebrity involvement in social advertising for immunisation [45]. Regional authorities are not equally trusted by the older and younger generations.

Table 3

Evaluation of Confidence in Agents of Influence Regarding the Need to Be Vaccinated in Different Age Groups (%)

Influence group	Nurses (n=376)		Control sample (n=388)	
	under 45 y.o.	45+ y.o.	under 45 y.o.	45+ y.o.
Representatives of state medical organizations	43.4	77.1	41.0	64.2
Representatives of regional authorities	1.3	4.0	4.4	6.4
Representatives of federal authorities	2.7	14.1	3.6	20.9
Bloggers (persons who have a lot of followers on social networks)	52.7	4.8	51.0	8.5

Table 4 shows the results of nurses' answers to the questions about the prospects for the end of COVID-19 pandemic and infodemic. Responses to the question “When do you think the epidemic caused by COVID-19 will end?” were as follows: 2022 (13.3%), 2023 (16.5%), 2024 (13.6%), COVID-19 will not go away 56.6%. In early 2022, 43.4% of nurses were optimistic about when the epidemic would end, choosing options for the next two years (2022–2024), and 56.6% believed COVID-19 would not disappear. When asked “In your opinion, when will the infodemic (“infection” with rumors, fakes and informational provocations that sow panic in social networks and the media around COVID-19 pandemic) end?”, respondents distributed themselves as follows: in 2022 – 16.0%, in 2023 – 13.6%, in 2024 – 8.8%, panic in the media will be supported, since it is beneficial to both the authorities and pharmaceutical companies – 61.7%. The estimated coverage of Russians vaccinated against COVID-19 in the nurses' group was M=42.18, SD=11.22, 10.82% less than the official figure (53%). This is just over half the target for herd immunity (80%). Nurses therefore felt pessimistic about the current situation and prospects for ending the COVID-19 pandemic.

Table 4

The Results of Nurses' Answers to the Questions About the Prospects for the End of COVID-19 Pandemic and Infodemic, and Subjective Assessment of the Real Level of Vaccination among Russians (%)

<i>Question 1. When do you think the epidemic caused by COVID-19 will end?</i>			
Response options			
in 2022	in 2023	in 2024	COVID-19 will not go away
13.3%	16.5%	13.6%	56.6%
<i>Question 2. In your opinion, when will the infodemic ("infection" with rumors, fakes and informational provocations that sow panic in social networks and the media around COVID-19 pandemic) end?</i>			
Response options			
in 2022	in 2023	in 2024	Panic in the media will be supported and this topic will not be released
16.0	13.6	8.8	61.7
<i>Question 3. According to the Deputy Prime Minister of the Government of Russia Tatyana Golikova, as of January 14, 2022, 76.7 million Russians were vaccinated against COVID-19 in the country, which is 53% of the total population. However, there is a lot of information in the media about cases when a person has a certificate of vaccination, but he did not get vaccinated against COVID-19. What percentage of Russians do you think actually got vaccinated against COVID-19? (enter any number from 0 to 100%).</i>			
The level of vaccination of Russians	Official statistics		Subjective assessment of nurses
	53%		42.18%; SD=11.22%

Correlation Analysis Results. Only one demographic factor, subjective income level, showed an association with the survey data. Nurses with higher perceived incomes were more optimistic about how long the pandemic lasted. Conversely, correlation analysis showed that the lower respondents' subjective income, the more confident they were that the pandemic would not end quickly ($r=0.15$, $p<0.001$).

The correlation analysis also showed that the degree of agreement that financial bonuses to doctors working in the red zones corrupt and encourage them to abuse correlates with the belief that "the danger of epidemics like COVID-19 is clearly exaggerated" ($r=0.30$ at $p<0.001$), i.e. manifestation of the so-called "COVID dissidence" [9; 33] among nurses. Those who trust vaccines against COVID-19 and believe that mass vaccination of Russians against COVID-19 is necessary are more irritated that WHO has not yet recognized (registered) a high-quality domestic vaccine Sputnik V ($r=0.34$ at $p<0.001$).

Discussion

The survey of nurses from different regions of Russia revealed their subjective assessment of the vaccine coverage in Russia, deviating from the official figure by 10 p.p. This indicator is less than half of that required to achieve herd immunity from COVID-19. Inadequate public participation in the COVID-19 vaccination campaign is largely due to failure to perceive the reality of the threat [27] and mistrust of health authorities [31]. There is a need to investigate the opinions of health care professionals, which influence the decision to vaccinate [7; 44].

Nurses were more confident about mass vaccination than the general population, which is in line with data from other authors. Some authors [44] consider negative experiences related to COVID-19, illness, and loss of loved ones and acquaintances to be of greater importance than medical knowledge. Nurses in Russia worry that the country's vaccine, Sputnik V, is still awaiting WHO's approval. They also showed higher conspiracy theory beliefs than the Russian sample.

According to the majority of respondents, COVID-19 will never disappear from society (56.6%), which may be due not only to pessimism, but also to medical knowledge, since the virus mutates and some of its versions become flu-like. Almost two-thirds of nurses (61.7%) believe that the media will continue to encourage panic, because it benefits the authorities and pharmaceutical companies, demonstrating a distrust of government agencies, the media and medical companies. Perceptions of exaggerated danger from epidemics like COVID-19 are closely linked to suspicions that extra pay for working in red zones encourages abuse by medical staff.

An analysis into nurses' beliefs about who they trust most showed that young adults are more likely to trust bloggers, while young adults are almost half as likely to trust government health officials as those aged 45+. Scientists largely explain this level of trust by younger people's emotional attachment to bloggers' activities. Both older and younger nurses are least likely to trust local government. The results obtained indicate the inadequate implementation of pandemic-related information policies at regional level. It is also important to improve nurses' skills and information literacy to strengthen their authority as an influential group on the population during mass vaccination.

Conclusions

There are still very few empirical studies on nurses' attitudes to vaccination, despite the fact that medical professionals' opinions about vaccines and trust in them are quite important and influence the immunoprophylaxis of the population. COVID-19 pandemic healthcare worker research highlights burnout while working in red zones, as well as issues facing by healthcare during the pandemic. Our study focuses on nurses' attitudes to vaccination against the backdrop of a pandemic and infodemic. A scaled questionnaire was developed to assess trust and distrust in vaccines and vaccination. The results showed that Russian nurses overwhelmingly adhered to vaccination, and expressed disappointment that WHO had not registered Russian high-quality Sputnik V vaccine. At the same time, most of the nurses were found to believe in the artificial origin of the

COVID-19 virus and that the coronavirus infection is here to stay, both as a medical fact and as an information campaign. It turned out that while younger people and those involved in social networks trust information from bloggers, people in the 45+ generation trust state medical organizations more. The results are useful for nursing training and for implementing an information policy on immunoprophylaxis via social networks.

Research Perspectives and Limitations

Future research should analyze the differences between nurses' and doctors' attitudes to vaccination, as well as the psychological factors that strengthen nurses' authority in immunoprophylaxis.

The limitation of the study is that the data were obtained only on a generalized sample of nurses from different regions of the country (mainly All-Russian Nurses Association members), which does not allow us to obtain regional differences in data.

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APPENDIX 1

Quantitative Distribution of Subjects by Methods

№	Instruments	Samples		
		Nurses (research period: 20.01.2022– 30.01.2022)	1 st control sample (research period: 23.10.2021– 12.11.2021)	2 nd control sample (research period: 04.02.2022)
1	Vaccination Attitude Scale	376	1214	-
2	Assessing confidence in vaccinating against COVID-19	376	-	388

APPENDIX 2

Characteristics of Samples Covered by Empirical Research

№	Group	n	% of men	% women	Average age (SD)
1	Nurses	376	4,5	95,5	43,01 (9,68)
2	1st control sample	1214	45,3	54,7	29,68 (9,70)
3	2nd control sample	388	46,6	53,4	42,16 (10,81)

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