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Behavioral Insights Informing the Pandemic Response in the City of Moscow

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Abstract

Background. The public response to the coronavirus pandemic, including their uptake of protective measures, was critical for containing the virus, and this required effective interventions, policy decisions, and public communication that took into account the perspectives of the population. The main goal of the study was to explore public perceptions, behaviors, and well-being of the population of Moscow, Russian Federation, to inform the pandemic response.

Methods. A survey tool originally developed by the WHO Regional Office for Europe with support from the University of Erfurt, Germany, was adapted to the Moscow (Russian Federation) context. Computer-assisted telephone interviews (CATI) were conducted using a stratified, two-core sample of landline and mobile phones. Three waves of data collection took place from mid-May 2020 to mid-June 2020: 1) May 13–18, 2020, n = 1019 people; 2) May 26, 2020 – June 1, n = 1000 people; 3) June 16–24, 2020, n = 993 people.

Findings. The study identified the awareness of Moscow residents about the coronavirus, their perceptions, understanding of the pandemic situation and behavioral responses to measures taken by the authorities to reduce the spread of COVID-19.

Interpretation. Monitoring of public perceptions, behaviors, and well-being allowed a people-centered approach, which took into account population perspectives alongside epidemiological data and economic, cultural, ethical, and structural-political considerations, to become the basis for an effective coronavirus response.

Research funding. The study collection was funded by the WHO Regional Office for Europe.

Keywords: BCI; behavioral and cultural insights; COVID-19; Moscow; response

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Принятие обоснованных решений на основе анализа поведенческих факторов в период пандемии: опыт города Москвы

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Аннотация

Введение. Сдерживание коронавирусной инфекции требовало активного общественного реагирования, в том числе принятия защитных мер в ответ на вызовы пандемии. В связи с этим понадобились эффективные вмешательства, политические решения и мероприятия по информированию общественности, которые учитывали бы взгляды населения на сложившуюся ситуацию.

Цель. Изучить восприятие, поведение и благополучие населения Москвы и определить, как эти переменные влияют на принятие обоснованных решений при выработке ответных мер в период пандемии.

Материалы и методы. Оригинальный инструментарий был разработан Европейским региональным бюро Всемирной организации здравоохранения (ЕРБ ВОЗ) при поддержке Эрфуртского университета, Германия, и адаптирован под особенности Москвы. Для исследования был выбран метод телефонного опроса (CATI). Реализована стратифицированная двухосновная выборка стационарных и мобильных телефонов. Было проведено три волны обследования: 1) 13–18 мая 2020 г., n = 1019 чел.; 2) 26 мая 2020 г.–1 июня, n = 1000 чел.; 3) 16–24 июня 2020 г., n = 993 чел.

Результаты. Выявлена информированность жителей Москвы о коронавирусе, их восприятие и понимание ситуации, связанной с пандемией, и их поведенческие реакции на меры, предпринимаемые органами власти по противодействию распространению инфекции COVID-19.

Выводы. Проведение мониторинга восприятия, поведения и благополучия населения позволяет использовать человеко-ориентированный подход, когда особенности понимания населения наряду с эпидемиологическими данными и соображениями экономического, культурного, этического и структурно-политического характера являются основой для действий по борьбе с коронавирусом.

Финансирование. Сбор данных для исследования осуществлялся при финансовой поддержке ЕРБ ВОЗ.

Ключевые слова: АПКФ; поведенческие и культурные факторы; COVID-19; Москва, ответные меры

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Introduction

The COVID-19 pandemic posed unprecedented challenges to governments and populations everywhere and placed a heavy burden on health systems. Above all, as argued by Rettie and Daniels [1], the pandemic was characterized by uncertainty due to the continuously evolving evidence related to the virus and its impact on different population groups, as well as shifting responses from governments and health systems.

Psychologically, this uncertainty about the likelihood of contracting the disease, its potential severity, and the ability to contain the virus was critical for individual and community risk perceptions and their acceptance and uptake of public health and social measures (PHSM); Koffman and colleagues stress that uncertainty can have a profound negative impact among the population and health workers [2].

Uncertainty can also pose a risk to mental wellbeing. In a literature review, Brooks and colleagues note that quarantine measures can lead to increased stress levels and symptoms such as anxiety, irritability, emotional distress, and insomnia [3]. The effect depends on the time spent in isolation, including how clearly the time of its ending was defined. Moreover, the possible consequences of social isolation may be more severe for people who are more intolerant of uncertainty and less psychologically flexible [4].

In response to this, experience from previous health crises could be used to reduce uncertainty and improve the systems' preparedness and response. Sharma and colleagues found that countries' past pandemic experiences have positively influenced their response to COVID-19, "With data collected from various sources and using an empirical methodology, [...] centralized governance positively affects reactive strategies, while healthcare infrastructure and learning from past pandemics positively influence proactive and reactive strategies" [5]. However, evidence shows that learning from the past was not straight-forward during this pandemic. Having studied the resilience of the healthcare system during the pandemic in countries such as Iran, Japan, South Korea, the United Kingdom, and the United States, researchers note that most countries still failed to build resilient health systems that could respond to public health emergencies [6].

Given this high degree of uncertainty and its adverse implications for population perceptions, behaviors, and mental health, as well as the lack of ability of many countries to have prepared resilient health systems for a crisis, there has been an urgent need that PHSM, policies, and communication are appropriate and acceptable and take into account the perspectives of those whose behaviors we wish to affect.

With regard to communication, Tambo and colleagues note that distrust, fear, as well as misinformation (the so-called infodemic) can reduce the effect of measures to contain virus transmission [7]. Several studies confirm this notion. A population study in England, Scotland, and Wales conducted during the early stages of the 2009 pandemic of influenza A/H1N1 virus showed that, despite a World Health Organization (WHO) statement on high risk, substantial media reporting, and an advertising campaign mounted by the United Kingdom government, the population risk perception was generally low. Moreover, the majority of respondents reported that they practically did not change their behavior in accordance with the recommendations.[8] This was deemed largely due to the public perception of the media, which, according to the respondents, exaggerated the risks and scope of the problem, "another example of scientists and media 'crying wolf'" [8]. In their studies [9] conducted during the COVID-19 pandemic in Lebanon, Jordan, and Tunisia Faour-Klingbeil and colleagues focus on the degree of people's confidence in the information received from scientists and local authorities. The latter was perceived to be credible by less than half of respondents. For the majority of respondents, social networks were one of the main sources of information, even if some of the information published in them was deemed to be unreliable. The challenge of communication and evoking an appropriate level of risk perception is clear. In response to these challenges, researchers pointed out that understanding public opinion, problems, views, and beliefs of key audiences, their behavior, and knowledge are critical for successful communication [7].

Drawing on these lessons and the need to take into account the population perspective for an effective pandemic response and virus containment, at a time when an overburdening of the health system and escalating epidemic required rapid and impactful action, it was decided to conduct a series of behavioral insights surveys with the population of the City of Moscow, Russian Federation with the aim to inform and support the local pandemic response, including the critical role of official communication. The relevance of focusing on the Moscow population was evident, as it amounts to about 10% of the country's population, and more than half of all confirmed cases (as of April 29, 2020, at the beginning of preparation for the monitoring study – 52,846 out of 105,240) and deaths (613 out of the total 1080) were registered in Moscow [10]. As in many regions of the Russian Federation, in the first days of the pandemic, a Coordination Council was created in Moscow to ensure measures to contain the virus while responding to the shifting evidence and epidemiology. In cooperation with the WHO Regional Office for Europe (WHO/Europe), the Moscow Healthcare Department in April 2020 adapted a survey tool provided by WHO/Europe to the local context. The main objective of the

study was to gain insights into risk perception, knowledge, emotional response and well-being, trust, information, and attitudes towards the pandemic response initiatives in order to inform the COVID-19 outbreak response, including policy decisions and communications. An important focus of the research was the monitoring of the behavioral reactions and perceptions of the population as measures were imposed [11] and lifted [12].

Methods

We conducted a serial cross-sectional study, as this method allowed direct and rapid data collection and incurred minimal risk to respondents. The study was observational, and participation was voluntary.

Data collection was carried out under the supervision of the Research Institute for Healthcare Organization and Medical Management of Moscow Healthcare Department (Research Institute NIIOZMM) and by Center for Sociological Research "Romir Lipetsk". Data was collected in three waves using computer-assisted telephone interviewing (CATI) on a stratified random two-core sampling of mobile and landline phone numbers in May-June 2020: 1) May 13-18, 2020, n1 = 1019 people; 2) May 26–June 1, 2020, n2 = 1000 people; 3) June 16-24, 2020, n3 = 993 people. Later in 2021, two additional waves regarding vaccination were carried out, but they are not the focus of the article.

Almost all of the Moscow population has mobile or landline phones. The call center collected data from a new random sample for each round based on the existing range of Moscow telephone numbers using randomization that ensures a representative sample. The random stratified sampling was conducted based on official data on age and sex in the Moscow population [13].

The survey was conducted in Russian. The questionnaire, originally created in English, was translated into Russian by professional translators familiar with the work of the WHO as well as the terminology related to COVID-19 and behavioral sciences. The Russian version of the questionnaire was adapted for this survey by the Research Institute NIIOZMM. Items were adapted to local features of the Russian Federation and Moscow, using data from surveys previously conducted in the Russian Federation, the epidemiological situation in Moscow, and existing response measures to the pandemic. Based on the experience and common practices in the Russian Federation, the method was also adapted to computer-assisted telephone interviewing (CATI). The final questionnaire and protocol were peer reviewed by two external reviewers, and their comments led to a few changes in both documents. The questionnaire included informed consent as well as 48-64 questions (the number varied from wave to wave) related to self-reported behaviors, perceptions, and well-being. Where possible, already validated scales were used.

We used chi-square analysis to examine the relationship among nominal variables. The significance of mean differences in quantitative variables was determined using the Student's t-test, following Levene's test of variance equality. This is frequently used in sociological and psychological studies. A difference between waves was stated if the significance value p in the z-test (for categorical variables) or t-test (for scale questions) was less than 0.0001, and the presence of a trend was stated if $p<0.05$.

It should be mentioned that the cross-sectional study design did not allow assessing the actual causal-effect relationships. Instead, it provided an opportunity to understand the current COVID-19-related situation and public behavior.

Response distribution is shown based on the data of a weighted sample, taking into account the probability of the respondent being included in the mobile phone sampling.

Results

Compliance with preventive measures

We found that respondents had a high subjective opinion about their awareness of the coronavirus (the mean group indicator varies from 3.80 (SD =±1·13) to 3.92 (SD =±1·07) points out of 5.0, Fig. 1), as well as ways to prevent the virus.

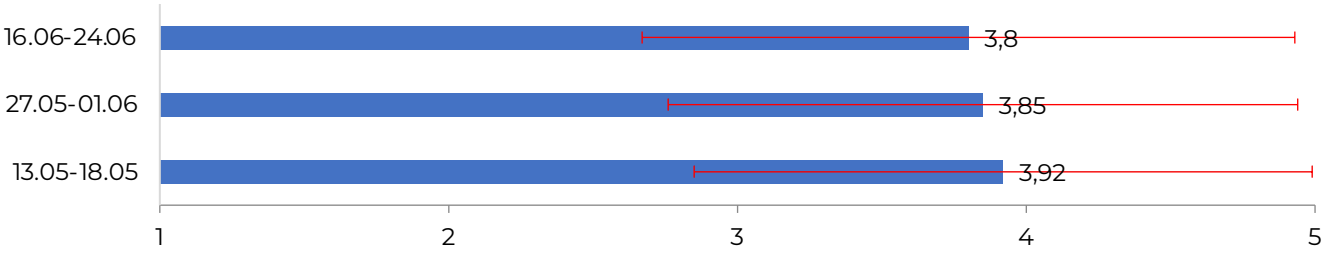


Figure 1 – Self-assessment of coronavirus awareness by Moscow respondents, including protection measures (on a 5-point scale, where 1 – "I know nothing about coronavirus at all", 5 – "I know a lot about coronavirus")
Рисунок 1 – Самооценка жителей Москвы своей осведомленности о коронавирусной инфекции, в том числе о защитных мерах (по пятибалльной шкале, где 1 – «Я совершенно ничего не знаю о коронавирусе», а 5 – «Я знаю много о коронавирусе»)

Along with it, during the period of main recommendations and restrictions (the requirement to use masks and gloves in public places, to keep social distance [14], recommendations for washing hands, using sanitizers [15], as well as the requirement not to leave the place of residence [14, 16] in effect during the first and second waves of the study) most Muscovites (from 60 to 93% respondents when answering questions about the use of various preventive measures) self-report upholding recommended protective behaviors (Fig. 2-4).). But by the third wave of the study, we saw a decrease in adherence to preventive measures.

The study revealed a number of challenges. An important identified issue in the context of the

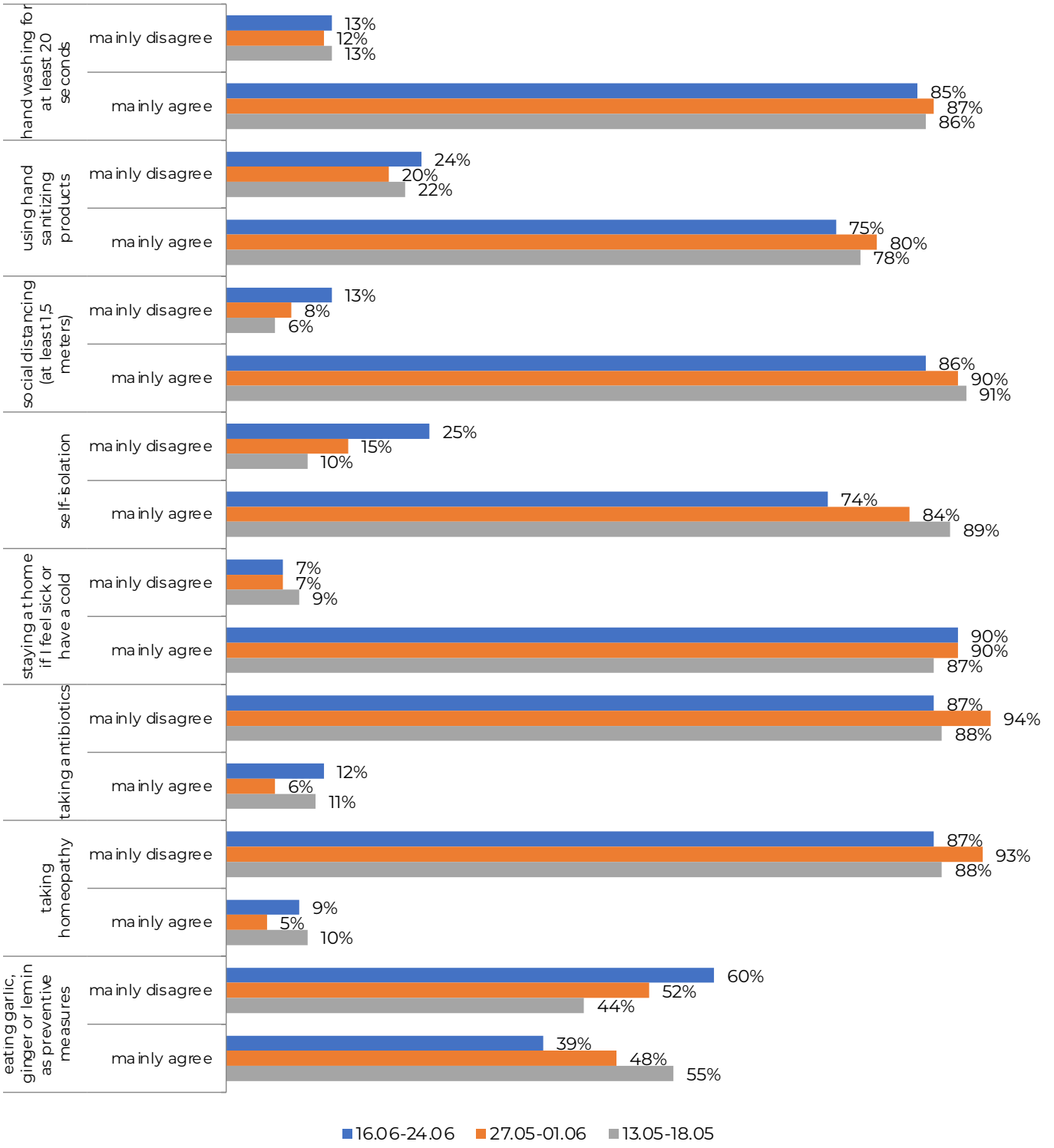
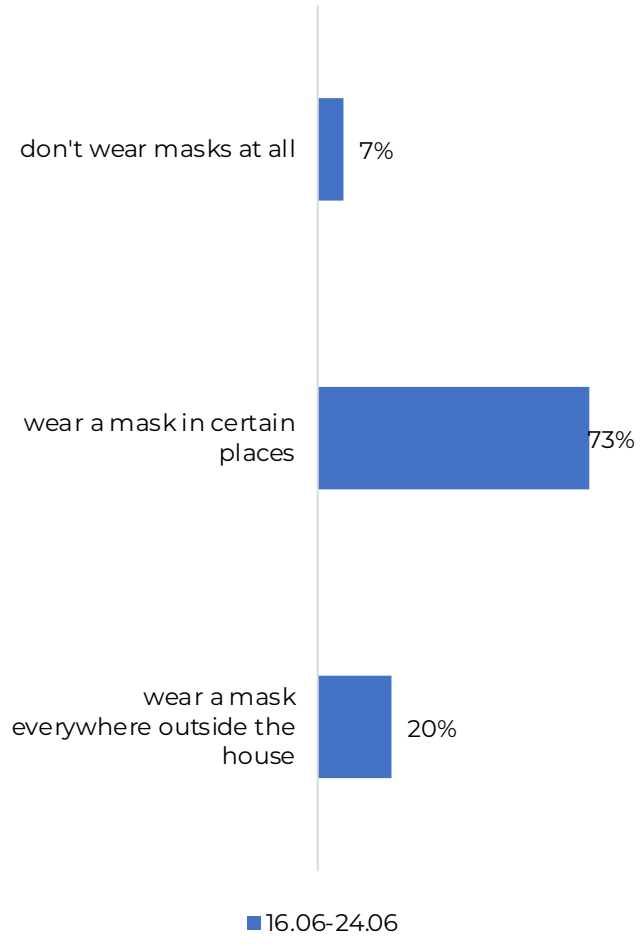


Figure 2 – Agreement with recommended health-protective behaviors ("Don't know" answer is not shown)
Рисунок 2 – Динамика соблюдения рекомендуемых моделей защитного поведения (на графике исключен вариант ответа «Затрудняюсь ответить»)

high self confidence in knowledge (Fig. 1) was that in the different waves of the study from 39% to 55% of respondents considered the use of garlic, ginger or lemon an effective preventive measure, and from 6% to 12% of respondents answered that they take antibiotics to avoid the infection, and from 5% to 10% were using homeopathy.

Also, not all the respondents self-reported intending to stay at home in case of illness at the time when staying isolated in case of symptoms was a clear and critical recommendation worldwide. Also, during the period of the requirement not to leave the place of residence [14], 39% of Muscovites indicated they did not ask family members not to visit them (Fig.3).

Figure 3 – Respondents' agreement with a statement describing their behavior intentions during a pandemic (visits)
Рисунок 3 – Динамика согласия респондентов с утверждениями, характеризующими их поведенческие намерения во время пандемии COVID-19



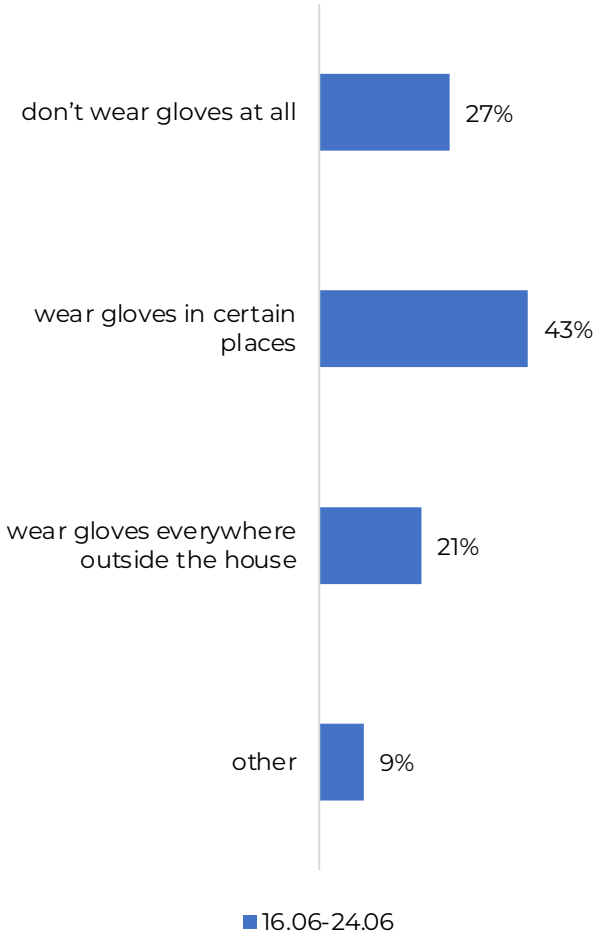


Figure 4 – Respondents' opinion on wearing a mask during the COVID-19 pandemic
Рисунок 4 – Мнение респондентов о необходимости соблюдения масочного режима в период пандемии COVID-19

Figure 5 – Respondents' opinion on wearing gloves during the COVID-19 pandemic
Рисунок 5 – Мнение респондентов о необходимости соблюдения перчаточного режима в период пандемии COVID-19

During the period of the requirements for wearing masks and gloves in public [16], according to the data collected during the third wave of the survey, 7% of respondents said that they never wore a mask, and 27% did not wear gloves (Fig. 4, 5), not least because they considered these measures ineffective (as evidenced by the open-ended question).

In order to identify the key drivers of adherence to preventive measures, in the second wave of the survey, respondents were asked to select the main reasons that induced them to comply with self-isolation, and in the third, the reasons for wearing a mask (Figure 6, 7). The results were comparable. The main reason for following the measures was the fear of getting sick. The other important reasons were concern for others and obeying the law. The least common reason was reluctance to pay a fine.

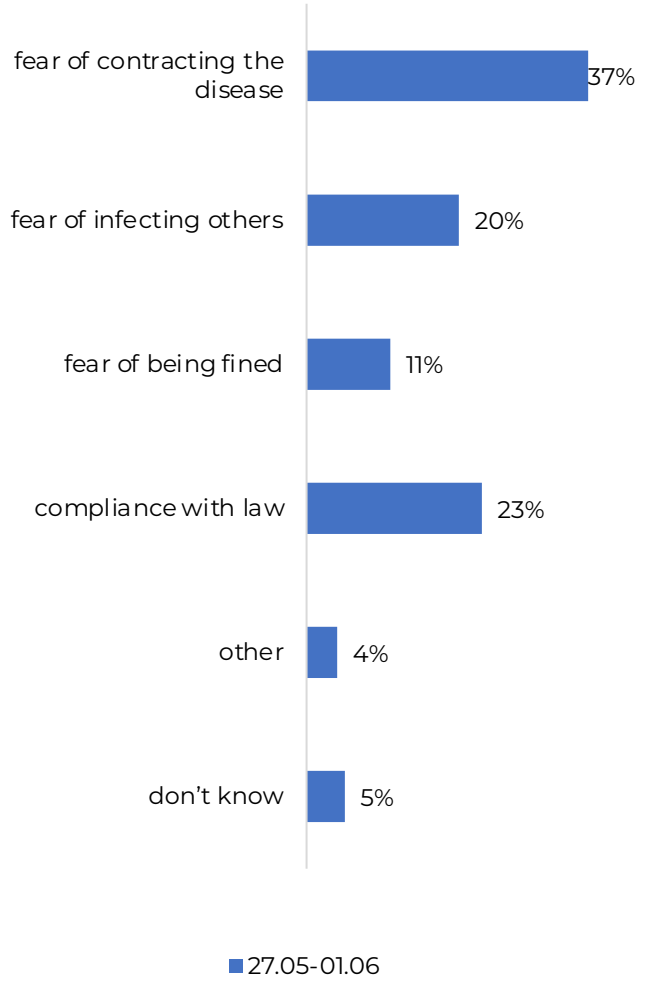


Figure 6 – Key drivers of respondents' adherence to self-isolation
Рисунок 6 – Ключевые факторы, мотивирующие респондентов придерживаться самоизоляции

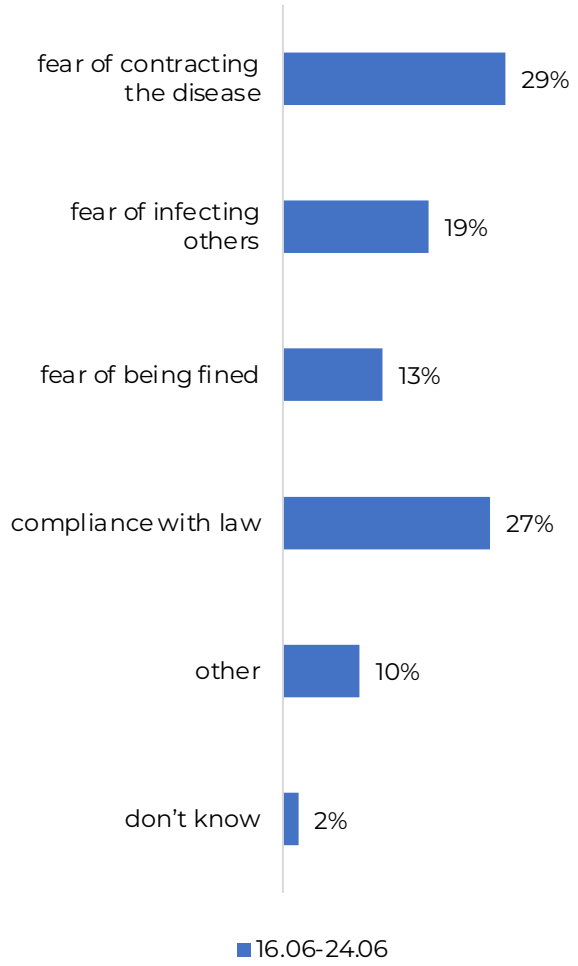
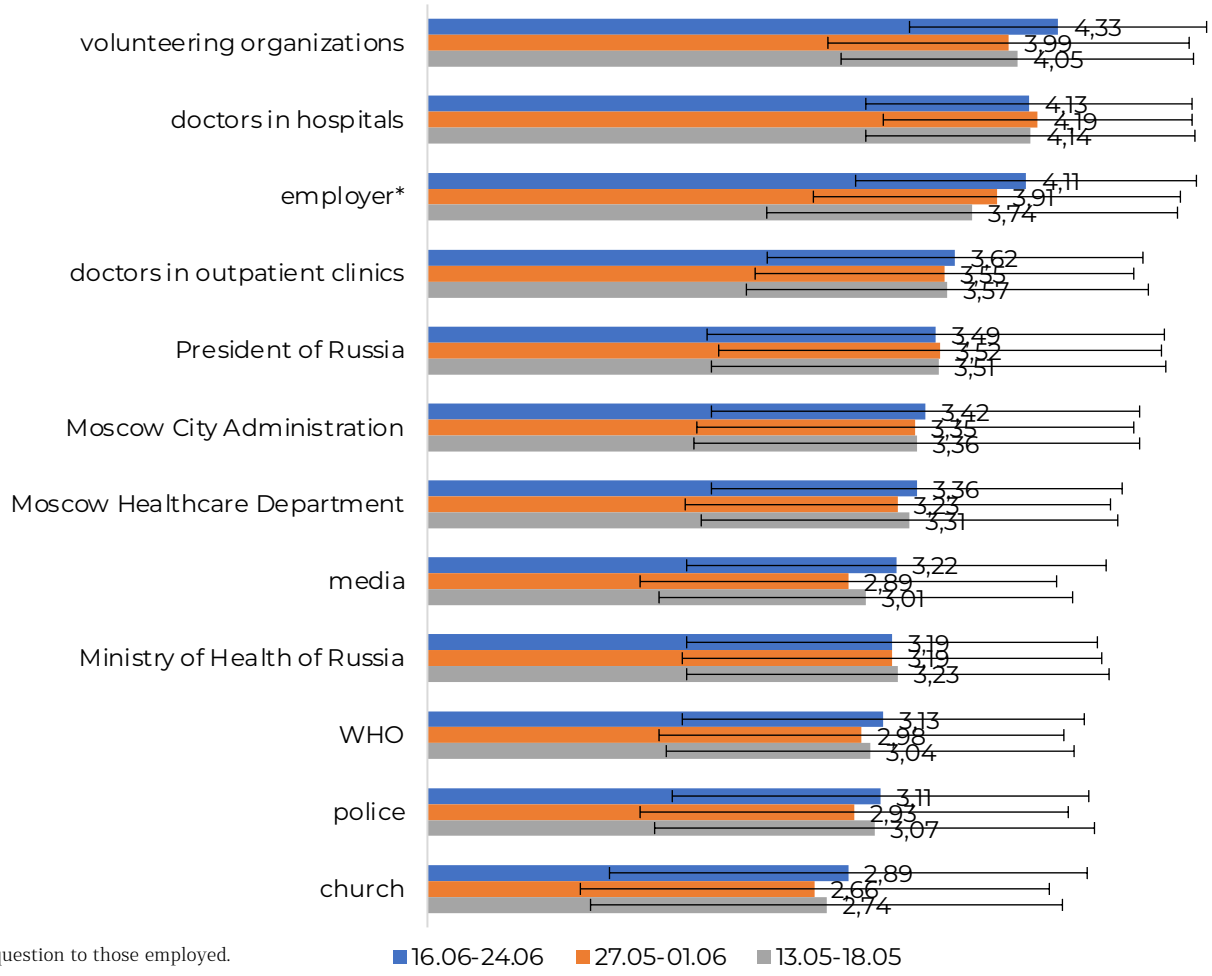


Figure 7 – Key drivers of respondents' adherence to wearing a mask
Рисунок 7 – Ключевые факторы, мотивирующие респондентов носить маску

In general, according to the study, the population was sure that doctors in hospitals, volunteers, and employers (for those who were employed) were coping especially well with the coronavirus (Fig. 8).

During the third wave of the survey, 39% of respondents indicated their readiness to follow all the official recommendations in the event of a new COVID-19 outbreak. The majority of respondents (54%) would adhere only to the measures that they deemed justified; another 5% would not comply with the recommendations at all (Fig. 9).



*A question to those employed.

Figure 8 – Assessment of the Muscovites' confidence in the effectiveness of efforts of individuals and organizations to combat coronavirus
Рисунок 8 – Оценка уверенности жителей Москвы в хорошей работе лиц и организаций в борьбе с коронавирусом

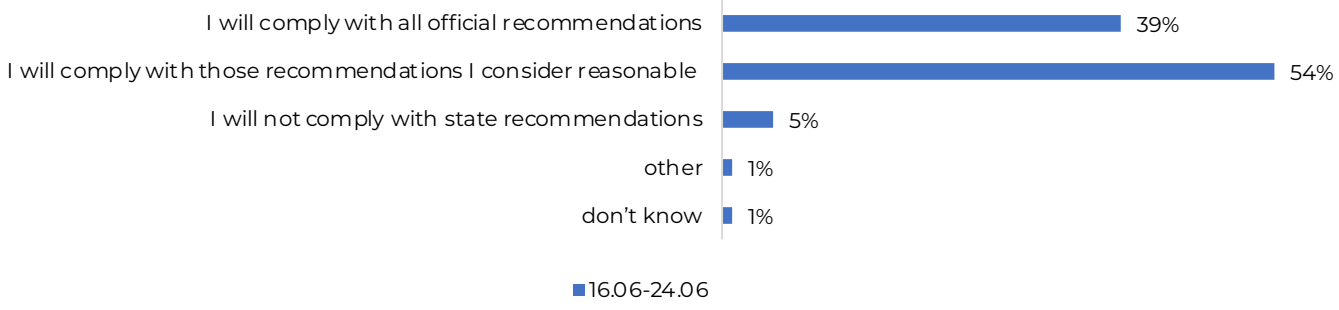


Figure 9 – Respondents' adherence to measures in case of a second wave of coronavirus (assessment)
Рисунок 9 – Оценка приверженности респондентов защитным мерам в случае второй волны коронавируса

Public health and healthy lifestyles

Social restrictions imposed to fight the spread of COVID-19 have led to a transformation of health-saving practices and healthy lifestyles (HLS). We observed a notable decline in the latter: 55–66% agreed that they "did physical activity less than usual," 42-49% agreed that they "followed the daily regime less than usual," and 20-21% "ate unhealthy food more than usual."

It is noteworthy that, according to the third wave of the survey, in the period from June 16 to 24, 2020, the number of respondents who assessed their health status as low ("weak" and "very weak," Fig. 10) increased from 9% to 13% (as a tendency, p = 0·015). The number of

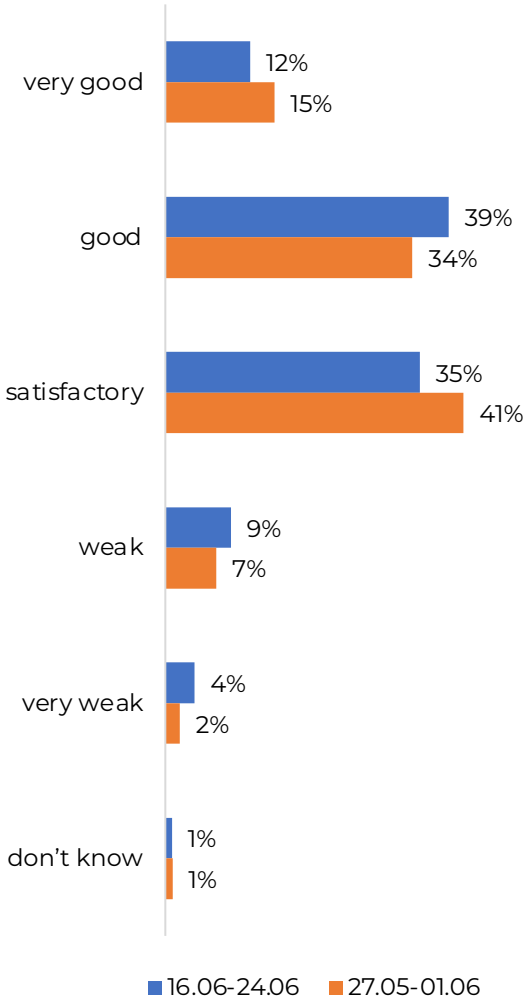


Figure 10 – Respondents' opinion on their health level during the pandemic (second and third waves of study)
Рисунок 10 – Мнение респондентов о состоянии своего здоровья в период пандемии (результаты второй и третьей волн обследования)

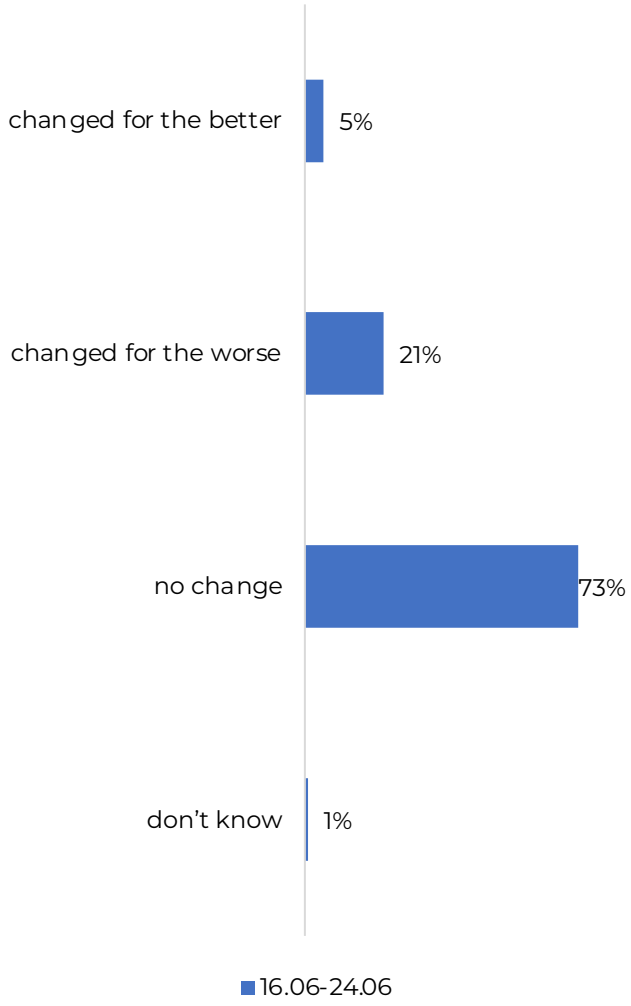


Figure 11 – Respondents' opinion on changes in their health during the pandemic (third wave of study)
Рисунок 11 – Мнение респондентов об изменении своего здоровья за период пандемии (результаты третьей волны обследования)

those who believed that their health had deteriorated during the pandemic was 21% (Fig. 11).

According to the results of the third wave of the study, 30% of respondents claimed to have experienced a need for medical care during the pandemic (Fig. 12). It mainly was COVID-19 risk groups: older people (p=0·034) and people with chronic conditions (p<0·0001).

At the same time, about 13% of the population who needed medical care reported not receiving it, and about 5% said they were denied services by a medical institution (Fig. 13).

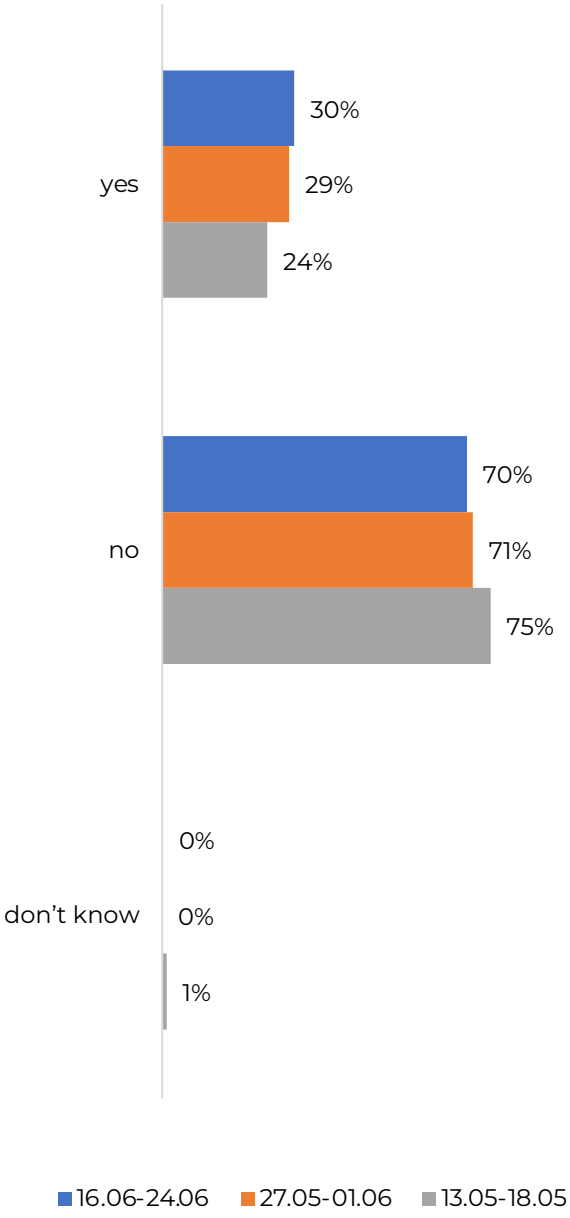


Figure 12 – Respondents' assessment of their need to seek medical care during a pandemic
Рисунок 12 – Оценка респондентами необходимости обратиться за медицинской помощью в период пандемии

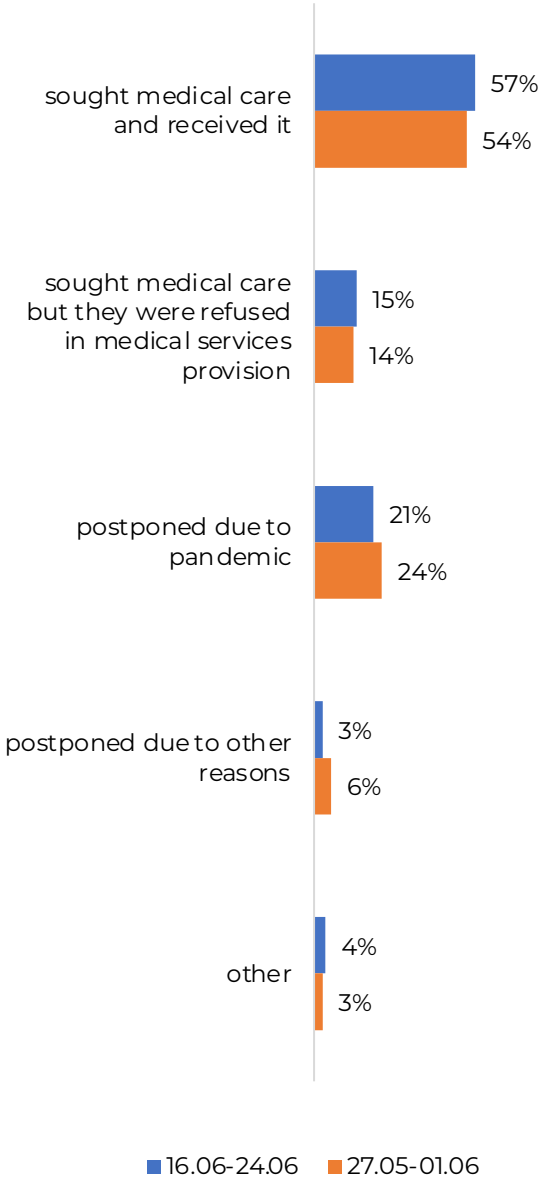


Figure 13 – Decisions taken by respondents who needed medical care (people who needed medical care in %, n=276 (June 16-24), n=300 (May 27–June 01)
Рисунок 13 – Ответы респондентов, нуждавшихся в медицинской помощи, на вопрос о том, как они поступили в такой ситуации (в % от тех, у кого была необходимость обратиться за помощью, n2 = 276, n3 = 300)

Emotional state well-being

As the protective measures were gradually lifted, we observed a positive trend in the emotional state of the respondents (Fig. 14, 15).

The majority of respondents considered their emotional well-being as quite good during all the observation period (3·44 (SD = ± 1·2) – 3·60 (SD = ± 1·2) out of 5.0), as shown in Fig. 14.

We also asked to evaluate the situation on different levels – in the inner circle, in the city of residence (Moscow), in the country, and in the world, thereby planning to get an emotional assessment of the perceived impact of the pandemic. A comparative analysis of mean indicators for the respondents' assessment of the COVID-19-related situation in Moscow showed an increase in the third wave of the study (compared to second wave, t=-6·708, df=1800, p<0·0001). A comparative analysis of their inner circle situation also showed an increase over time between the second and third waves (t=-3·207, do=1911, p=0·001), as seen in Fig. 15. There was no significant

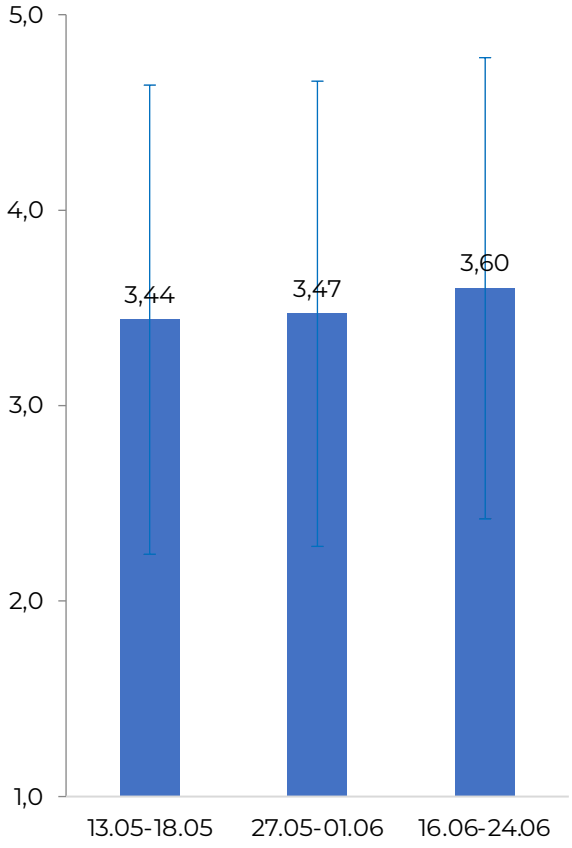


Figure 14 – Moscow residents' assessment of their emotional state during the COVID-19 pandemic (on a 5-point scale, where 1 – "constantly experienced negative emotions" and 5 – "was constantly in a good mood")
Рисунок 14 – Самооценка жителями Москвы своего эмоционального состояния в период пандемии COVID-19 (по пятибалльной шкале, где 1 – «постоянно испытываю отрицательные эмоции», а 5 – «постоянно нахожусь в хорошем настроении»)

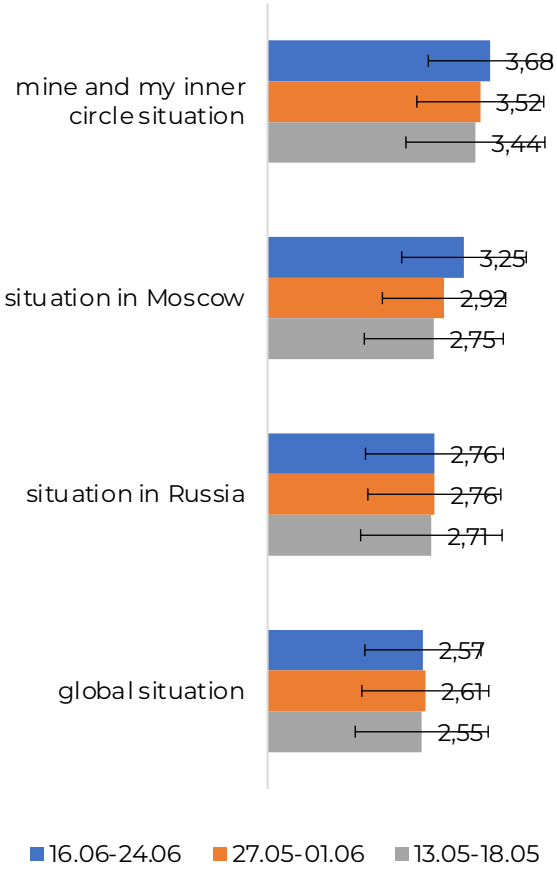


Figure 15 – Moscow residents' assessment of COVID-19-related situation (on a 5-point scale, where 1 – "very bad" and 5 – "very good")
Рисунок 15 – Оценка жителями Москвы ситуации, связанной с пандемией COVID-19 (по пятибалльной шкале, где 1 – «очень плохо», а 5 – «очень хорошо»)

difference observed regarding the situation in the Russian Federation and the global situation. Despite the absence of significant differences between the indicators obtained during all three waves of the survey, the comparison of absolute values allows us to talk about positive changes in the well-being of Moscow residents.

As the restrictive measures were being lifted [12], financial (Fig. 16) and epidemiological situations [17] improved, and fears associated with the coronavirus also decreased (Fig. 17).

The most common fear was associated with the health of family and friends, overriding concern for their own health (t=-22·538, do=1396, p<0·0001). The other fears mentioned in Fig. 17 were just above the middle of the score.

It is important to mention that the fears associated with the disease itself decreased.

However, the presence of fears and worries did not contribute to the population's appeal for professional psychological help; only 3% of Muscovites applied for it during the period.

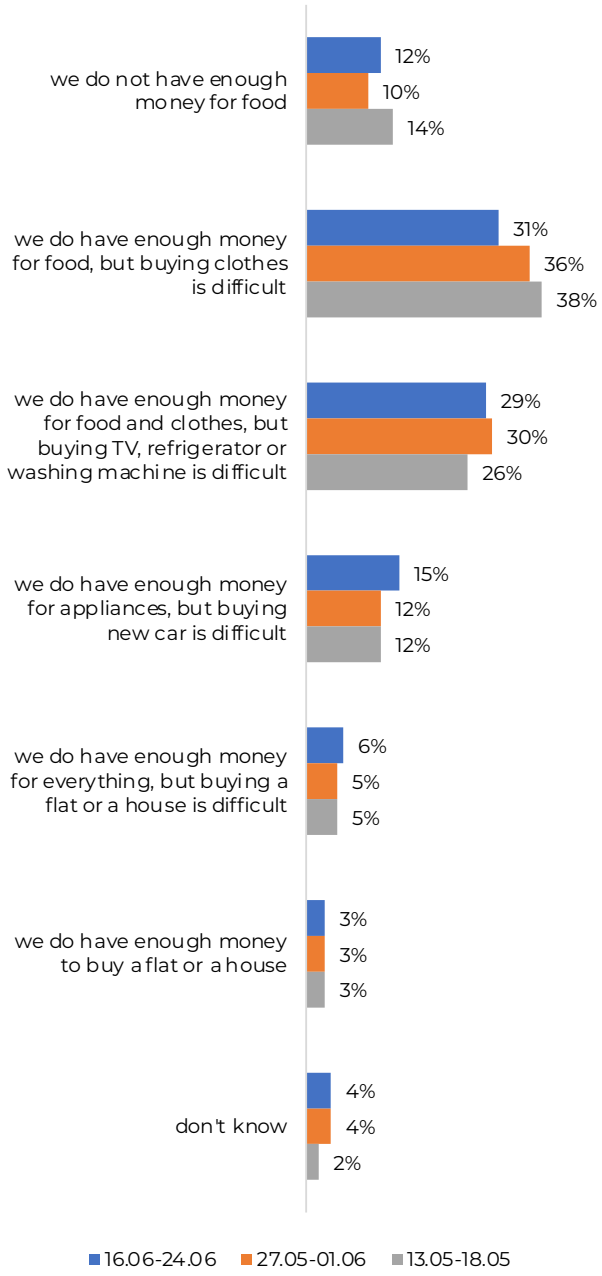


Figure 16 – Dynamics of population's self-assessment of their own financial situation
Рисунок 16 – Динамика самооценки населения своего финансового положения

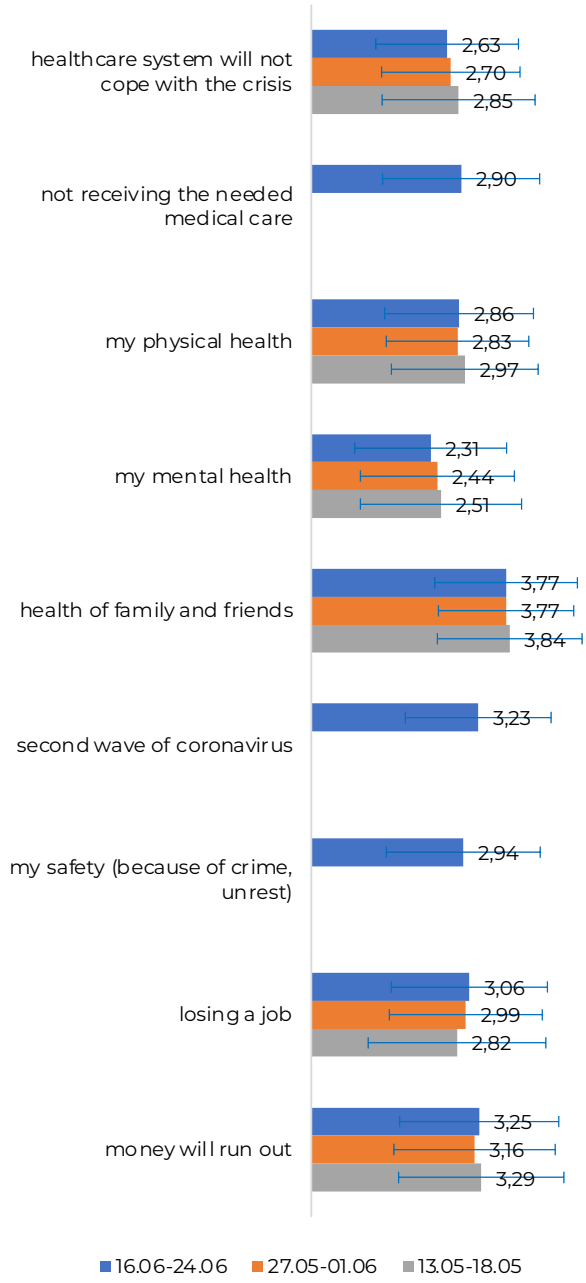


Figure 17 – Dynamics of pandemics-related fears of Moscow residents (on a 5-point scale, where 1 – "not worried at all", 5 – "very worried")
Рисунок 17 – Динамика страхов жителей Москвы, связанных с пандемией (по пятибалльной шкале, где 1 – это «совершенно не беспокоит», а 5 – «очень беспокоит»)

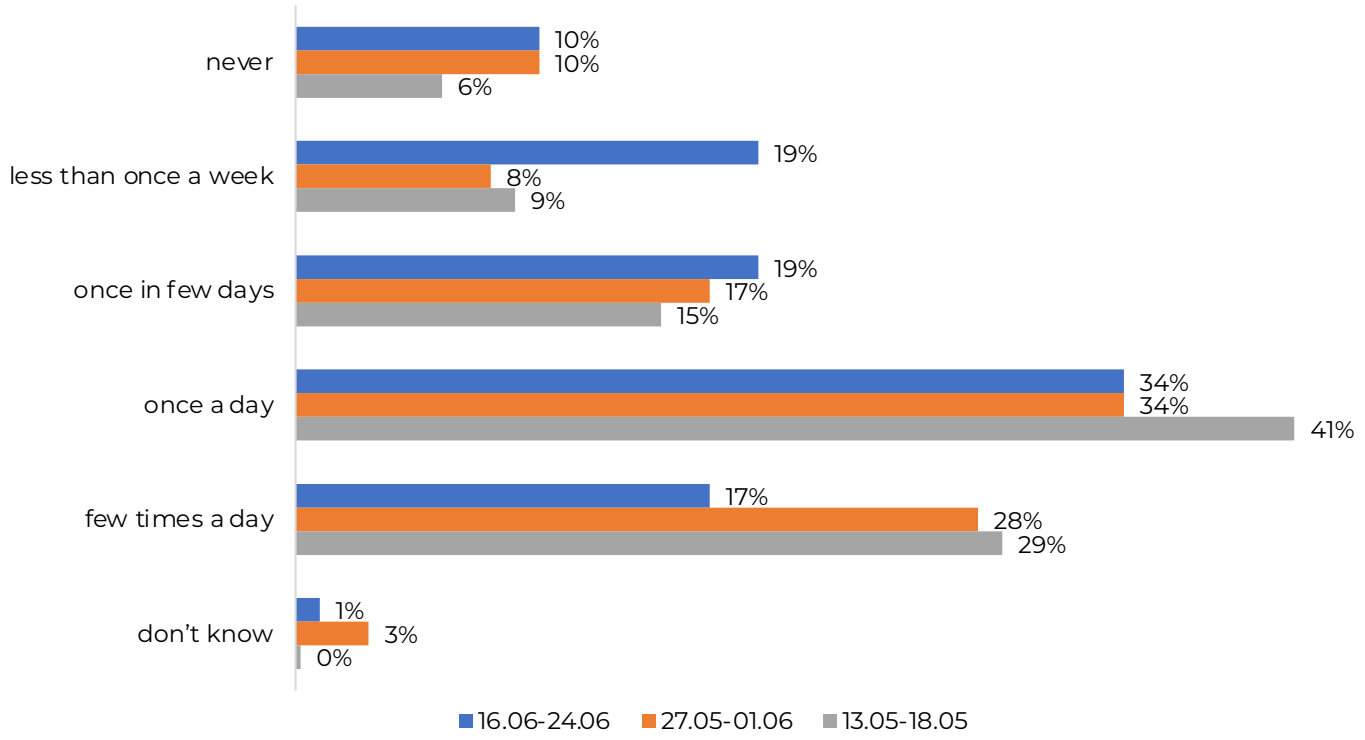


Figure 18 – How often respondents look up COVID-19 related information
Рисунок 18 – Частота поиска респондентами информации, связанной с COVID-19

Use of and trust in information

Over time, the self-reported frequency of searches concerning the latest news decreased (Fig. 18). A sharp drop in interest was observed among senior Muscovites ($p<0{\cdot}0001$), those who watched news on TV ($p<0{\cdot}001$), and those who were often supportive of the introduced measures (agreed that "the actions of the authorities in the fight against coronavirus were justified," $p<0{\cdot}0001$).

In the answers to the open-ended question, "Have you come across information about the coronavirus that was difficult for you to decide whether to trust or not?" some population groups doubted the reliability of official numbers of cases and deaths and suspected that the real case numbers were covered up, underrepresented, or overrepresented. The population complained about the conflicting information on the effectiveness of measures, symptoms of the disease, and treatment tactics. Some respondents noted that they grew critical of any information, stating: "I always doubt," "All information is false," "I don't believe anything," "You have to think for yourself."

The analysis demonstrated an association between watching TV and perceptions related to a potential future COVID-19 vaccination ($\chi2$ (3) = 10 · 701, p = 0 · 013): among those who called for universal vaccination against coronavirus, 61% watched news on TV (compared to 52% among the total population).

COVID-19 vaccination

At the time of this data collection, no COVID-19 vaccine had yet been approved. Perceptions related to vaccination varied: 42% of the respondents were convinced that the entire population must be vaccinated, 39% believed that only individual groups should be vaccinated, and 11% expressed their complete distrust in vaccination against COVID- 19 (Fig. 19). It should be noted that these questions weren't proposed to people with radical anti-vaccination views, those who answered sharply negatively to both of the following questions: 1) about the attitude towards vaccination in general ("vaccinations are harmful to health; I am against any vaccinations"), and 2) towards vaccination against coronavirus ("no one needs a vaccine against coronavirus"). On this basis, further questions were not asked to these groups in order not to provoke aggression in the respondents who had previously declared their anti-vaccination position.

We found statistically significant differences between the respondents who believe that vaccination is necessary for the entire population and those who

consider it unnecessary. The approval rates of the Healthcare Department's (t = 3 · 926, df = 34, p <0 · 0001) and the Mayor of Moscow Office's (t = 4 · 205, df = 414, p <0 · 0001) efforts to fight coronavirus, as well as rates of assessing the threat of COVID-19 (t = 5 · 555, df = 41, p <0 · 0001) demonstrated that those supportive of vaccination also had a higher COVID-19 risk perception and agreement with actions of state authorities.

At the time of the third wave of the survey, when the vaccine had not yet been approved and used, 46% of the respondents reported that they would refuse to get vaccinated against COVID-19. However, many of them accepted the need for vaccination, not for themselves but for others, see Fig. 19.

Refusal to vaccinate was associated with a lack of trust in the information about coronavirus and doubts about the possibility of developing an effective and safe vaccine (at the level of trends, they more often agreed that the coronavirus is "inflated" by the media (p <0 · 01) and more often did not agree that "an effective and safe vaccine against coronavirus will be developed this year", p <0 · 01). Among those respondents who did not exclude the possibility of vaccination, 45% expressed distrust in the development of an effective and safe vaccine in 2020, and 25% doubted the possibility of its development in the Russian Federation (Fig. 20).

Using the results of the survey, we compiled a social portrait of those who were unwilling to get vaccinated against COVID-19. This group was represented by middle-aged people, often women, or those who have children. People from this group also tended to consider themselves to be healthy, had low COVID-19 risk perception, low trust in health authorities, and low acceptance of the public health measures in place to contain the virus (Table 1).

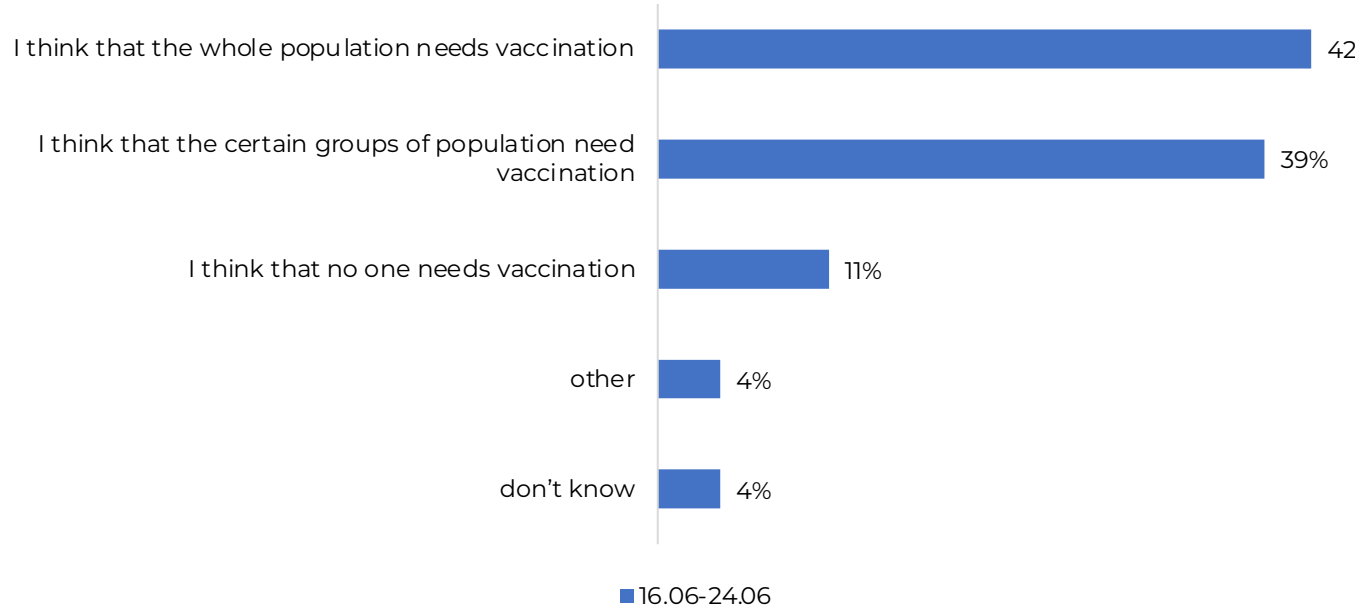


Figure 19 – Opinion on vaccination against COVID-19 (in %, excluding those with radical anti-vaccination views, n = 852)
Рисунок 19 – Отношение жителей Москвы к вакцинации от коронавируса (в %, исключая тех, кто крайне негативно относится к вакцинации, n = 852)

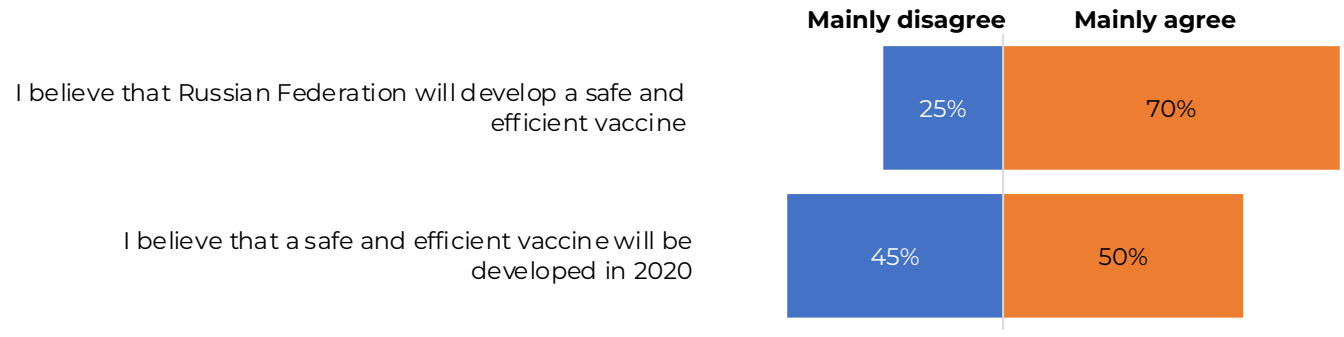


Figure 20 – Public trust in the possibility of developing a safe and efficient vaccine in 2020 and in Russia (% excluding those with radical anti-vaccination views, third wave, n = 743)
Рисунок 20 – Доверие возможности разработки эффективной и безопасной вакцины в 2020 году, в том числе в России (в %, исключая тех, кто крайне негативно относится к вакцинации, третья волна, n = 743)

Table 1 – Social portrait of those unwilling to get vaccinated (according to the third wave of research, excluding those expressing radical views against vaccination; see the explanation above)
Таблица 1 – Социальный портрет нежелающих вакцинироваться (по данным третьей волны исследования, исключая тех, кто крайне негативно относится к вакцинации)

	Unlikely to get vaccinated	Likely to get vaccinated
Social portrait: middle-aged women with children		
Average age (35-44)*	34%	19%
Women**	65%	51%
Parents: have children under 18 years of age*	52%	34%
Health and risk assessment: all good		
Health is «great» or «good»**	62%	46%
Potential severity of coronavirus (out of 5)	2·62 (±1·28)	3·15 (±1·26)
Trust in measures: low		
Trust in Moscow's mayor's office (out of 5)*	3·08 (±1·47)	3·80 (±1·32)
Will adhere to all the measures in case of a second wave*	29%	51%
Measures are justified (degree of agreement, out of 5)**	3·17 (±1·37)	3·71 (±1·36)
Opinion on vaccination: distrust		
Only major vaccines should be distributed*	65%	35%
Disagree that an effective and safe vaccine can be developed this year*	69%	36%

* p<0·0001
** p<0·003

Discussion

In the period before and during this study, several behavioral insight studies were conducted globally. This allowed us to base our findings on already-existing insights. It was soon clear that the behavioral aspects and perceptions of the pandemic varied from country to country [18], and even within countries [19], in part likely due to an uneven spread of coronavirus infection, differences in the measures taken and their impact on people's everyday lives and economy, cultural factors, and the levels of trust in the population.

In the Russian Federation, regional authorities were leading the implementation of public health and social measures [20]. Thus, local studies were important to inform a timely and effective response.

The findings from the study informed the Moscow pandemic response alongside other data gained through various research projects and analytical work in Moscow; additional in-depth research conducted by the Research Institute for Healthcare Organization and Medical Management of Moscow Healthcare Department to support the findings of the survey have also contributed to this process, such as mask wearing at public places study (summer, 2020) [21] or healthcare professionals focus group study later in 2021 [22]. It should be noted that in the context of the COVID-19 pandemic, a rapid response from the decision-makers — the Moscow Government and subordinate authorities — was needed, often not leaving enough time to consider and discuss the gained evidence in detail. Thus, translating the findings into practice represented one of the main challenges of the study. Moreover, surveys are often seen as stand-alone project activities rather than a way of learning about and adapting an emergency response based on perceptions from the population.

According to the results of the study, a critical challenge to the pandemic response was that a certain part of the population did not believe in official information, and despite high self-reported uptake of protective measures, a sizeable proportion still did not stay at home in case of symptoms or refrained from visiting family members. Also, misperceptions existed regarding preventive treatment, which were in some cases harmless and in others could have more serious implications, e.g., resulting in inappropriate use of antibiotics at a time when antimicrobial resistance is becoming a global health threat. This confirmed the need for new messages regarding prevention as well as the importance of tailoring information and using a variety of trusted communication channels. For this purpose, materials recommending against the use of antibiotics for the treatment and prevention of coronavirus were deployed on official Internet portals for informing about the coronavirus situation (the main official site was 'stopcoronavirus'); special issues of educational programs aired on federal television. Importantly, protecting oneself and others was a key driver for compliance with recommendations above the fear of paying fines. This affected messaging (for example, integrated in the metro alerts for passengers) that shifted to focus on social norms and social responsibility in keeping up protective behaviors. Another finding was a need to increase public trust in coronavirus vaccination, and as a result, Moscow has been implementing a comprehensive COVID vaccine acceptance and demand strategy. For example, well-known health workers, philanthropists in the health area, and other identified trusted stakeholders were involved, as the survey showed health professionals and volunteers were the most trusted groups in coping well with the coronavirus.

The findings on the critical negative implications for public health and access to health services and treatment alarmed health authorities and demonstrated the need for action. In response to reported difficulties in receiving routine medical care, the Moscow Healthcare Department developed pandemic health care protocols.

The survey identified fears related to the socio-economic consequences of the pandemic. In this context, the Moscow government took policy measures aimed at mitigating the economic consequences of the pandemic. These interventions focused on providing support to the populations most affected by the loss of their livelihoods, including a set of measures to support urban enterprises and organizations [23], provide assistance to small businesses, [24] introduce regional payments to the unemployed [25], social payments to families raising children under 16 [26], and develop recommendations to employers on calculating wages for remote employees [27]. Additionally, according to the findings, a significant positive dynamic was revealed in assessing the financial situation: the number of respondents who negatively assessed their financial situation decreased. While a causal relationship cannot be shown, this could support the effectiveness of the decisions taken.

The study revealed the negative impact of lockdown on the emotional state of the population, as well as a decrease in healthy lifestyle and physical activity practices of the Moscow citizens. These tendencies contributed to the fact that cultural, sports, and educational organizations updated or introduced online projects designed to support groups of citizens who had to stay at home, and also organized remote counseling in various ways, including social networks. For example, urban cultural virtual platforms "Know Moscow", #Moscowwithyou, "Moscow Museum online" [28], online events within the framework of the "Sports Saturdays" project [29], online directions of the project "Moscow Longevity"

[30] etc. At the same time, data showed that the mental health services available in Moscow are not widely used, so more actions should be planned to promote this, as well as to support population mental wellbeing overall.

Overall, the findings of the study provided valuable population insights in the context of this health crisis. Identification of information gaps, adoption of certain measures by the population, determination of the consequences for the population of their observance, and the pandemic situation as a whole were necessary when the local government was preparing measures for the likely next waves of coronavirus for further informing about the need and safety of vaccination.

Besides, from a political point of view, the study provided a platform for advocacy for the crucial role of population insights in decision-making. This has positively contributed to the use of a social sciences approach in health in Moscow.

Conclusion

Systematic monitoring of awareness, risk perception, preventive behavior patterns and level of public confidence allows using people-centered approaches to develop and adopt timely responses to pandemic-related issues, especially considering characteristics of awareness, perception and public behavior, as well as epidemiology data and economic, cultural, ethical and structural-political considerations, are the basis for fighting coronavirus infection.

The WHO survey tool which was adapted by Research Institute NIIOZMM allowed for1) monitoring indicators that were critical for the behavior of the population to control the transmission of COVID-19, including risk perception, knowledge, confidence in the actions of social institutions, behavior, rumors, psychological impact, concern, resilience, use and credibility of information sources, etc.; 2) tracking changes in these factors over time to understand the effect of the pandemic process, changes, events or measures taken; 3) monitoring the emergence of possible new problems associated with disinformation to ensure early response, identify the gap between perceived and factual knowledge about human behavior and the effectiveness of pandemic response and management decisions.

Monitoring studies allowed the Moscow region healthcare system and authorities to timely and adequately respond to changes in public opinion and mood. This contributed to the fact that the second wave of the COVID-19 outbreak in Moscow was manageable and passed without the introduction of a hard lockdown.

The article was originally written in 2021 and contains relevant information to that date.

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References

1. Rettie H, Daniels J. Coping and tolerance of uncertainty: Predictors and mediators of mental health during the COVID-19 pandemic. *American Psychologist*.2020. Advance online publication. Available from: doi:10.1037/amp0000710 [Accessed 29th May 2024].
2. Koffman J, Gross J, Etkind S, Selman L. Uncertainty and COVID-19: how are we to respond? *Journal of the Royal Society of Medicine.* 2020;*113*(6): 211-216.
3. Brooks S, Webster R, Smith L, [et al.]. The psychological impact of quarantine and how to reduce it: rapid review of the evidence // *Lancet*. 2020; 395: 912–920. Available from: doi:10.1016/S0140-6736(20)30460-8[Accessed 29th May 2024].
4. Smith B, Brooke M, Smith A, Twohy J, Gregory S. Psychological inflexibility and intolerance of uncertainty moderate the relationship between social isolation and mental health outcomes during COVID-19. *Journal of Contextual Behavioral Science.* 2020;18: 162–174. Available from: doi:10.1016/j.jcbs.2020.09.005.
5. Sharma A, Sourav B, Aditya C. Responses to COVID-19: The role of governance, healthcare infrastructure, and learning from past pandemics. *Journal of Business Research.* 2021;122: 597–607. Available from: doi:10.1016/j.jbusres.2020.09.011.
6. Wang Z, Duan Y, Jin Y, Zheng J. Coronavirus disease 2019 (COVID-19) pandemic: how countries should build more resilient health systems for preparedness and response. *Global Health Journal. 2020*;4(4): 139–145. Available from: doi:10.1016/j.glohj.2020.12.001.
7. Tambo E, Djuikoue C, Tazemda K, FotsingF,ZhouN. Early stage risk communication and community engagement (RCCE) strategies and measures against the coronavirus disease 2019 (COVID-19) pandemic crisis. *Global Health Journal.* 2021;5(1): 44–50. Available from: doi:10.1016/j.glohj.2021.02.009.
8. Rubin G, Amlot R, Page L, Wessely S. Public perceptions, anxiety, and behaviour change in relation to the swine flu outbreak: cross sectional telephone survey. *British Medical Journal.* 2009;339: b2651. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2714687/ [Accessed 29th May 2024].
9. Faour-Klingbeil D, Osaili T, Al-Nabulsi A, Jemni M, Todd C. The public perception of food and non-food related risks of infection and trust in the risk communication during COVID-19 crisis: A study on selected countries from the Arab region. *Food Control.* 2021;121: 107617 Available from: doi:10.1016/j.foodcont.2020.107617
10. Maps of Russian cities. *Coronavirus statistics in Russia and the world as of 29 April, 2020 – latest news.* Available from: https://1maps.ru/statistika-koronavirusa-v-rossii-i-mire-na-29-aprelya-2020-poslednie-novosti/ [Accessed 29th May 2024].
11. Decree of the Mayor of Moscow No. 21-UM dated March 16, 2020 "On amendments to Decree of Moscow Government dated March 5, 2020 No. 12-UM". Available from: https://www.mos.ru/authority/documents/doc/43541220/ [Accessed 29th May 2024].
12. Decree of the Mayor of Moscow No. 68-UM dated June 8, 2020 "On the stages of lifting the restrictions established in connection with the introduction of the high alert regime". Available from: https://www.mos.ru/authority/documents/doc/44016220/ [Accessed 29th May 2024].
13. Mosstat. Office of Russian Federal State Statistics Service for Moscow and Moscow region. *Population distribution by age groups for 2010-2020.*Availablefrom: https://mosstat.gks.ru/folder/64634 [Accessed 9th April 2021].
14. Decree of the Mayor of Moscow No. 55-UM dated May 7, 2020 "On Amendments to the Decree of the Mayor of Moscow dated March 5, 2020. No.12-UM". Available from: https://www.mos.ru/authority/documents/doc/43838220/ [Accessed 29th May 2024].
15. Official information about the coronavirus in Russia. Stopcoronavirus.rf. What to do. Available from: https://стопкоронавирус.рф/what-to-do/all/ [Accessed 29th May 2024].
16. Decree of the Mayor of Moscow No. 61-UM dated May 27, 2020 "On Amendments to the Decree of the Mayor of Moscow dated March 5, 2020. No.12-UM". Available from: https://www.mos.ru/authority/documents/doc/43931220/ [Accessed 29th May 2024].
17. Statistics of coronavirus in Moscow. Available from: https://russian-trade.com/coronavirus-russia/moskva/ [Accessed 29th May 2024].
18. Perrotta D, Grow A, Rampazzo F, Cimentada J, Del Fava E, Gil-Clavel S, Zagheni E. Behaviours and attitudes in response to the COVID-19 pandemic: insights from a cross-national Facebook survey. *EPJ Data Science.* 2021;10:17. Available from: doi:10.1140/epjds/s13688-021-00270-1.
19. Pew Research Center. *Public assessments of the U.S. coronavirus outbreak. 2020.*Available from: https://www.pewresearch.org/politics/2020/08/06/public-assessments-of-the-u-s-coronavirus-outbreak/[Accessed 29th May 2024].

20. Presidential Decree No. 239 dated April 2, 2020 "On measures to ensure the sanitary and epidemiological well-being of the population in the Russian Federation in connection with the spread of a new coronavirus infection (COVID-19)".Available from: http://www.consultant.ru/document/cons_doc_LAW_349217/ [Accessed 29th May 2024].
21. Bogdan I.V.,., Chistyakova D.P., Gabov K.I. Compliance with the mask regime and social distancing in a pandemic in the city: factors of reducing external control and features of practices. *City Healthcare*. 2021;2(3): 54-65.
22. Jackson C., Smith S., Aghasaryan A., Andreasyan D., Aregay A.K., Habersaat K.B., Hovhannisyan L., Bogdan I.V., Chistyakova D.P., Cilović-Lagarija Š., Colonescu S., Hajiyev J., Ilves A., Isahakyan A., Isahakyan S., Jusupov N., Kachkachishvili I., Kender E., Kjosevska E., Nielsen S.M., Mazhnaia A., Oona M., Păunescu B., Šabanović H., Săndulescu A., Vasilevska A., Warsi S., Yusifli E., Zamfirescu R., Craig B. Barriers and drivers of positive COVID-19 vaccination behaviors among healthcare workers in Europe and Central Asia: a qualitative cross-country synthesis. *Humanit Soc Sci Commun.* 2023; 10, 926.
23. Decree of Government of Moscow No. 212-PP dated March 24, 2020"On measures of economic support in conditions of high alert". Available from: https://www.mos.ru/upload/documents/docs/212-PP(2).pdf [Accessed 29th May 2024].
24. Decree of Government of Moscow No 405-PP dated April 15, 2020."On amendments to Decree of Moscow Government dated March 24, 2020 No. 212-PP". Available from: https://www.mos.ru/upload/documents/docs/405-PP(2).pdf [Accessed 29th May 2024].
25. Decree of the Mayor of Moscow No. 34-UM dated March 29, 2020 "On Amendments to the Decree of the Mayor of Moscow dated March 5, 2020. No.12-UM". Available from: https://www.mos.ru/upload/documents/docs/34-YM.pdf [Accessed 29th May 2024].
26. Resolution of the Government of the Russian Federation No. 919 dated June 25, 2020 "On Amendments to the Resolution of the Government of the Russian Federation dated April 9, 2020 No. 474". Available from: http://static.government.ru/media/files/tB20F0ttggIidbp9hNv2ApbApoUSbDHz.pdf [Accessed 29th May 2024].
27. Letter of the Ministry of Labor and Social Protection of the Russian Federation dated April 23, 2020 No. 14-2/10/P-3710. Available from: https://www.garant.ru/products/ipo/prime/doc/73861439/ [Accessed 29th May 2024].
28. Official site of the Mayor of Moscow. Useful summer: online services for schoolchildren. 2020. Available from: https://www.mos.ru/news/item/75048073/ [Accessed 29th May 2024].
29. Official site of the Mayor of Moscow. Muscovites are invited to online sports classes for the whole family. 2020. Available from: https://www.mos.ru/news/item/74360073/ [Accessed 29th May 2024].
30. Official site of the Mayor of Moscow. "Moscow Longevity" online: what they will talk about in gardening classes. 2020. Available from: https://www.mos.ru/news/item/74288073/ [Accessed 29th May 2024].

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