



## Socio-psychological aspects of the economic behavior of people during a pandemic

Sergey A. Surkov<sup>1\*</sup>, Ellen G. Trofimova<sup>2</sup>

<sup>1</sup>PhD in Tecnic. International Institute of Management, Moscow, Russia.

<sup>2</sup>PhD in Tecnic, Associate Professor of the Department of Medical Law, Public Health and Health Management of the FSBEI FPE RMACPE MOH Russia (Moscow).

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\*Corresponding author: Sergey A. Surkov

PhD in Tecnic. International Institute of Management, Moscow, Russia.

### Abstract

*The influence of socio-psychological factors on people's economic behavior is assessed. The topic of the article is very relevant, since to date a lot of data has been accumulated on the peculiarities of the impact of the pandemic on society, in particular, socio-psychological phenomena in relation to the economic behavior of people, but the practical aspects of using research results have not been sufficiently developed.*

*Statistical processing of published data made it possible to draw conclusions on some aspects of the influence of socio-psychological states on the prospects for the economic behavior of people in society.*

*Results important for practice were obtained. It has been established that as the population grows, the probability, and, consequently, the proportion of people who approve of vaccination increases, while fluctuating widely. It was revealed that the transition to increased morbidity does not lead to an increase in mortality, a change in the number of recovered patients and is not directly reflected in economic indicators. It is noted that the initial strain of the COVID-19 coronavirus was very highly contagious, but measures taken by governments and medical administrations of all countries of the world led to the "washing out" of weaker strains and the isolation of stronger ones. A relationship was found between public approval of vaccination and the level of collective immunity.*

*It has been established that the human community has a certain resistance to pandemic-type perturbations and most of the population has no psychological barriers and approves of vaccination.*

*Based on ideas about the relatively low level of turbulence in human society, estimates for the duration of the pandemic were obtained.*

*Based on these conditions, studies have been carried out to study forecasts of the duration of the pandemic, the economic damage associated with it, and the herd immunity necessary to stop it. It is established that the pandemic will be long-term.*

**Keywords:** pandemic, forecasts, state of the economy

### 1. Introduction

The emergence and development of the COVID-19 pandemic has led to significant economic and social consequences. The result was not only a crisis of physical health, but also a large number of various psychological crises, including changes in individual economic status and individual and social status. The pandemic has

led to increased economic uncertainty, increased unemployment and underemployment pressures, increased income uncertainty and varying degrees of impact on employment. These economic hardships have caused a variety of mental health issues, ranging from perceived insecurity to behavioral changes. Various forms of

stress behavior also arise, such as defensive behavior patterns and, in particular, protest behavior [1].

Any actions of public and private organizations during a pandemic are implemented primarily in the economic field. This is confirmed, for example, by the data of sources [2]-[5]. In the economy, it is important to correctly predict crises, including those related to pandemics. Mass epidemics disrupt the normal course of economic processes. Therefore, such attention is paid to long-term forecasts for the end of the Covid-19 pandemic. The vast majority of forecasts pointed to the end of 2022 (for example, [6], [7]).

The pandemic has taken a significant toll. The global cost of the pandemic is estimated at \$36 trillion [8]. This figure is significant in comparison with the world GDP of 100 trillion. dollars [9].

However, in most works only integral parameters are analyzed, which are nothing more than an indirect reflection of ongoing economic processes. Therefore, it is important to analyze the socio-psychological characteristics of people's behavior during a pandemic, including economic behavior. This article is dedicated to the solution of this problem.

## 2. Literature review

The literature provides relatively many sources on the topic under consideration. For example, Pedrosa A.L et al [2] reviewed the key components of the emotional reaction to the pandemic. Namely, how internal and external factors such as personality traits, gender, media, economics and government response influence public perception of the pandemic and the psychological consequences of the current scenario. Moreover, they examined groups at increased risk of mental health burden secondary to these circumstances. These include health care workers, the elderly, children, college students, black and Latino communities, as well as economically disadvantaged groups, the homeless, prisoners, rural populations and psychiatric patients.

However, the information obtained is mosaic in nature and does not allow us to solve the complex problem of leveling the negative consequences of the pandemic for the entire society as a whole.

Di Crosta A. et al [3] believe that the COVID-19 pandemic is not just a health crisis, but it has changed the entire way of life of society in an unpredictable way. An analysis of economic sales data showed that the pandemic also had a major impact on individuals' spending levels. The study by Di Crosta A. et al [3] focused on consumer behavior and its psychological antecedents.

The disadvantage of this work is the narrow scope of analysis of consumer behavior, which does not allow us to see the full picture for all aspects of social life.

Rafael S and Schneider D [4] concluded that the COVID-19 pandemic has taken a historic toll on the health and longevity of Americans. The pandemic has also shaped socioeconomic inequalities along the lines of gender, race, ethnicity, background and class. The effects of the pandemic are reflected in Americans' negative experiences of work, unemployment and unpaid work, worsening wealth and income inequality, cuts in social welfare spending, and increased violence and related changes in the criminal justice system.

The examination of the issue is quite detailed, but it was produced for one country and it is difficult to extend the validity of the findings beyond its borders.

The goal of research in this area should be to obtain initial data for activities in the fight against the pandemic. In this work, this goal is to estimate the duration of the pandemic.

Any actions of public and private organizations during a pandemic are implemented primarily in the economic field. This is confirmed, for example, by the data of sources [5]-[8]. In the economy, it is important to correctly predict crises, including those related to pandemics. Mass epidemics disrupt the normal course of economic processes. Therefore, such attention is paid to long-term forecasts for the end of the Covid-19 pandemic. The vast majority of forecasts pointed to the end of 2022 (for example, [9], [10]).

The pandemic has taken a significant toll. The global cost of the pandemic is estimated at \$36 trillion [11]. This figure is significant in comparison with the world GDP of 100 trillion. dollars [12].

Many authors (for example, [13] and [14]) point to a significant change in the economic behavior of people, which is associated with socio-psychological circumstances during a pandemic. In particular, the author of [13] notes that, in her opinion, "the crisis of the coronavirus pandemic, which caused emotional, psychological, social and economic upheavals, can already be called a "Black Swan", which marked as the beginning of a "new normal", characterized by a high degree of uncertainty."

In [14], it is emphasized that "these bursts [of incidence - approx. Auth.], are characteristic of the COVID-19 virus, which ... we continue to face, given the very social nature of humanity."

R. Curtin, according to B. DeGroat [15], believes that "the most important consequence of the pandemic is how it will change judgments about the relevant economic policy." He notes that, in his opinion, "any action of people in society leads to certain economic consequences, therefore, the economic behavior of people is derived from the circumstances of this activity."

At the same time, it should be taken into account that, in essence, a virus and a person are symbionts, since, for example, a decrease in the number of a carrier leads to a decrease in the number of a virus, so the latter undergoes a kind of "natural selection" - those variants that lead to death and / or significant weakening of the host organism.

The interaction of these agents occurs through the third component, which is the socio-psychological relations in society.

An analysis of the results of past and current pandemics suggests the presence of a chain of connections between the virus, the socio-psychological properties of society, and the human body. In particular, the influence of the virus is manifested in its virulence, contagiousness, etc.

The socio-psychological properties of society characterize the relationship between people, the structure of society, the type of its formation, the model of communication, and many other interrelated factors. A person, or a human body, has such properties as immunity, a genetic passport, a set of diseases, a model and social circle, etc.

Studying the patterns of the emergence and course of a pandemic makes it possible to preserve the health and lives of people, as well as save significant material resources. This consideration should be based on the study of the relationship between people and the impact of these relationships on the life of society. However, their study due to the large number of people in the world, the diversity of behavioral patterns, the complexity of the chains of

implementation of the main economic processes and the intricacy of causal relationships, is difficult and is only possible indirectly through statistical comparisons.

There are a large number of sources with statistical data on the COVID-19 pandemic in the literature (for example, [16]). However, data from such sources do not allow any reasonable predictions for the end of the pandemic.

More definite assumptions are made in [17], where a specific predicted end date for the pandemic is indicated.

However, the complexity of the situation forced WHO representatives to express themselves more carefully and accurately. "We have never been in a better position to end a pandemic," Tedros Adhanom Ghebreyesus, director general of the UN health agency, told reporters. "We see the finish line. We are in a comparatively advantageous position" [18].

It is advisable to control the situation with the development of a pandemic using the concept of herd immunity. As the authors of the source [19] point out: "herd immunity is the effect of resistance to the spread of infection in a population, some of whose members have personal immunity to it." The authors of the work [20] from the specialized Kursk Regional Center indicate that "Collective or population immunity of the population is the concept of epidemiology, meaning the effect of resistance to the spread of infection in a population of people, a significant part of whose members have personal immunity to this infection." It is difficult to analyze the situation with the development of a pandemic using this concept, since even its existence is often called into question. According to the authors of an editorial from the site [21] expressing a similar opinion, herd immunity is "such a state of a population and its living conditions in which the appearance of an infectious disease agent in it does not cause an avalanche-like increase in the number of members of the population infected with this disease."

The peculiarities of the influence of various variants of the virus can also be studied using the concept of contagiousness, which, as the authors of the book [22] point out, is "the ability of the causative agent of an infectious disease to be transmitted from an infected organism to a healthy one." To characterize the degree of contagiousness, the contagiousness index is determined, i.e. Percentage of infected persons out of the total number of susceptible persons exposed to the risk of infection. With regard to coronavirus, this issue is considered in the source [23], but the approach does not differ from the above.

The economic behavior of people during a pandemic consists in counteracting its spread, namely, various kinds of lockdowns, a mask regime are introduced, a requirement is put forward to maintain social distance or self-isolation of vulnerable groups of the population, staff reductions and the volume of functioning of organizations, mass layoffs, there is a break in commodity chains, reduction tourism, early retirement, etc.

All these actions are of an economic nature, but are accompanied by inevitable socio-psychological consequences. So, for example, lockdowns, disruption of supply chains, layoffs and layoffs, in addition to understandable economic losses for the working population, lead to a disruption in their usual working rhythm of work, a feeling of uselessness, breaking ties in the workforce, and, ultimately, to depression. Wearing a mask, maintaining social distance, and self-isolation also lead to the rupture of existing social ties with the same result. Other features of the economic

behavior of people during a pandemic have the same, or similar, consequences. Depressive psychological states can have a negative impact on attitudes towards vaccination, masking or social distancing, etc., which will further spur the spread of the disease. They also lead to a decrease in labor productivity, which negatively affects economic performance.

Thus, it is desirable to clarify the problem of duration of the pandemic with the involvement of questions of the socio-psychological aspects of people's behavior, and to control changes in the state of the problem with the timing of the end of the pandemic, since this is associated with the expenditure or saving of quite significant funds and human resources. This article is devoted to the solution of this problem.

### 3. Materials and methods

Statistical materials on the course of the pandemic in the world were used as initial data. Information about the losses associated with the pandemic and the required levels of herd immunity are also considered.

The decline in the economic activity of people during a pandemic is associated with their desire to protect themselves and their loved ones from its consequences. On the other hand, the opposite phenomenon was also noted - people tend not to reduce their economic activity, fearing the deterioration of their and their relatives' financial situation.

The main reasons for the decline in the economic activity of people during a pandemic is the restriction of contacts between them in order to avoid the spread of infection. Achieving the level of herd immunity makes it possible to partially remove or reduce these restrictions, which leads to a revival of business activities.

The pandemic also leads to the "atomization" of public consciousness, which, at the level of each individual, increases the degree of individualization of people's behavior. At the level of mass consciousness, various false rumors, misconceptions appear, groups of people appear, united by fake messages into protest communities. This, in all likelihood, explains the difference in the proportion of people who approve of vaccination, from 100%

The statistical method was chosen by the authors for processing and analyzing data from the literature in accordance with the recommendations of [24], which talks about comparing estimates with real data sets. In addition, it is necessary to take into account the influence of the research instrument (the researcher himself) on the object of study, which affects the result of statistical analysis to a lesser extent. This is also evidenced by data from [25], which refers to the recognition of the existence of an imbalance in the relationship between the researcher (researchers) and the object of research in the field of quality healthcare.

### 4. Theory

Based on the literature data, the following hypothesis can be put forward.

#### Hypothesis:

*The pandemic causes a change in the economic behavior of people, which is reflected in their socio-psychological state.*

*The human population, despite the damage caused by the pandemic, is generally stable in trend, which makes it possible to reliably predict its duration.*



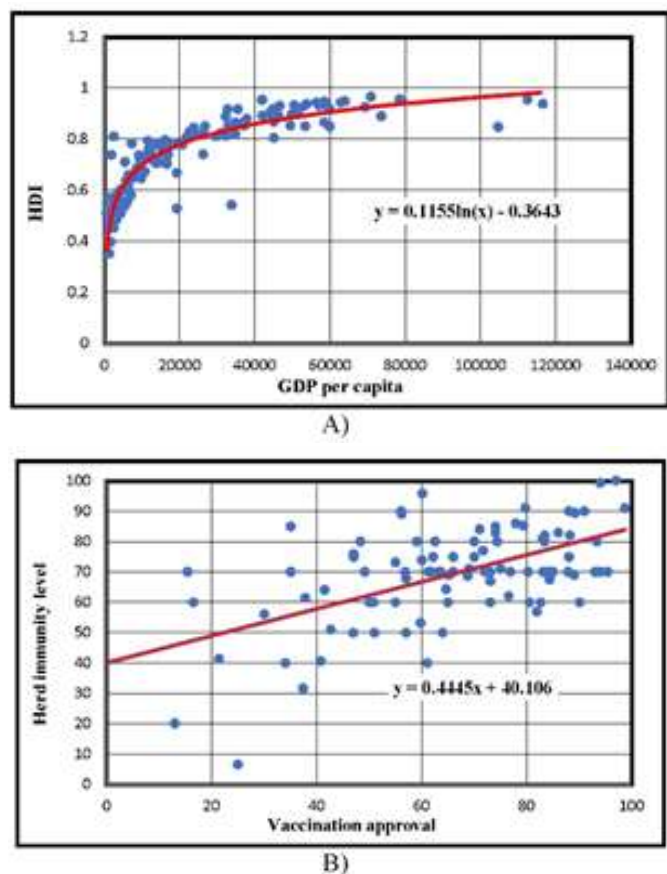
## 5. Results

The question of the socio-psychological aspects of people's economic behavior, especially during a pandemic, is very difficult, even with an intuitive understanding of the relationship between these factors. First of all, the relationship is complex, so the phenomenon needs to be studied from different angles. Moreover, it is necessary to use indirect factors and analyze them using statistical methods

From this, among other things, it follows that the results obtained in this way do not characterize the behavior of individuals, but rather the social environment surrounding them.

To study the economic basis of people's behavior during a pandemic, it is advisable to assess the impact of the relevant economic parameters on it. Often, the Human Development Index HDI and WFP per capita are chosen as such parameters. However, it is already known that these two parameters are closely correlated with a coefficient of 0.71, which is significant for all significance levels exceeding 0.05. (See Fig.1A). The same applies to other similar economic parameters.

In the case of studying the patterns of a pandemic, it is advisable to focus on the population size, since only statistical calculations can be significant in the epidemiological sense. This is what happened with the proportion of the population of various countries that approve of vaccination against coronavirus (Fig. 1B).



**Figure 1. Indicators for the population of the countries of the world. A) the dependence between GNP per capita and HDI; B) dependence between public approval of vaccination and the level of herd immunity**

The population of various countries expresses, in general, approval of vaccination, which directly corresponds to the level of herd immunity for the population (Fig. 1b). The correlation coefficient

of 0.565 is significant for all significance levels greater than 0.05. The regression equation is  $y=0.445x+40.06$ .

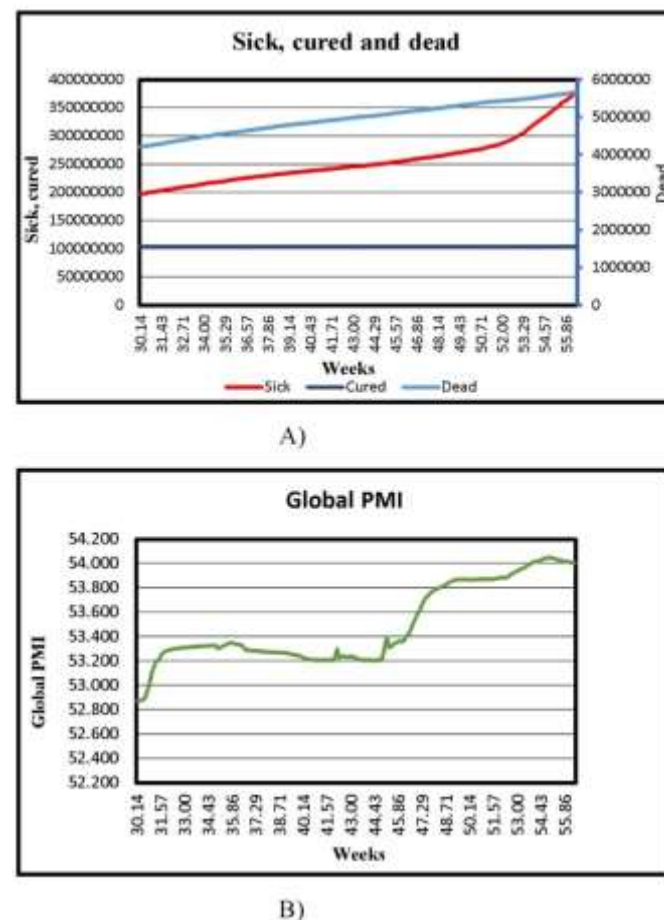
Such statistics demonstrate a significant scatter of data, so it makes sense to move on to the study of time dependences.

Figure 2 shows on the same time scale graphs for disease indicators, and one of the economic indicators.

Figure 2A), built on the basis of data from the source [26], shows such dependencies for morbidity, mortality and recovery of the world's population. It can be seen from the graphs in Fig. 2A) that, despite the change in the morbidity graph, there is no such change in mortality and the number of recovered, which also leaves a wide scope for generalizations. The same can be said for the Global Business Activity Index (Fig. 2B). In particular, among other things, this indicates the relative resilience of the human population to such turbulence as a pandemic.

It can be seen from the graphs in Fig. 2 that the inflection on the morbidity curve is not reflected in the curves for the number of recovered and the number of deaths. For the global business activity index, the inflection occurred nearly two months earlier than the inflection in the incidence curve. This means that these factors do not depend on the increase in the incidence, which shows the absence of the impact of turbulence on the human community.

The global index of business activity was chosen as the studied economic indicator. Yu. Afanasyeva [27] defines the global index of business activity. According to her, "this is the opinion of specialists involved in the supply of goods and materials for the company they work for. This opinion is collected in the course of a survey and subsequently compiled into an index of business activity. The specific values of this indicator are taken from the source [28] (Fig. 2B).



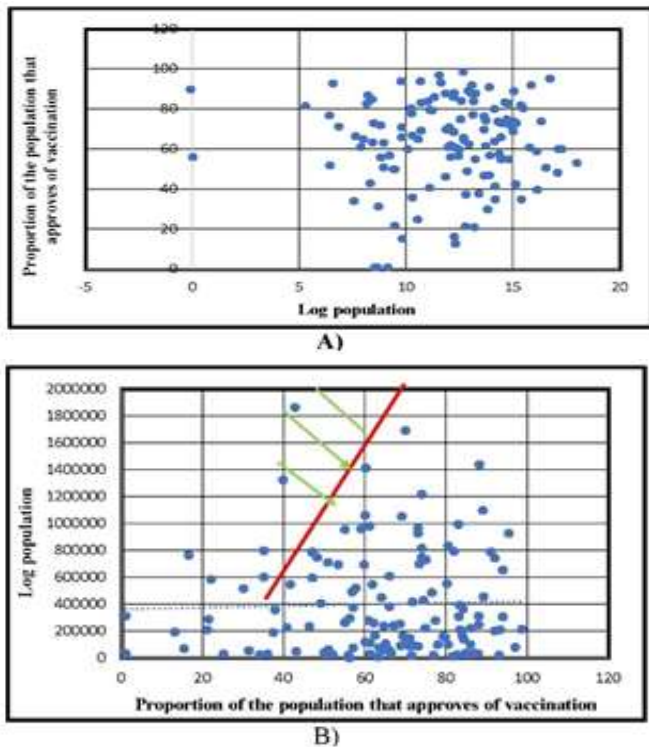
**Figure 2. Indicators during the pandemic. A) disease parameters; B) global business activity index**

In the case of studying the patterns of the pandemic, the authors focused on the population size, since only statistical calculations can be significant in the epidemiological sense. This is what happened with the proportion of the population of various countries that approve of vaccination against coronavirus.

Researchers from various countries surveyed the population of different states on whether they approve of vaccination or not.

The results obtained are summarized in Fig.3.

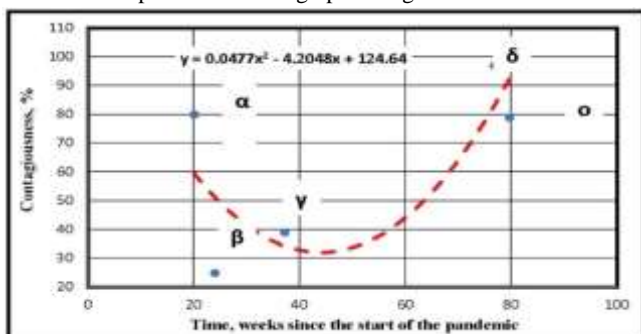
It was possible to find only the relationship of this indicator with the population of these countries, and even then, to study only the imposed restrictions. Fig.3a) shows the raw data, Fig.3c) contains the result of the transformation of this data by inverting the axes.



**Figure 3. Comparison of the logarithm of the population size and the proportion of the population that approves vaccination: A) direct dependence; B) inverse dependence**

The transformed figure shows that as the population grows, the probability, and hence the proportion of people who approve of vaccination, increases, while fluctuating widely. This fact indicates the absence of indifference to vaccination, regardless of its polarity.

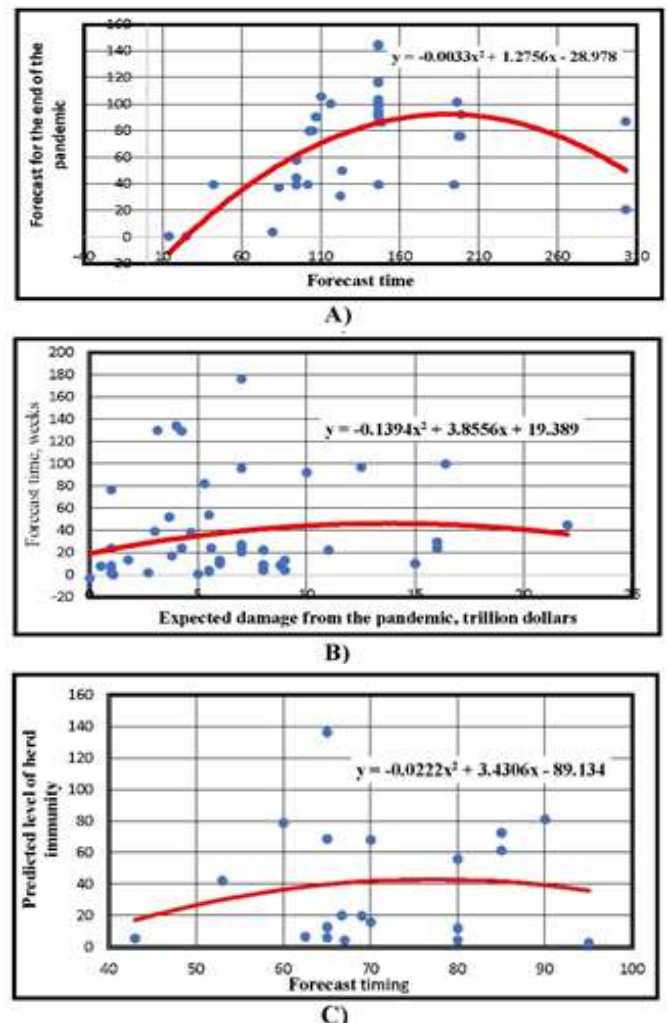
Comparison of the contagiousness of various strains of coronavirus COVID-19 is presented in the graph of Fig.4.

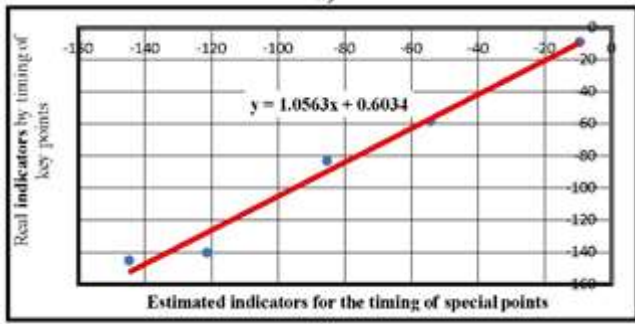


**Figure 4. Change in the contagiousness of coronavirus over time**

The graph in Fig. 4 shows that the initial strain of the COVID-19 coronavirus had a very high contagiousness, but the measures taken by governments and medical administrations of all countries of the world led to the “washing out” of weaker strains and the isolation of stronger ones. It can be assumed that this trend will continue in the future. However, despite this, most countries of the world consider the epidemic over and move on to the normalization of economic life. Data on contagiousness and the time of emergence of new strains of coronavirus were obtained from sources [29] and [30].

The presence of the resistance of the human community to various kinds of disturbances, including the pandemic, as well as the positive attitude of the majority of the population towards vaccination, confirms the hypothesis put forward. This makes it possible to study the temporal characteristics of a pandemic without taking into account various concomitant insignificant factors, highlighting those factors that have the main impact on the resulting pandemic indicators. The authors of the forecasts represent organizations, scientific groups, collaborations and agglomerations that have extensive experience in combating pandemics and their consequences, as a result of which, perhaps even partly intuitively, they take into account the whole variety of acting factors. Taking into account the established stability of the behavior of the human population as a whole, it is legitimate to rely on these forecasts. The results of generalized assessments based on the analysis of forecasts using environmental parameters are presented in Fig.5.





D)

**Figure 5. Exploring possible options for the duration of the pandemic:**

- A) comparison of the timing of the forecast and the time of its publication;
- B) comparison of the timing of the forecast and the possible damage from the pandemic;
- C) comparison of the timing of the forecast and the expected level of herd immunity;
- D) comparison of calculated and real terms for special points

All equations are obtained by the least squares method. The first three graphs in Figure 5 are used to determine the duration of processes and are analyzed using quadratic equations. In fact, the expression for describing the forecast data may be different, but the quadratic form is the most convenient for practice. An equation of the form

$$Ax^2 + Bx + C = 0 \quad (1)$$

can be considered, in a sense, characteristic for the functions on the graphs of Fig. 5A), Fig.5B) and Fig.5C). Its roots show the points of intersection of the graph of the function with the abscissa axis. Despite the rather significant scatter of data, the correlation coefficients for all four graphs are significant, since they exceed the tabular indicators for significance levels exceeding the 0.05 level.

Data on the relationship between the expected duration of the pandemic and the time of publication of the forecast were obtained from sources [31]-[46].

Similar calculations were made by the authors earlier in [8], but here they are supplemented by later predictions. Accordingly, the roots of the characteristic equation will be significantly shifted to the right, and will be -144.8 and 531.4 weeks. In the first forecast, the roots were closer to the current time - 85.4 and 4.2 weeks.

The second forecast in this paper concerns the total damage to the global economy based on the sources [11], [47]-[84]. The roots of the characteristic equation correspond to the intersection points of the x-axis function graph at points -121.5 and 33.1.

The third study in the framework of this work concerned the relationship between the time of forecast development and the level of herd immunity associated with the "quenching" of the pandemic. The study used sources [85]-[105]. The roots of the characteristic equation are -9.5 and 162.8. Data on the duration of the pandemic according to forecasts are summarized in Tab.1

**Table 1. Forecast duration of the pandemic**

Forecast type, duration in weeks	Comparison of predicted durations of the pandemic	Comparison of durations from the source [4]	Forecast for damage	Prognosis for achieving herd immunity	Average
Beginning	-144,8	-85,4	-121,5	-9,5	-90,3
Ending	531,4	4,2	33,1	162,8	182,9

Negative values for the roots of the characteristic equations correspond to past waves of morbidity within the COVID-19 pandemic. Next, a comparison of calculated points and real indicators for past real events was carried out. As "singular points" were considered both the peaks of the morbidity and the points of "inflections" of the incidence graph. The data for the calculations were taken from [98]. The results obtained as a result of the comparison are shown in Fig. 5D). This graph shows the close relationship of these indicators. The correlation coefficient is 0.99. It is significant for all significance levels. The regression equation  $y = 1.056x + 0.603$  also confirms the close relationship between the calculated and real dates of occurrence of special points, with the real dates being slightly higher. Positive roots of all characteristic equations indicate a long duration of the pandemic. In addition, the fairness of the entire process of their determination is given by a high degree of coincidence of the calculated and real pandemic events for negative roots of the characteristic equations. This is in line with the published opinions of virologists (eg [106]). Thus, everything points to a long duration of the pandemic.

At the same time, it should be noted that the economic behavior of people has changed irrevocably. R. Curtin [15] points out that, in his opinion, "the benefits of social distancing will reduce the likelihood that people will be at risk of being in a crowd in the future, and the financial difficulties suffered will increase the likelihood that people will increase their savings in case of emergencies. This is a rational response when consumers face significantly higher risks to their health and finances." The results obtained in the work, together with the above quote, show that, along with the economic behavior of people during a pandemic, their socio-psychological characteristics also change, which again affects the economy.

## 6. Conclusion

All the integral forecasts obtained, as well as the average values, give high levels of the expected duration of the pandemic. In addition, the analysis indicates significant economic losses from the pandemic. To prevent the development of this epidemic, it is necessary to ensure a high level of herd immunity.

However, this is clearly not enough, since it is necessary to change the economic behavior of people, including by influencing their socio-psychological characteristics. For example, to reduce the risk of depressive states by changing the economic conditions in human society by partially canceling lockdowns, lifting the mask regime, restoring the normal functioning of enterprises and organizations. Apparently, it may be necessary to consult a psychologist, and even the use of special medical devices.

The study of the socio-psychological characteristics of the economic behavior of people has shown the resilience of the human community to such disturbing influences as pandemics.



Results important for practice were obtained. It has been established that as the population grows, the probability, and, consequently, the proportion of people who approve of vaccination increases, while fluctuating widely. It was revealed that the transition to increased morbidity does not lead to an increase in mortality, a change in the number of recovered patients and is not directly reflected in economic indicators. It is noted that the initial strain of the COVID-19 coronavirus was very highly contagious, but measures taken by governments and medical administrations of all countries of the world led to the “washing out” of weaker strains and the isolation of stronger ones. A relationship was found between public approval of vaccination and the level of collective immunity.

In the course of further research, it is planned to expand the factual data on the course of the pandemic and its impact on the socio-psychological characteristics of people’s economic activity. In addition, it is necessary to study the possible consequences of the practical application of the obtained information.

## 7. Recommendations

The significant duration of the pandemic makes it necessary to prepare accordingly to eliminate its consequences. The severity of restrictions in economic relations needs to be reduced, especially since the pandemic was recognized as over, which will inevitably lead to a decrease in tension in socio-psychological relations, and this tension must be reduced by all possible means

The population’s favorable attitude towards vaccination, accompanied by an increase in herd immunity, makes it possible to intensify vaccination of the population, thereby bringing the end of the pandemic closer and reducing the economic damage from it. Government bodies and medical administrations must provide the necessary funding, instrumentation and drug equipment for medical organizations designated as specialized in the fight against the pandemic. It is also necessary to continue developing vaccines that take into account the emergence of new strains of coronavirus.

## References

1. Xiaoqian Lu, Zhibin Lin. COVID-19, Economic Impact, Mental Health, and Coping Behaviors: A Conceptual Framework and Future Research Directions . Website Frontier.12.11.2021 <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.759974/full>.
2. Pedrosa A.L., Bitencourt L., Fonoura-Froes A.C.et al. Emotional, Behavioral, and Psychological Impact of the COVID-19 Pandemic. Website Frontiers,0210.2020 <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.566212/full>
3. Di Crosta A. , Ceccato I., Marchetti D. et al. Psychological factors and consumer behavior during the COVID-19 pandemic. Website PLOS, 16.08.2023P <https://doi.org/10.1371/journal.pone.0256095>
4. Rafael S., Shnyder D. Socioeconomic Impacts of the COVID-19 Pandemic. RSF: The Russell Sage Foundation Journal of the Social Sciences , May 2023, Vol. 9, No. 3, The (May 2023), pp. 1-30 Published by: Russell Sage Foundation Stable URL: <https://www.jstor.org/stable/10.2307/48724527>
5. Press Room Team. The Global Economy: on Track for Strong but Uneven Growth as COVID-19 Still Weighs. World Bank. Feature story. 08.06.2021 International World of Business. 06.10. 2021. <https://internationalworldofbusiness.com/the-global-economy-on-track-for-strong-but-uneven-growth-as-covid-19-still-weighs>.
6. Impact of the coronavirus pandemic on the global economy. Website Counter Carrents.org. 02.26. 2021 <https://countercurrents.org/2021/02/impact-of-the-coronavirus-pandemic-on-the-global-economy>.
7. By Post Editorial Board. The COVID pandemic’s lasting impact on the economy and other commentary. Website New York Post. 03.06. 2022. <https://nypost.com/2022/03/06/the-pandemics-impact-on-economy-and-other-commentary>.
8. Surkov S.A., Trofimova E.G. Economic Aspects of Forecasting the Coronavirus Pandemic. Himalayan Economics and Business Management; 2(6) 33-40. 2021. <https://www.himjournals.com/article/459>
9. Krouse L. and Mille K When Will The Novel Coronavirus Pandemic Be Over/Multiple vaccines are currently being distributed. <https://www.womenshealthmag.com/health/a31406983/when-will-coronavirus-end/> Published: Jan 12, 2021
10. StillmanJ., Bill Gates Just Predicted the Pandemic Will Finally End in 2022. The Microsoft founder warned about the threat of a pandemic years before. Website Inc, 12.17.2021, <https://www.inc.com/jessica-stillman/bill-gates-pandemic-prediction-2022.html>.
11. By 2022, 95 million people will live in extreme poverty. Website UN News. Global perspective Human stories. 10.05.2022. <https://news.un.org/ru/story/2022/10/1433127>.
12. Dumanskaya E. World GDP in 2022 for the first time in history will exceed \$100 trillion. Website RGRU. 12.28.2021. <https://rg.ru/2021/12/28/mirovoj-vvp-v-2022-godu-vpervye-v-istorii-prevysit-100-trln-dollarov.html>.
13. Akhmerova A. M. The impact of the COVID-19 pandemic crisis on the behavior of firms and consumers. Public administration. Electronic Bulletin. No. 87, August 2021. <https://cyberleninka.ru/article/n/vliyanie-krizisa-pandemii-covid-19-na-povedenie-firm-i-potrebitely>.
14. Beaumont P. Decades of progress on extreme poverty now in reverse due to Covid. Website «TheGuardian». 02.03.2021. <https://www.theguardian.com/global-development/2021/feb/03/decades-of-progress-on-extreme-poverty-now-in-reverse-due-to-covid>
15. Curtin R: Pandemic’s impact on economic behavior. Written By DeGroat B. Website of Vice President for Communication. Michigan university. Michigan News. 05.08.2020. <https://news.umich.edu/pandemics-impact-on-economic-behavior>.
16. Mathieu E., Ritchie H., Rodés-Guiraol. et al. Coronavirus Pandemic (COVID-19). Research and data. Website Our World in Data. 10.24.2022. <https://ourworldindata.org/coronavirus>.
17. Doshi P., Robertson D. The end of the pandemic won’t come from biology or medicine — it will come from us. History indicates it is social behavior, not some epidemiological data point, that ends respiratory pandemics. Website The Washington Post. 02.10.2022. <https://www.washingtonpost.com/outlook/2022/02/10/end-pandemic-wont-come-biology-or-medicine-it-will-come-us>.
18. The end of the COVID-19 pandemic is in sight: WHO. Website UN news. Global perspective Human stories. 09.14.2022. <https://news.un.org/en/story/2022/09/1126621>.
19. Herd Immunity: Does Humanity Have a Chance to Defeat COVID-19 Website Sechenov University, 11.06.2020.

- <https://www.sechenov.ru/pressroom/news/kollektivnyy-immunitet-est-li-u-chelovechestva-shans-pobedit-covid-19/?ysclid=lin0fxoyvp192535953>.
20. Herd immunity and its importance. Website "Center for Hygiene and Epidemiology in the Kursk Region". 12.28.2022. <http://46cge.rosпотребнадзор.ru/content/%D0%BA%D0%BE%D0%BB%D0%BB%D0%B5%D0%BA%D1%82%D0%B8%D0%B2%D0%BD%D1%8B%D0%B9-%D0%B8%D0%BC%D0%BC%D1%83%D0%BD%D0%B8%D1%82%D0%B5%D1%82-%D0%B8-%D0%B5%D0%B3%D0%BE-%D0%B7%D0%BD%D0%B0%D1%87%D0%B5%D0%BD%D0%B8%D0%B5?ysclid=liirknedpj115572859>
  21. Herd immunity: does it exist or is it invented? Website GBUZ RM Republican Infectious Diseases Hospital. <https://rikb.ru/231-kollektivnyy-immunitet-on-sushhestvuet-ili-ego-vyidumali>.
  22. Alekseenko S.N., Drobot E.V. Disease prevention. Publisher Academy of Natural Sciences. M. 2015, 245 pp.
  23. Francis M.R. Just how contagious is COVID-19? This chart puts it in perspective. Everything epidemiology can tell us about the new coronavirus. Website Popular Science. 02.20.2020. <https://www.popsci.com/story/health/how-diseases-spread>.
  24. Paldam M. Methods Used in Economic Research: An Empirical Study of Trends and Levels. Website Издательства De Gruyter. <https://doi.org/10.1515/econ-2021-0003>
  25. Råheim M., \* Magnussen L.H., Tveit Sekse R.J. et al. Researcher–researched relationship in qualitative research: Shifts in positions and researcher vulnerability. Website Pub-Med. 14.06.2014. <https://pubmed.ncbi.nlm.nih.gov/27307132/>
  26. Statistics and news of the coronavirus "Covid-19" in the world today. Website It's good there. 06.14.2023. <https://horoshotam.ru/mir/coronavirus?ysclid=livt0cqqpo775851957>.
  27. Afanasyeva Yu. PMI business activity index - what is it and why does an investor need it. Website Finam Group. 03.26.2021. <https://www.finam.ru/publications/item/index-delovoy-aktivnosti-pmi-chto-eto-takoe-i-pochemu-on-nuzhen-investoru-20210326-18070/?ysclid=livydl8srb423076321>.
  28. The 12 Global Economic Indicators to Watch. Website Bloomberg. Last updated: 01.06.2023. <https://www.bloomberg.com/graphics/world-economic-indicators-dashboard>.
  29. Torkhova N. What strains of coronavirus are there and how do they differ? Website SC. 08.06.2021. <https://kirovportal.ru/news/vopros-otvet/kakie-shtammy-koronavirusa-est-i-chem-oni-otlichayutsya-1617/?ysclid=lgziandd2b960967039>.
  30. Lishova E.V. Strains of the new coronavirus infection SARS-CoV-2. Website INVITRO. 03.03.2023. <https://www.invitro.ru/moscow/library/bolezni/koronavirus/32323/?ysclid=lgzjzhknuz524990448>.
  31. Charumilind S., Craven M., Lamb J., Sabow A, S Singhal Sh., and Wilson M. When will the COVID-19 pandemic end? Website McKinsey Healthcare Systems & Services. 07.28.2022. <https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/when-will-the-covid-19-pandemic-end>.
  32. Scudellari M. How the pandemic might play out in 2021 and beyond. This coronavirus is here for the long haul — here's what scientists predict for the next months and years. Website Nature. 08.08.2020. [https://www.nature.com/articles/d41586-020-02278-5?awc=26427\\_1669390744\\_281d9ccbde24e950a4b55a817dd4936&utm\\_medium=affiliate&utm\\_source=awin&utm\\_campaign=CONR\\_PF018\\_ECOM\\_DE\\_PHSS\\_ALWYS\\_DEEPLINK&utm\\_content=textlink&utm\\_term=!!!affid](https://www.nature.com/articles/d41586-020-02278-5?awc=26427_1669390744_281d9ccbde24e950a4b55a817dd4936&utm_medium=affiliate&utm_source=awin&utm_campaign=CONR_PF018_ECOM_DE_PHSS_ALWYS_DEEPLINK&utm_content=textlink&utm_term=!!!affid).
  33. Puiu T. When will the pandemic end? Life could go back to normal this fall. Website ZME science. 02.24.2021. <https://www.zmescience.com/science/when-will-the-pandemic-end>.
  34. Merrick J. When the Covid pandemic ends: Government's best and worst-case scenarios revealed. 11.12. 2021. Website INEWS. <https://inews.co.uk/news/politics/covid-pandemic-end-another-year-government-forecasts-1297889>.
  35. McGrath L, Bill Gates Thinks 'Acute Phase' of Pandemic Will End in 2022 Despite Omicron. Website Bloomberg. 12.07. 2021. <https://www.bloomberg.com/news/articles/2021-12-07/bill-gates-thinks-acute-phase-of-pandemic-will-end-in-2022>.
  36. Collis H. WHO forecasts coronavirus pandemic will end in 2022, WHO Director General Tedros Adhanom Ghebreyesus said we have 'all the tools' to fight COVID. Website Politico. 12.21.2021. <https://www.politico.eu/article/who-forecasts-coronavirus-pandemic-will-end-in-2022/>.
  37. Zambrana K. The end of the COVID-19 pandemic is in sight: WHO. Website UN. News. Global perspective. Human stories. 12.21.2021. <https://news.un.org/en/story/2022/09/1126621>.
  38. McSweeney T. Just a Few More Weeks': Newsom Forecasts End to Pandemic in Very Near Future. Website Continuing Coverage 01.12.2022. <https://www.nbclosangeles.com/news/national-international/just-a-few-more-weeks-newsom-forecasts-end-to-pandemic-in-very-near-future/2796875>.
  39. Ji-Ming Chen. Novel statistics predict the COVID-19 pandemic could terminate in 2022. Website National Library of Medicine. 02.21.2022. <https://pubmed.ncbi.nlm.nih.gov/35150458/>
  40. Ralf E. Here's How the Pandemic Finally Ends. A vaccine by early 2021, a steady decline in cases by next fall and back to normal in a few years—11 top experts look into the future. Website Politico. 09.25.2020. <https://www.politico.com/news/magazine/2020/09/25/how-covid-19-pandemic-ends-421122>.
  41. Bozhko S. I. When will the coronavirus end. Website Coronavirus. 01.02.2023. <https://coronavirus-control.ru/kogda-zakonchitsya-koronavirus/?ysclid=lbfa6nmer52497073004>.
  42. Proshina E. When will the COVID-19 pandemic end? Expert forecasts. Website Rambler/Finance. 08.10.2021. <https://finance.rambler.ru/economics/46988141-kogda-zavershitsya-pandemiya-covid-19-prognozy-spetsialistov/?ysclid=lbfb3h08zq656733276>.
  43. When will the coronavirus pandemic end in Russia and in the world: experts and forecasts. Website Sverdlovsk Regional Television 01.10.26.2021. <https://www.obltv.ru/news/society/kogda-zakonchitsya-koronavirus-v-rossii-i-v-1mire-eksperty-i-prognozy/?ysclid=lbfbaknsc182190476>
  44. The forecast of British scientists: the pandemic will end by 2026. Website BFM.RU. 12.04.2021.



- <https://www.bfm.ru/news/487644?ysclid=lbgb2rud4523981577>.
45. Kuznetsov P. When the pandemic will end: all forecasts at the moment. Website NOTEBOOK. 09.29. 2021. <https://bloknot.ru/obshchestvo/kogda-zakonchitsya-pandemiya-vse-prognozy-na-dannyj-moment-816271.html>.
  46. The end of the COVID-19 pandemic is in sight: WHO. Website UN News. Global perspective Human stories. 09.14.2022. <https://news.un.org/en/story/2022/09/1126621>.
  47. Will the coronavirus end in 1922: forecasts in Russia and in the world. Website of the weekly Yuridicheskaya Gazeta. 08.11.2021. <https://yur-gazeta.ru/interesnoe/zakonchitsia-li-koronavirys-v-2022-gody-prognozy-v-rossii-i-mire.html?ysclid=lbgm63y9mu934490374>.
  48. Tairov R. "A very sharp shock": the damage to the global economy from the coronavirus pandemic was estimated at \$1 trillion. Website Forbes. 02.25.2020. <https://www.forbes.ru/newsroom/obshchestvo/393807-ochen-ostroy-shok-ushcherb-mirovoy-ekonomiki-ot-pandemii-koronavirusa?ysclid=lab48cr9o1780821783>.
  49. Dembinskaya N. Minus seven trillion: coronavirus has devastated the global economy. Website RIA Novosti. 09.21.2020. <https://ria.ru/20200921/tsena-pandemii-1577459576.html?ysclid=lab4fs8kx0139467984>.
  50. TASS. Experts: the loss of the global economy from the pandemic could reach \$8.8 trillion. Website Russian Lotto. 05.15.2020. <https://finance.rambler.ru/economics/44182672-eksperty-poteri-mirovoy-ekonomiki-ot-pandemii-mogut-dostich-8-8-trln/?ysclid=lab4i96j7364421885>.
  51. Danilov V. Socio-political and economic consequences of the pandemic. Website Enews. Stop colonialism. 12.18.2021. <https://e-news.su/mnenie-i-analitika/407771-socialno-politicheskie-i-jekonomicheskie-posledstviya-pandemii.html>.
  52. "Coronavirus" is the first pandemic that brought down the stock markets. Website Coursera. 12.08.2021. <https://e-news.su/mnenie-i-analitika/407771-socialno-politicheskie-i-jekonomicheskie-posledstviya-pandemii.html>.
  53. Analysts: COVID-pandemic is more devastating for the economy than war. Website Pravda.ru. 08.11.2020. [https://www.pravda.ru/news/economics/1519866-pandemiya\\_razrushitelnee\\_chem\\_vojna/](https://www.pravda.ru/news/economics/1519866-pandemiya_razrushitelnee_chem_vojna/).
  54. What will the world be like after the coronavirus pandemic? And how can we get through it. Portal hi-tech. 03.31.2020. [https://hi-tech.mail.ru/review/coronavirus\\_economic/](https://hi-tech.mail.ru/review/coronavirus_economic/).
  55. The damage from natural disasters in the world amounted to \$93 billion in 2021. Website Kursiv Media. 08.30.2021. <https://kz.kursiv.media/2021-08-10/uscherb-ot-stikhiynykh-bedstviy-v-mire-sostavil-93-mlrd-v-2021-godu/>.
  56. Gopinath G. The Great Lockdown: Worst Economic Downturn Since the Great Depression. IMF Blog. 04.14.2020. <https://www.imf.org/en/Blogs/Articles/2020/04/14/blog-weo-the-great-lockdown-worst-economic-downturn-since-the-great-depression>.
  57. Morrison R. Covid-19 pandemic has cost the world's economy \$3.8 trillion 'and made 147 million people unemployed', study claims. Website Mailonline. 09.07.2020. <https://www.dailymail.co.uk/sciencetech/article-8506463/Covid-19-pandemic-cost-worlds-economy-3-8TRILLION.html>.
  58. Tsegoev V. The Pandemic Effect: Why the Coronavirus-Related Global Economic Downturn Could Be Worse than the 2008 Crisis. Website RT in Russian. 03.26.2020. <https://russian.rt.com/business/article/731992-mirovaya-ekonomika-krizis?ysclid=lbl3cm9shn438774219>.
  59. Ivanovsky B. G. Economic damage from the Covid-19 pandemic and measures to overcome it in the countries of the European Union (Review). 03.04.2021. <https://cyberleninka.ru/article/n/ekonomicheskij-uscherb-ot-pandemii-covid-19-i-mery-po-ego-preodoleniyu-v-stranah-evropejskogo-soyuza-obzor?ysclid=lbl3mk0m6m213650962>.
  60. Experts assessed the damage to the global economy from the pandemic. Website.CO. 09.07.2020. <https://ko.ru/news/eksperty-otsenili-ushcherb-mirovoy-ekonomiki-ot-andemii?ysclid=lbl40zjhve812195282>.
  61. Kashepov A.V. Factors and economic consequences of the coronavirus pandemic. Bulletin of the Altai Academy of Economics and Law. #2, 2021, pp.38-46. <https://vael.ru/ru/article/view?id=1595>.
  62. Semushkin D. 2.5 million victims and \$28 trillion loss: on the global impact of the Covid-19 pandemic. Website EurAsiaDaily. 03.29.2021. <https://eadaily.com/ru/news/2021/03/29/25-mln-zhertv-i-28-trln-ubytko-o-globalnom-vozdeystvii-pandemii-covid-19>.
  63. The damage to the global economy from the pandemic was estimated at \$35 trillion. Website CO. 09.07.2020. <https://ko.ru/news/ushcherb-mirovoy-ekonomiki-ot-pandemii-otsenili-v-35-trln/?ysclid=lbl4sf67h6344997756>.
  64. Andrianov V. Activities of international financial institutions to overcome the consequences of the Covid-19 pandemic and the global socio-economic crisis. Website Situation center in Telegram. 08.11. 2020. <https://news.myseldon.com/ru/news/index/235670004>.
  65. The WEF warned of the serious consequences of the pandemic for the global economy. Website Rosbalt agency. 01.30.2021. <https://www.rosbalt.ru/business/2021/01/20/1883016.html>.
  66. The loss of the global economy due to the pandemic has been announced. Website Vesti.ru. 06.22. 2020. <https://www.vesti.ru/finance/article/2423610>.
  67. Oskolkova Z. The losses of the global economy due to the pandemic were estimated at 9 trillion dollars. Website Russian News Agency "New Day". 05.15.2020. <https://newdaynews.ru/economy/691992.html>.
  68. Claims for economic losses from the COVID-19 pandemic are mounting. Key events of the RSPP international partners. Bulletin #7. 04.16.2020. [https://rspp.ru/upload/iblock/95b/%D0%9A%D0%BB%D1%8E%D1%87%D0%B5%D0%B2%D1%8B%D0%B5%20%D1%81%D0%BE%D0%B1%D1%8B%D1%82%D0%B8%D1%8F%20%D0%BC%D0%B5%D0%B6%D0%B4%D1%83%D0%BD%D0%B0%D1%80%D0%BE%D0%B4%D0%BD%D1%8B%D1%85%20%D0%BF%D0%B0%D1%80%D1%82%D0%BD%D0%B5%D1%80%D0%BE%D0%B2%20%D0%A0%D0%A1%D0%9F%D0%9F\\_%D0%BE%D0%B1%D1%89%D0%B8%D0%B9%20%D1%81%D0%B2%D0%BE%D0%B4%2016.04.2020%20\(1\).pdf](https://rspp.ru/upload/iblock/95b/%D0%9A%D0%BB%D1%8E%D1%87%D0%B5%D0%B2%D1%8B%D0%B5%20%D1%81%D0%BE%D0%B1%D1%8B%D1%82%D0%B8%D1%8F%20%D0%BC%D0%B5%D0%B6%D0%B4%D1%83%D0%BD%D0%B0%D1%80%D0%BE%D0%B4%D0%BD%D1%8B%D1%85%20%D0%BF%D0%B0%D1%80%D1%82%D0%BD%D0%B5%D1%80%D0%BE%D0%B2%20%D0%A0%D0%A1%D0%9F%D0%9F_%D0%BE%D0%B1%D1%89%D0%B8%D0%B9%20%D1%81%D0%B2%D0%BE%D0%B4%2016.04.2020%20(1).pdf).
  69. Bunyakova D. Damage from coronavirus to the global economy was estimated at \$ 7 trillion. Website 360tv. 09.17.2020. <https://360tv.ru/news/mir/uscherb-ot-koronavirusa-mirovoj-ekonomike-otsenili-v-7-trln/>.
  70. The IMF has estimated the damage from the coronavirus pandemic at \$28 trillion. Website of the online newspaper Zona. 10.14.2020. <https://zonakz.net/2020/10/14/mvf-ocenil-ushcherb-ot-pandemii-koronavirusa-v-28-trln/>.

71. Updated Budget Projections Show Fiscal Toll of COVID-19 Pandemic. Website Committee for a Responsible Federal Budget. 07.28.07.2022. <https://www.crfb.org/papers/updated-budget-projections-show-fiscal-toll-covid-19-pandemic>.
72. Bruns R., Teran N. Weighing the Cost of the Pandemic. Knowing what we know now, how much damage did COVID-19 cause in the United States? Website Institute for progress. 04.21.2022. <https://progress.institute/weighing-the-cost-of-the-pandemic/>.
73. Global Economic Effects of COVID-19. Updated 11.10.2021. Congressional Research Service. <https://sgp.fas.org/crs/row/R46270.pdf>.
74. Agarwal R. Gopinath G. *A broad-based economic recovery requires an end to the pandemic.* Website International Monetary Fund. Finance & Development. December 2021. <https://www.imf.org/en/Publications/fandd/issues/2021/12/Pandemic-Economics-Agarwal-Gopinath>.
75. Cutler D.M., Summers L.H. The COVID-19 Pandemic and the \$16 Trillion Virus. Website JAMA network. 10.12.2020. <https://jamanetwork.com/journals/jama/fullarticle/2771764>.
76. Segal St., Gerste D. The Global Economic Impacts of Covid-19. Website Center for Strategic and International Studies. 03.10.2020. <https://www.csis.org/analysis/global-economic-impacts-covid-19>
77. Department of Economic and Social Affairs. United Nations. COVID-19 to slash global economic output by \$8.5 trillion over next two years. Website Department of Economic and Social Affairs. United Nations. Mid-2020. <https://www.un.org/en/desa/covid-19-slash-global-economic-output-85-trillion-over-next-two-years>
78. What will the pandemic mean for the global economy? Website Rambler/Finance. 09.01.2020. <https://finance.rambler.ru/markets/44762734-chemobnertsya-pandemiya-dlya-mirovoy-ekonomiki/?ysclid=lcw501gtk7828740352>.
79. Kadik L. The eye of a pandemic. How poor countries coped with coronavirus better than rich ones. Website Kommersant. 12.31.2020. <https://www.kommersant.ru/doc/4637555?ysclid=lcw6g0avdc665481156>.
80. Economic Impact of the COVID-19 Pandemic. Website Wikibrief. 05.13.2021. [https://ru.wikibrief.org/wiki/Economic\\_impact\\_of\\_the\\_COVID-19\\_pandemic](https://ru.wikibrief.org/wiki/Economic_impact_of_the_COVID-19_pandemic).
81. Keffer L. IMF: the damage from the fragmentation of the world economy can be up to 7% of world GDP. Website Kommersant. 01.16.2023. <https://www.kommersant.ru/doc/5772455>
82. UN experts called the amount of global damage from the pandemic. Website COURSE. 03.20.2021. <https://kurs.com.ru/novost/67221-eksperti-oon-nazvali-sumu-mirovogo-usherba-ot-pandemii>.
83. Kim Yo., Park Yo. Hy. COVID-19 outbreak, herd immunity formation, and future public health strategies. Website National Library of Medicine. 09.16.2021. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8666682/78.Hess>
84. S5.Lanscar E., Mariel P. et al. The path towards herd immunity: Predicting COVID-19 vaccination uptake through results from a stated choice study across six continents. Website ScienceDirect. 04,2021. <https://www.sciencedirect.com/science/article/pii/S027795362200106X>.
85. Randolph H.E., Barreiro L.B. Herd Immunity: Understanding COVID-19. Website National Library of Medicine. 05.19.2020. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7236739/>.
86. Frederiksen L.S.F., Zhang Yi., Foged C. Thakur A. The Long Road Toward COVID-19 Herd Immunity: Vaccine Platform Technologies and Mass Immunization Strategies. Website Frontiers. 07.21.2020. <https://www.frontiersin.org/articles/10.3389/fimmu.2020.01817/full>.
87. Lipsitch M. Report: COVID-19 will likely spread for up to two more years. Website Harvard T.H. Chan. School of Public Health. 05.01.2020. <https://www.hsph.harvard.edu/news/hsph-in-the-news/report-covid-19-will-likely-spread-for-up-to-two-more-years/>.
88. Miller A.M. WHO: Herd immunity is a long way off stopping COVID-19. Website World Economic Forum. 08.21.2020. <https://www.weforum.org/agenda/2020/08/herd-immunity-not-enough-to-stop-coronavirus/>.
89. Fontanet, A., Cauchemez, S. COVID-19 herd immunity: where are we? Website Nature Reviews Immunology, pp583–584 (2020). <https://doi.org/10.1038/s41577-020-00451-5>. [https://www.nature.com/articles/s41577-020-00451-5?awc=26427\\_1675089885\\_bb55ffd8731ed998c8d4bcb671f0e96f&utm\\_medium=affiliate&utm\\_source=awin&utm\\_campaign=CONR\\_PF018\\_ECOM\\_DE\\_PHSS\\_ALWAYS\\_DEEPLINK&utm\\_content=textlink&utm\\_term=!!!affid](https://www.nature.com/articles/s41577-020-00451-5?awc=26427_1675089885_bb55ffd8731ed998c8d4bcb671f0e96f&utm_medium=affiliate&utm_source=awin&utm_campaign=CONR_PF018_ECOM_DE_PHSS_ALWAYS_DEEPLINK&utm_content=textlink&utm_term=!!!affid).
90. Suryawanshi Ya. N., Biswas D.A. Herd Immunity to Fight Against COVID-19: A Narrative Review. Website Cureus. 01.09,2023. <https://www.cureus.com/articles/116952-herd-immunity-to-fight-against-covid-19-a-narrative-review#!/>
91. Kiwan A. Understanding the journey to herd immunity. Website PATH. 02.04.2021. <https://www.path.org/articles/understanding-journey-herd-immunity/>.
92. Kim Yo., Park Yo.H. COVID-19 outbreak, herd immunity formation, and future public health strategies. Website EpiH. 09.16.2021. Epidemiol Health 2021;43:e2021071. DOI: <https://doi.org/10.4178/epih.e2021071>. Published online: September 16, 2021. <https://www.e-epih.org/journal/view.php?doi=10.4178/epih.e2021071>
93. Jung, F., Krieger V., Hufert, F.T., Küpper, J.-H. Herd immunity or suppression strategy to combat COVID-19. Clinical Hemorheology and Microcirculation, vol. 75, no. 1, pp.13-17, 2020. Website IOS Press. 07.22.2020. <https://content.iospress.com/articles/clinical-hemorheology-and-microcirculation/ch209006>.
94. Kaushal Sh., Rajput A. S., Bhattacharya S. et al. Estimating the herd immunity threshold by accounting for the hidden asymptomatics using a COVID-19 specific model. Website PLOS ONE. 12.16.2020. <https://doi.org/10.1371/journal.pone.0242132>. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242132>.
95. Kortepeter M. An Infectious Disease Doctor Explains Why Striving For Herd Immunity From Covid-19 Is A Bad Idea. Website Forbes. 09.14.2020. <https://www.forbes.com/sites/coronavirusfrontlines/2020/09/14/an-infectious-disease-doctor-explains-why-striving-for->

herd-immunity-from-covid-19-is-a-bad-idea/?sh=69071d876b4f

96. Herd immunity and COVID-19: 5 things to know. Website INTERNIST. 04.19.2021. <https://internist.ru/publications/detail/kollektivnyy-immunitet-i-covid-19-5-veshchey-kotorye-nuzhno-znat/?ysclid=ldiyva946r654000379>.
97. Nesterova Yu.V. Herd immunity: myth or reality? Website MedAbout. 09.28.2021. [https://medaboutme.ru/articles/kollektivnyy\\_immunitet\\_mif\\_i\\_li\\_vse\\_taki\\_realnost/?ysclid=ldiz3r3mp9941595225](https://medaboutme.ru/articles/kollektivnyy_immunitet_mif_i_li_vse_taki_realnost/?ysclid=ldiz3r3mp9941595225)
98. What you need to know about herd immunity: 4 main questions. Website Lvrach. 04.15.2021. <https://www.lvrach.ru/news/15436723?ysclid=ldiz8yfvj706436870>.
99. Reznikova E. Collective immunity to COVID-19: what are the chances of its occurrence and can we forget about coronavirus without a vaccine? Website Dog. 05.27.2020. <https://www.sobaka.ru/health/health/109255?ysclid=ldizbbtg6887583629>.
100. Yashlavsky A. German scientists named the conditions for herd immunity from coronavirus. Weak vaccination in poor countries is making it difficult to stop the COVID-19 pandemic. Website MK.RU. 10.04.2021. <https://www.mk.ru/science/2021/10/04/nemeckie-uchenye-nazvali-usloviya-dlya-kollektivnogo-immuniteta-ot-koronavirusa.html?ysclid=ldizmjcwps119541630>.
101. Kostarnova N. Increased virological liability. To achieve herd immunity, more than 80% of the country's inhabitants must be ill or vaccinated. Website Kommersant. 07.07.2021. <https://www.kommersant.ru/doc/4890035?ysclid=ldizpsox9y773792516>.
102. Herd immunity during coronavirus infection. Website Russian Medical Journal. 06.25.2020. <https://www.rmj.ru/news/kollektivnyy-immunitet-pri-koronavirusnoy-infektsii/?ysclid=ldizr7ujs6170606833>.
103. Putin: the level of herd immunity to coronavirus should reach 90%. Website Parliamentary Newspaper. 12.18.2021. <https://www.pnp.ru/social/putin-uroven-kollektivnogo-immuniteta-k-koronavirusu-dolzhen-dostich-90.html>.
104. Statistics and news of the coronavirus "Covid-19" in the world today. Website It's good there. 02.18.2023. <https://horoshotam.ru/mir/coronavirus>.
105. Nedyuk M. COVID persistence: Coronavirus will become a seasonal disease, like the flu. The infection will take hold due to the long incubation period and the high capacity for infection. Website Izvestiya IZ. 02.24.2020. <https://iz.ru/980830/mariia-nediuk/covidnoe-postoianstvo-koronavirus-stanet-sezonnoi-bolezniu-kak-gripp?ysclid=leb0jc1xm995416423>.