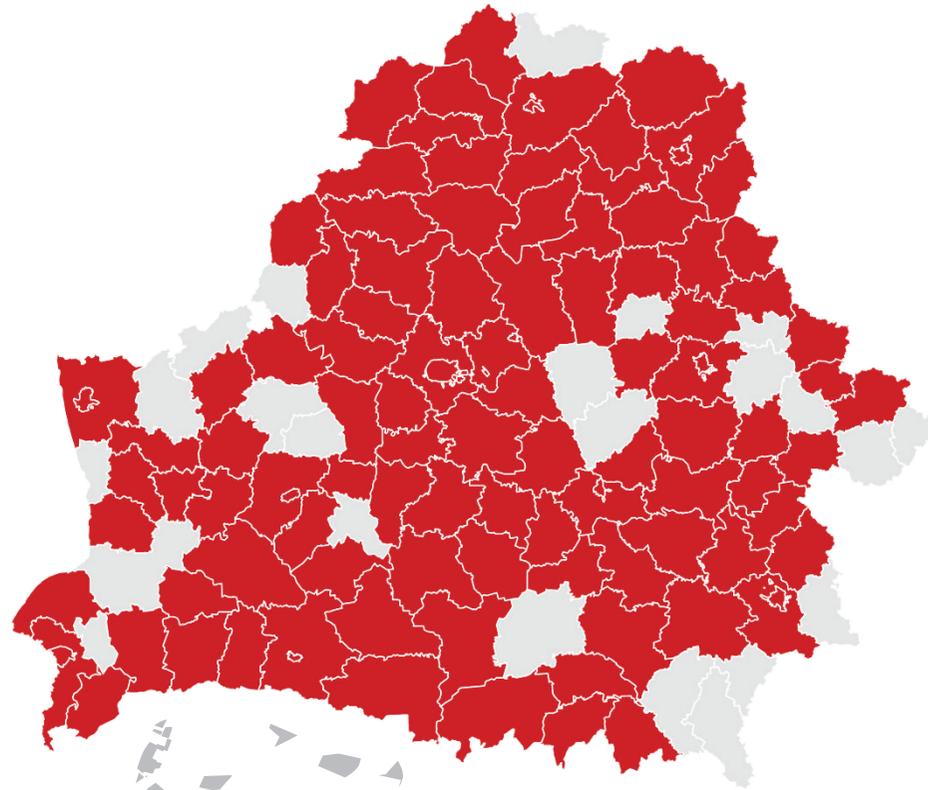


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Belarusian Institute
for Strategic Studies

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Analysis # 2
June 16, 2020

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Piotr Rudkouski

A large, stylized graphic of a virus particle, resembling a coronavirus, is positioned on the left side of the page. It features a grey outer shell with several protrusions and a white inner core with a network of lines and circles.

Herd Immunity or Death?

Neither*

* The full message is: on the one hand, herd immunity against the novel coronavirus has so far been achieved at a low level. On the other hand, the infection fatality rate is much lower than originally expected.

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Main points

Immunity. Almost all countries, including Belarus, are far from the threshold of herd immunity against SARS-CoV-2, which means that the readiness of health services and anti-infective preventive measures must be maintained.

Mortality. The infection mortality rate from the novel coronavirus in Europe does not exceed 1.5%; many studies estimate it within the range of 0.3-0.7%.

Grey area. There is a significant 'grey area' in determining CoViD deaths. Often, it is difficult to establish a causal link between infection and death with a high probability. The grey area can be a factor of various biases, either towards understating the number of CoViD deaths, or towards overstating them.

Realism. Countering the spread of infection remains an important imperative, but it will be more productive if we act in solidarity and coordination, without unnecessary emotions and mutual suspicions.



Research on various aspects of the epidemiology, clinic, and therapy of CoViD-19 is being intensively conducted across the globe. Just recently, data from different countries have become available to estimate the number of people affected by this infection, which provides a clearer picture of the mortality rate in relation to the entire population, as well as the intensity of herd immunity in different countries.

In our analysis, we will try to establish a preliminary indicator of herd immunity against SARS-CoV-2 and mortality of the novel coronavirus. We will also propose a conceptual framework for statistical biases when accounting CoViD deaths and touch upon the relationship between the number of infection detected cases and the herd immunity indicator.

General: CoViD tests, serological studies, and mortality rates

The most common method of confirming the diagnosis of CoViD-19 disease is to find the **RNA** of the virus responsible for it on the patient's mucous membranes. The patient's nose or nasopharynx is scraped (bronchial and tracheal wash can also be used) and the material is examined in the laboratory by carrying out [polymerase chain reaction \(PCR\)](#). This is how diagnostics are performed in Belarus. And when the local ministry of health [re-](#)

[ports](#) that, for example, 54,680 patients diagnosed with CoViD-19 were registered on June 15, these data were obtained by the PCR method.

But the specificity of the infection caused by SARS-CoV-2 is that a significant part of patients¹ cope with the disease in a mild or asymptomatic form. To get a more complete picture of the infection prevalence in society, it is necessary to conduct population testing as wide as possible, which is not always possible for organizational reasons. As a rule, each country makes its own decision about which patient groups and contact persons are subject to the CoViD-19 PCR testing, depending on the epidemiological situation and available opportunities.

The American public health regulator, CDC (*Centers for Diseases Control and Prevention*), [has developed minimal sufficient testing criteria](#). Priority is given to the following categories of people: hospitalized patients with severe and moderate forms of illness, employees of the health system, employees of institutions where a large number of people are brought together (nursing homes, prisons, etc.), as well as employees of the ambulance and emergency services. Patients with mild symptoms of CoViD-19 were identified as less priority for testing. Last of all, asymptomatic cases are treated. It should be noted that even in the first half of May, the recommendations were more restrictive and did not include people without symptoms as a priority, which is similar to the approach of Sweden, which did not impose a strict quarantine (unlike the rest of the EU).

¹ Table 1 presents the data estimates.

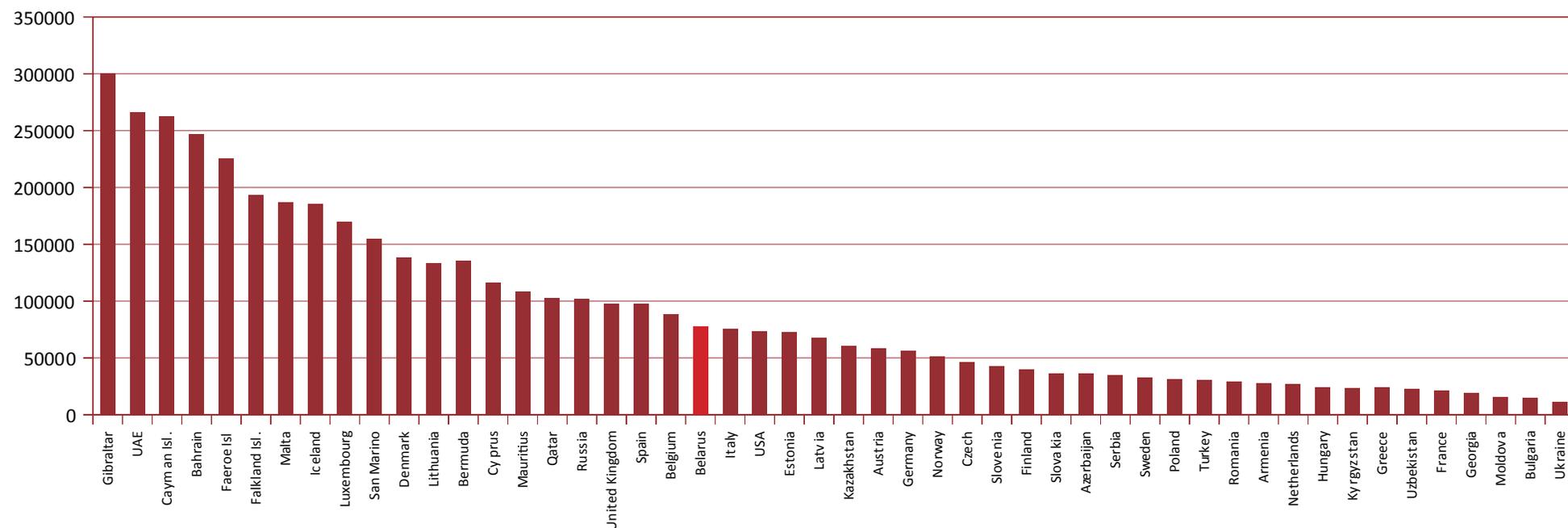


In the second half of May, the Swedish authorities [announced](#) the expansion of the range of candidates for testing to include people with minimal symptoms. This was done not to identify patients with CoViD-19 among them, but to identify those who have not contracted the coronavirus, since separate rules of self-isolation apply for the latter and they can be allowed earlier to communicate with other people.

As one can see, Belarus is one of the regional leaders in terms of the number of tests for SARS-CoV-2. At the time of preparing this paper, 750 thousand tests were conducted, i.e. about **78 thousand per 1 million** people. Proportionally, this is more than twice the number of tests in Poland, almost four times as many as in Moldova and seven times as many as in Ukraine. Belarus is also slightly ahead of Estonia and Latvia, but lags behind Lithuania and Russia.

Chart 1 presents a breakdown by countries of tests' number per 1 million population.

Chart 1. Number of tests per 1 million population as of June 15, 2020*



Sources: [Worldometers](#), [Ministry of health of the Republic of Belarus](#), [euractiv.pl](#)

* For convenience, we do not include data from all 197 countries and territories, but only from 50 countries. We included 1) all countries with the number of tests more than 100 thousand per 1 million; 2) all countries from the former Soviet Union and Central and Eastern Europe; 3) (selectively) developed countries.



To find out what percentage of the population has had CoViD-19, studies are being conducted on immunity to this disease – the so called serological studies. Technically, this looks like a blood sample for testing for antibodies (first, IgM and, later, IgG) to SARS-CoV-2.

Serological studies are needed for the following:

1. Estimating the intensity of herd immunity and getting an idea of how close the population is to the threshold of herd immunity, which for CoViD-19 is about 67%²;

2. Determining the ratio between the number of cases detected by PCR and the number of patients who have immunity (who have been affected by infection). Thus, it is possible to get an idea of the number of mild-symptom and asymptomatic cases of coronavirus infection.

3. Estimating how deadly SARS-CoV-2 is. International research uses two parameters to determine it:

- *Case fatality rate, CFR*, which is the percentage of deaths among *reported* cases of infection with a novel coronavirus. One can get it by dividing the number of deaths by the number of detected cases of CoViD-19 using the PCR method. For example, as of June 15, the figure for Belarus was **0.57%**: 312 (deaths) divided by 54,680 (detected cases) and multiplied by 100. The CFR is a very

² Haley E. Randolph, Luis B. Barreiro. [Herd Immunity: Understanding COVID-19](#). *Immunity*, 52, May 19, 2020. Elsevier.

approximate indicator, the reliability of which depends on many factors, primarily on the extent of population testing.

- *Infection fatality rate, IFR*, or lethality is the percentage of deaths among all (reported and not reported) cases of SARS-CoV-2 infection. This is the most adequate mortality indicator, which answers the question: *what is the probability of death if infected with this infection?* Serological studies are one of the most appropriate ways to determine the IFR.

It is not difficult to guess that the IFR is, as a rule, lower than the CFR, since the latter almost never takes into account all cases of infection. The CFR reflects only *reported* cases, which are usually symptomatic cases requiring medical intervention.

What can be said about the IFR? This indicator can only be accurately determined after the end of the pandemic. However, over the past two months a number of serological studies from different parts of the world have been published. The results of these studies already provide an opportunity to get a preliminary estimate on how deadly the new coronavirus is.



World: IFR between 0.07 and 1.4%. Herd immunity – up to 30%

We reviewed 23 studies and reports on the presence of antibodies to the novel coronavirus, published during April and May and based on data from around the world. The materials were divided into two categories depending on the degree of scientific value: (I) peer-reviewed publications in academic journals and official reports of national health authorities; (II) media reports and the so called preprints (i.e. drafts of publications in specialized journals that have not yet passed due review).

The conclusions from the studies and reports that interest us are presented in Table 1.

Table 1. Key indicators of the SARS-CoV-2 pandemic in different countries across the world

The authors of the study or the institution that published the report	Population	% of individuals in the population with antibodies*	Ratio of persons with antibodies/ PCR-positive patients	% of asymptomatic CoViD-19 cases among all detected	% of IFR in the population	Reference to a source
<i>I. Scientific publications and official reports of national health authorities</i>						
ENE-COVID19. National serological study of SARS-CoV-2	Population of Spain	5.0 (4.7-5.4)		2.5	1.2	https://www.mscbs.gob.es/gabinetePrensa/notaPrensa/pdf/ENE-C140520115618104.pdf
Neeraj Sood et al.	Population of Los Angeles County, California	4.1 (2.8-5.6)	28-55 times		0.07	https://jamanetwork.com/journals/jama/fullarticle/2766367 http://publichealth.lacounty.gov/phcommon/public/media/mediapubhpdetail.cfm?prid=2328&fbclid=IwAR3MpnleX6gearYrGRwAGrMWpEr3K5MOK7zB29hgNHJW4krvpyeGJRGEHqT8

* Average. The 95% confidence interval is shown in parentheses.



The authors of the study or the institution that published the report	Population	% of individuals in the population with antibodies*	Ratio of persons with antibodies/ PCR-positive patients	% of asymptomatic CoViD-19 cases among all detected	% of IFR in the population	Reference to a source
Hendrik Streeck et al.	Population of the municipality of Gangelt, Germany	5	5-10 times	22	0.36	https://www.ukbonn.de/C12582D3002FD21D/vwLookupDownloads/Streeck_et_al_Infection_fatality_rate_of_SARS_CoV_2_infection2.pdf/%24FILE/Streeck_et_al_Infection_fatality_rate_of_SARS_CoV_2_infection2.pdf
Merit Melin	442 inhabitants of the Hospital district of Helsinki and Uusimaa	0.7				https://thl.fi/en/web/thlfi-en/-/number-of-people-with-coronavirus-infections-may-be-dozens-of-times-higher-than-the-number-of-confirmed-cases?fbclid=IwAR3bDYNRIQBQFxfhJdrmjyPoHtbk_thqb5E_ayR9IUU3FUGeXrP3oc6GwpS0
Xiaodong Wu et al.	Patients of a hospital in Wuhan, China	10				https://onlinelibrary.wiley.com/doi/10.1002/jmv.25904
<i>II. Preprints and reports in the media</i>						
Ed Slot et al.	Population of the Netherlands	2.7-9.5				https://www.researchsquare.com/article/rs-25862/v1
Chantal J. Snoeck et al.	Population of Luxembourg	2.15				https://www.medrxiv.org/content/10.1101/2020.05.11.20092916v1
Ladislav Dušek	Population of the Czech Republic	5			0.59	https://medicalxpress.com/news/2020-05-czech-covid-incidence-population.html
Ministry of Health of Slovenia	Population of Slovenia	2-4				https://www.rtv slo.si/zdravje/novi-koronavirus/nihce-od-pozitivnih-v-raziskavi-ni-pomisllil-da-ga-je-covid-19-ze-oplazil/522756
Luca Valenti et al.	Donors from the city Milan, Italy	4.6 before the outbreak of the epidemic Then, growth to 7.1				https://www.medrxiv.org/content/10.1101/2020.05.11.20098442v1.full



The authors of the study or the institution that published the report	Population	% of individuals in the population with antibodies*	Ratio of persons with antibodies/ PCR-positive patients	% of asymptomatic CoViD-19 cases among all detected	% of IFR in the population	Reference to a source
Nir Menachemi	Population of the state of Indiana, USA	2.8	11 times	45	0.58	https://news.iu.edu/stories/2020/05/iupui/releases/13-preliminary-findings-impact-covid-19-indiana-coronavirus.html
Silvia Stringhini et al.	Population of the city of Geneva, Switzerland	9.7 (6.1-13.1)			0.5-1.4	https://lenews.ch/2020/05/15/coronavirus-new-studies-suggest-fatality-rates-far-lower-than-early-estimates/ https://www.medrxiv.org/content/10.1101/2020.05.02.20088898v1.full.pdf
Diane Havlir	Population of the city of San Francisco, USA	1.4		53		https://www.ucsf.edu/news/2020/05/417356/initial-results-mission-district-covid-19-testing-announced
Jochen Schwenk	Population of the city of Stockholm	10				https://www.kth.se/aktuellt/nyheter/10-procent-av-stockholmarna-smittade-1.980727
Eran Bendavid et al.	Population of Santa Clara County, California, USA	2.8	23-54 times		0.17	https://www.medrxiv.org/content/10.1101/2020.04.14.20062463v2
Asako Doi et al.	Population of the city of Kobe, Japan	2.7 (1.8-3.9)	396-858 times			https://www.medrxiv.org/content/10.1101/2020.04.26.20079822v1.full.pdf
The State of New York	Population of the state and city of New York	12.5 (state) 20 (city)				https://www.governor.ny.gov/news/amid-ongoing-covid-19-pandemic-governor-cuomo-announces-results-completed-antibody-testing
Andrew Bryan et al.	Population of the city Boise, Idaho, USA	1.79				https://www.medrxiv.org/content/10.1101/2020.04.27.20082362v1
Carlos Gimenez, mayor of Miami Dade County	Population of Miami Dade County	4.4-7.9		50		https://www.miamiherald.com/news/coronavirus/article242260406.html?fbclid=IwAR2svgTSw4gmNVTrCl35bG1YQtmqkMXOc4Sre_92zLdJx1Uyr1T6FeaR2U



The authors of the study or the institution that published the report	Population	% of individuals in the population with antibodies*	Ratio of persons with antibodies/ PCR-positive patients	% of asymptomatic CoViD-19 cases among all detected	% of IFR in the population	Reference to a source
Arnaut Fontanet et al.	Students and staff of 1 school in the Oise department, France	25		17		https://www.medrxiv.org/content/10.1101/2020.04.18.20071134v1
Arnaut Fontanet et al.	Donors in the Oise department, France	3				https://www.medrxiv.org/content/10.1101/2020.04.18.20071134v1
John lafrate	Chelsea, Massachusetts, USA. 200 random people on the street	30				https://www.bostonglobe.com/2020/04/17/business/nearly-third-200-blood-samples-taken-chelsea-show-exposure-coronavirus/?fbclid=IwAR3XQlYzGz7cMfc3nmQSAbg8jTICJ7nkG8ZMFH-fObf8QmQ2FYthvSiAEkQ
Moscow branch of Hadassah Medical clinic	1000 individuals who paid for a test for the presence of antibodies to SARS-CoV-2	10				https://www.reuters.com/article/us-health-coronavirus-russia-antibodies/up-to-one-in-10-residents-of-moscow-may-have-had-coronavirus-infections-laboratory-idUSKCN2262Z7?utm_source=reddit.com

So far, the largest national serological study in terms of the number of participants (60,983) has been carried out in **Spain** (*ENECOVID19*). It showed that the estimated number of individuals in the population with antibodies to the novel coronavirus is on average **5%**, with significant variations across regions (the largest number being in Madrid, 10%).

It should be noted that as of June 15 Spain [ranks](#) second among the countries of the European economic area in terms of the num-

ber of detected CoViD-19 cases: **521 per 100 thousand** population. It is followed by [Italy](#) (392 per 100 thousand) and [Germany](#) (225 per 100 thousand). Serological studies data for Italy are not available yet.

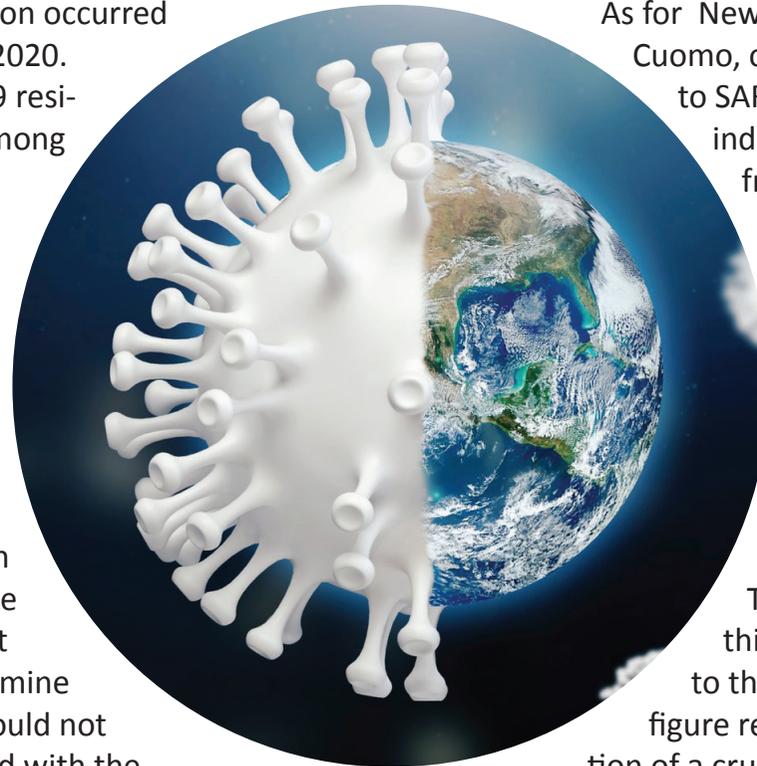
The information about the situation with herd immunity in **Germany** can be found in a study by the group of Hendrik Streeck, which was conducted in the municipality of Gangelt in the west of the country. Gangelt was nicknamed ‘German Wuhan’ after an



outbreak of the novel coronavirus infection occurred there following the carnival in February 2020. Upon analysing the blood samples of 919 residents, researchers found that only **5%** among them had antibodies.

A similar intensity of herd immunity (about 5%) is also recorded in the **Czech Republic**, where as of June, 15, 2020 [there were](#) 94 cases per 100 thousand. (almost 2.5 times less than in Germany). In **Finland**, where [there were](#) almost 1.4 times more cases of CoViD-19 per 100,000 population than in the Czech Republic, the preliminary indicator for the number of immune persons is only about 1%. These data tell that in order to determine the spread of infection in society one should not focus on the number of people diagnosed with the virus, since it depends on the testing practices adopted in different countries, as well as on the number of mild and asymptomatic cases.

Other national studies in the EU (Netherlands and Slovenia) also estimate the number of immune persons to be no higher than 5% nationally; in some regions – up to 10%. In **Stockholm**, Sweden's largest city, the number of immune individuals, according to long-term immune screening, is 10%.



As for New York, according to its governor Andrew Cuomo, only about 20% of residents are immune to SARS-CoV-2. Less representative, but quite indicative data were presented by researchers from Wuhan, where among the patients of a multidisciplinary hospital, at the epicenter of the pandemic, the number of immune people did not exceed 10%. Thus, the intensity of collective immunity to SARS-CoV-2 in different countries is still well below the threshold of 67%.

In Table 1 we can also see estimates of how common asymptomatic CoViD-19 is. The largest study – *ENECOV19* – estimates this number at 2.5%, which is in stark contrast to the data for the United States, where the figure reaches 50%. A study of the isolated population of a cruise ship, which in mid-March 2020 toured ‘in the footsteps of Ernest Shackleton’, showed that in 81% of cases the disease was asymptomatic³. The differences in the data can be explained by the fact that different groups of respondents may be sensitive to symptoms to different degrees, which in turn affects whether in answering the questions of researchers they report them or not.

The data also help us get an idea of IFR for the novel coronavirus. It ranges from 0.36% (Germany) to 1.4% (some regions of

³ Alvin J. Ing, Christine Cocks, Jeffery P. Green. [COVID-19: in the footsteps of Ernest Shackleton](#). Thorax Published Online First: 27 May 2020.



Switzerland). These estimates roughly coincide with previous ones, in particular:

- by John Ioannidis, professor at Stanford University; his analysis of the situation on the cruise ship Diamond Princess led to IFR estimate between 0.05-1%⁴;

- Joseph Wu and colleagues; their analysis of the situation in Wuhan led to the conclusion that the IFR was around 1.4%⁵;

- a group of 33 scientists: their analysis of the situation throughout China resulted in IFR estimate at 0.66%⁶.

In an [announced](#) (but not yet published) study by Richard Grewelle and colleagues from Stanford University, the global IFR of the novel coronavirus is estimated at 1.04%.

⁴ John P.A. Ioannidis. [A fiasco in the making? As the coronavirus pandemic takes hold, we are making decisions without reliable data.](#) *StatsNews*. March 17, 2020.

⁵ Joseph T. Wu, Kathy Leung, Mary Bushman, Nishant Kishore, Rene Niehus, Pablo M. de Salazar, Benjamin J. Cowling, Marc Lipsitch and Gabriel M. Leung. [Estimating clinical severity of COVID-19 from the transmission dynamics in Wuhan, China.](#) *Nature Medicine*. March 19, 2020.

⁶ Robert Verity, Lucy C Okell, Ilaria Dorigatti, Peter Winskill, Charles Whittaker, Natsuko Imai, Gina Cuomo-Dannenburg, Hayley Thompson, Patrick G T Walker, Han Fu, Amy Dighe, Jamie T Griffin, Marc Baguelin, Sangeeta Bhatia, Adhiratha Boonyasiri, Anne Cori, Zulma Cucunubá, Rich FitzJohn, Katy Gaythorpe, Will Green, Arran Hamlet, Wes Hinsley, Daniel Laydon, Gemma Nedjati-Gilani, Steven Riley, Sabine van Elsland, Erik Volz, Haowei Wang, Yuanrong Wang, Xiaoyue Xi, Christl A Donnelly, Azra C Ghani, Neil M Ferguson. [Estimates of the severity of coronavirus disease 2019: a model-based analysis.](#) *The Lancet* March 30, 2020.

Belarus: the probable number of immune people – 4%

The Minister of Health **Vladimir Karanik** [announced](#) the start of serological tests in Belarus on May 8. According to him, the tests will first be run by national medical institutions, and after that they will become available to everyone. The Minister also announced a plan for mass testing in some regions of the country.

In order to estimate the number of people with antibodies to the novel coronavirus in Belarus, we can use the research data on the ratio of the number of immune subjects to the number of patients in whom SARS-CoV-2 was detected by polymerase chain reaction (PCR). We suggest using the research data collected in Germany, as the number of tests per capita in this country is close to that in Belarus.

The aforementioned study by Hendrik Streeck's group shows a ratio of 1 to 10 (the number of immune individuals is 10 times higher than the number of patients with the virus). Based on this assumption, the number of people who are immune to the new coronavirus in Belarus comprises approximately **4%**. If to take the



maximum ratios that were shown in studies on the US (1 to 55), the number of immune individuals would be about 20%.

Applying the Stockholm's case, the number of immune individuals comprises 10%. Yet, it shall be noted that each of these figures is still far from the threshold of herd immunity, which means there is still the need to keep the health care system prepared for emergency as well as to maintain social distancing and prevention of infection. Only well-organized, large-scale serological tests can give a precise answer to the question about herd immunity of Belarusian people. In order to prevent public distrust regarding these data, the Ministry of Health is well-advised to submit these results for publication in a reliable specialized international medical journal. Moreover, the Ministry should share regular and detailed information about the intermediate and final results of the testing with the public.

As it follows from official data, the number of deaths per 100,000 population caused by the novel coronavirus infection in Belarus is commensurate with the number in the neighbouring countries, which introduced full-scale anti-epidemic restrictions. Yet, the mortality rate clearly contrasts with similar rates in the neighbouring states — see Table 2.

Table 2. Number of CoViD-19 deaths in Belarus and neighbouring states as of June, 15

Country	Reported deaths per 100 000 population	Case fatality rate
Latvia	1.5	2.5%
Ukraine	2.1	2.8%
Lithuania	2.7	4.2%
Belarus	3	0,57%
Poland	3.3	4.2%
Russia	4.9	1.3%

Calculations taken from or made on the basis of: [ECDPC](#), [index.minfin.com.ua](#), [стопкоронавирус.рф](#), [http://stopcovid.belta.by/](#)

If to accept the hypothesis (which seems to be quite controversial) that

(1) The milder the lockdown measures, the higher CoViD-19 mortality.

then the data on Belarus would look like a 'statistical anomaly'. The media, both domestic and foreign, often articulate the thesis that the Belarusian authorities deliberately underreport the number of infected and the number of CoViD-19 deaths. In a previous BISS analysis, a special attention was devoted to this issue.⁷ Here, we will point to the following moments. If we accept that

(2) Both the number of CoViD-19 deaths and the number of infected SARS-CoV-2 are underreported.

then the CFR will not change significantly. In other words, if the Ministry of Health underreports the number of infected by

⁷ Piotr Rudkouski. [70 Days without a Lockdown. Belarus's Special Path in the Fight against CoViD-19](#). *BISS CovidResearch*. May 22, 2020. P. 9-10.



4-5 times *and* the number of CoViD-19 deaths by 4-5 times, the mortality rate will still remain about the same: around 0.57%. of course, the proportion of deaths per 100,000 people will change.

We can hypothesize that

(3) The number of deaths is underreported, but the number of infections is (more or less) true.

Such a possibility cannot be rejected, but due attention shall be paid to the *problem of causality*. When establishing a cause-and-effect relationship between being infected and death, there is a 'gray zone' of indeterminacy, i.e. situations where it is impossible to unambiguously answer the question whether the patient died *because of* the infection, or just *with* the infection.⁸

⁸ See George D. Lundberg. [Are Patients Dying 'From' COVID or 'With' COVID?](#) *Medscape*. June 5, 2020.

Death statistics and the problem of causality

In the theory of argumentation there is a well-known fallacy which is called *post hoc ergo propter hoc* (literally: after this, therefore because of this).⁹ The fallacy consists in a mistaken assumption that if the phenomenon *F* occurs after the phenomenon *G*, it automatically means that *G* is the cause of *F*. In order to reliably determine whether the infection was the cause of death, we need – in addition to the fact of detection of the virus in the body – a number of additional criteria. However, it does not seem that such criteria exist; the WHO just suggest to count as CoViD deaths all deaths as to which an alternative cause has not been established or it is unclear.¹⁰

Let us have a look at Chart 2 and 3 (next page). Except for two obvious facts, we face a fairly wide 'gray area', where it is impossible to unambiguously define what was (the main or only) cause of death. Government statisticians usually present data on a *yes or no* basis, what with the strong public demand for *fast* and *clear* information. Thus, statistics — both in Belarus and in other countries — can be marked by various biases.

⁹ A related concept is *cum hoc ergo propter hoc* – literally: together with this, therefore because of this.

¹⁰ On April 11, the WHO [instructed](#) that 'COVID-19 death is defined for surveillance purposes as a death resulting from a clinically compatible illness in a probable or confirmed COVID-19 case, unless there is a clear alternative cause of death that cannot be related to COVID disease (e.g., trauma). There should be no period of complete recovery between the illness and death.'



Chart 2. CoViD-19: Facts and a 'gray zone'

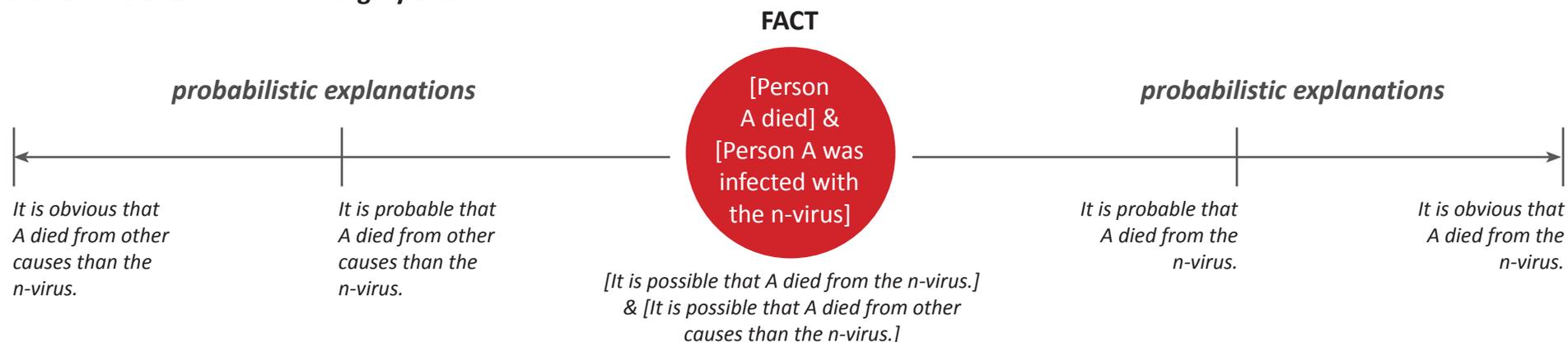


Chart 3. A spectrum of statistical biases in relation to CoViD deaths

Fact	Explanations	Falling under the category of 'covid deaths' ("+" falls; "-" doesn't fall)					
		I	II	III	IV	V	VI
[Person A died] & [Person A was infected with the n-virus]	It is obvious that A died from other causes than the n-virus.	+	-	-	-	-	-
	It is probable that A died from other causes than the n-virus.	+	+	-	-	-	-
	[It is possible that A died from the n-virus.] & [It is possible that A died from other causes than the n-virus.]	+	+	+	-	-	-
	It is probable that A died from the n-virus.	+	+	+	+	-	-
	It is obvious that A died from the n-virus.	+	+	+	+	+	-

Based on this scheme, we can distinguish five types of statistical distortions:

- (a) Deliberate falsification in favour of underreporting the number of CoViD deaths: *situation VI*.
- (b) Deliberate falsification in favour of overreporting the number of CoViD deaths: *situation I*.

- (c) Bias in favour of underreporting the number of CoViD deaths: *situation V*.
- (d) Bias in favour of overreporting the number of CoViD deaths: *situation II*.
- (e) The insurmountable 'gray zone', which is a factor of unintentional distortions: *situation III and IV*.



We can now take a look at hypothesis (3) through the prism of the above clarifications. With these clarifications, we can understand why the main argument in support of this hypothesis is problematic. The argument is: *In most other countries, the mortality rate is much higher than in Belarus.* Given the existence of the 'gray zone', it cannot be excluded that in many countries there are — intentional or unintentional — distortions in favour of overreporting the number of CoViD deaths.

Summary and conclusions

1. Almost all countries, including Belarus, are still far from the threshold of herd immunity against SARS-CoV-2. Thus, there is still a need to maintain the readiness of health services and anti-infective measures.

2. The infection fatality rate of the novel coronavirus in Europe does not exceed 1.5%. Many studies/reports estimate it at around 0.3-0.7%.

3. When interpreting national statistics on the number of infected cases, it should be noted that they always reflect only *reported* cases. Reported cases are always only *a part* of all cases, and this unreported part is often larger than the reported one.

4. When interpreting the statistics on the number of CoViD deaths, we should factor in a 'gray zone' — a number of situations where it is impossible to determine the cause-and-effect relationship between infection and death with a high probability. This gray area can be a factor of various distortions: both towards



underreporting the number of CoViD deaths and towards their overreporting.

Countering the spread of infection remains an important imperative, but it will be more productive if we act in solidarity and coordination, without unnecessary emotions and mutual suspicions.

Glossary

CoViD-19 – *Corona Virus Disease-2019* – disease caused by SARS-CoV-2.

Herd immunity – a situation when in a population there is a clear proportion of individuals immune (not susceptible) to a particular infection, which makes the entire population immune to the given infection. Herd immunity is determined by the threshold of collective immunity — the percentage of the population that has contracted the infection or was vaccinated against it.

PCR – *Polymerase Chain Reaction*, a method of identifying nucleic acid (DNA, RNA) in the material under study.

RNA – *ribonucleic acid* – transmitter of a virus' genetic information.

SARS-CoV-2 – *Severe Acute Respiratory Syndrome related Corona Virus 2*, coronavirus of a second type, which causes (*inter alia*) severe respiratory problems.



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About the project

Aware of multiple ethical and sociopolitical challenges resulting from the rapid spread of SARS-CoV-2, at the beginning of May 2020 the BISS team launched the research-and-policy project

Covid19. Optimal Solutions in a Situation of Uncertainty (shortly: BISS CovidResearch).

The main goals of the project are the following: 1) analysis of various responses to the coronavirus pandemic; 2) assessment of short- and long-term risks entailed by particular responses; 3) making practical recommendations on how best to deal with the pandemic in Belarus; 4) building horizontal solidarity for dealing with the pandemic's consequences.

The main focus is on the situation in Belarus, but we also pay much attention to the global context.

Website: <http://covidresearch.by/eng>

About the BISS

Belarusian Institute for Strategic Studies (BISS) is an independent Belarusian think tank, founded in 2007 by a group of prominent scientists and public figures. Its main mission is to provide an integrated picture of socio-political processes in Belarus and assess them in a long-term (strategic) perspective. In its advocacy dimension, BISS promotes the values of an open society and critical thinking skills.

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