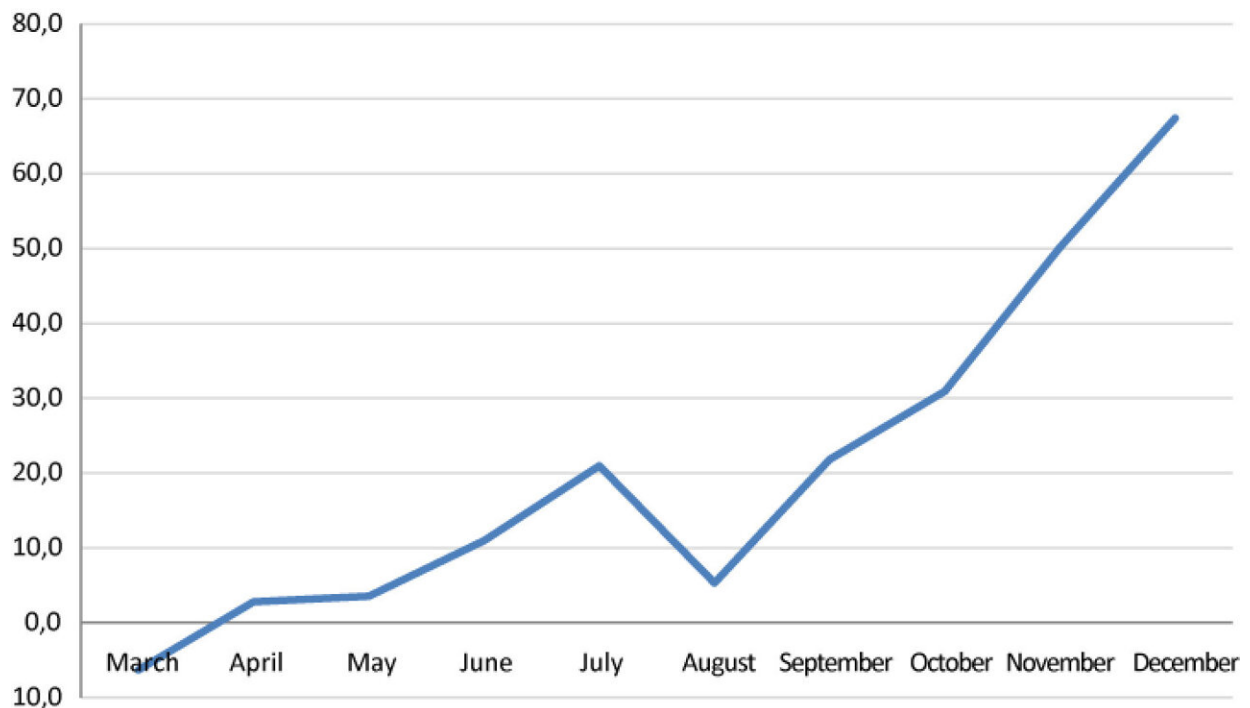


Scientists have named regional factors that can affect the spread of COVID-19

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Average excess mortality per 100 000 population in Russia by month, 2020.
Source: authors' calculations based on Rosstat data. Credit: *Population and Economics* (2022). DOI: 10.3897/popecon.6.e87739

COVID-19 came as an unexpected challenge for humanity. Countries adopted different, sometimes diametrically opposed approaches to minimizing the pandemic's impact: from hard lockdowns to no restrictions at all, as in Sweden. It was only last week that China began to

relax its zero-tolerance policy.

Researchers of the HSE Faculty of Economic Sciences have identified a few factors which tend to have the greatest impact on the spread of COVID-19—in Russia, such factors include ambient humidity and temperatures, population mobility, the share of internal migrants in the [local population](#), and household incomes. The study findings are published in *Population and Economics*.

The coronavirus pandemic has caused a slowdown in economic growth, a fall in household incomes, an increase in unemployment, and a substantial human toll: according to Johns Hopkins University, more than 650 million cases of COVID-19 have been reported worldwide, and more than 6.6 million people have died.

To learn the lessons of COVID-19 and to prepare for potential new infections, scientists examine and analyze all sorts of data collected during the pandemic on the course of the disease, the efficacy of vaccines and medicines, successful public health policies, and the effect of restrictions and government support measures.

Studies point to many factors which may affect the spread of coronavirus in a certain location. In many countries, the first cases were diagnosed in big cities—economic centers that attract people from other regions and countries. High population density is also known to accelerate the spread of the virus, especially in [poorer countries](#) (although researchers differ on this point).

The vulnerability of older people to coronavirus has also been questioned. The higher number of reported cases in this age group may be due to older people being more health-aware and getting tested more often.

Other factors that can influence the spread of the virus include ambient temperature (the warmer the climate, the lower the rate of infection) and humidity (found to reduce the likelihood of infection in [warmer climates](#) but to increase it in colder countries), greenery in cities, whether the authorities imposed public health-related restrictions promptly and decisively, the scale of testing, whether a country has an advanced public health system, and much more.

The authors have investigated whether the Russian data confirms these findings and whether country-specific factors exist which affect the spread of the virus. The paper is based on Rosstat data from 82 Russian regions collected between March and December 2020, including information about local weather and population mobility, measured using the Yandex self-isolation index.

The prevalence of COVID-19 was estimated based on excess [mortality](#) rates. Many studies use this indicator rather than official statistics on the number of COVID-19 cases and deaths, as such statistics can depend on testing rates, reporting policies, and other factors.

Variables used for modeling in this study include demographics (the share of pensioners, internal migrants, and urban residents in the population), nature and climate (average ambient temperatures, humidity, green spaces in cities), policies (self-isolation index), economic factors (per capita income, housing security, [unemployment rate](#)), and local healthcare (doctors and nurses per 10,000 people).

The resulting models reveal the most important factors to include weather (humidity and temperature), the self-isolation index reported by Yandex, the share of internal migrants, and [household incomes](#). In contrast, the share of people living in cities, housing and urban greenery do not appear to be significant. It turns out that each group of factors includes at least one which is significantly associated with mortality.

High humidity and low average temperatures are associated with higher mortality from COVID-19, as is intensive migration from other regions. In addition to this, the situation appears to be worse in regions with high average incomes and high unemployment. One version of the model also shows a negative association between mortality and the share of pensioners in the region and a positive association between mortality and the reported self-isolation index. Another version of the model confirms a negative association with the number of health workers: the higher it is, the lower the mortality.

"Many of our results are consistent with those observed by researchers in other countries. However, there are differences. In some developed countries, such as the UK and the US, COVID-19-related morbidity and mortality were found to be positively associated with poverty. In contrast, in Russia, higher mortality from COVID-19 was observed in more affluent regions, other things being equal. Also contrary to some other countries, we did not observe the 'right' negative association between anti-COVID public health policy and mortality. In fact, higher mortality was reported in those regions and in those months in which population mobility was at its lowest. One could assume that the Russian population chose to be less mobile in response to a perceived rise in disease rates in their region rather than in compliance with the official regional policies," says Marina Kolosnitsyna, Co-author of the paper, Professor of the HSE Faculty of Economic Sciences.

The observed negative relationship between COVID-19-related mortality and the share of pensioners in the region may seem counterintuitive. According to the authors, the reason may be that older people tend to have fewer social contacts, be more cautious, and observe self-isolation regulations, all of which make the COVID-19 incidence in this group lower compared to younger people. A positive relationship between the self-isolation index and excess mortality may actually indicate reverse causation, ie that lower mobility and activity levels were the

result—rather than the cause—of a critical COVID-19 situation in the region.

High incomes may indicate that local industries, transport and commerce are thriving and business activity is high, facilitating the spread of the virus. Unemployment may be forcing people to accept low-level jobs that cannot be performed remotely.

"Infection control policies should be differentiated by region. There needs to be a special focus on areas with cold and humid climates and on regions which are industrially developed and more affluent, have younger populations, significant incoming migration, and high unemployment. It is particularly important to ensure a more equal distribution of the health workforce across the country's vast territory: this pandemic has clearly shown differences in mortality rates depending on regional healthcare capacity," says Kolosnitsyna.

More information: Marina G. Kolosnitsyna et al, Spread of COVID-19 in the Russian regions in 2020: factors of excess mortality, *Population and Economics* (2022). [DOI: 10.3897/popecon.6.e87739](https://doi.org/10.3897/popecon.6.e87739)

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