COVID-19 Results Briefing: the European Region

November 19, 2020

This document contains summary information on the latest projections from the IHME model on COVID-19 in the European Region. The model was run on November 18, 2020.

Cases and deaths in the region continue to increase, although the pace has slowed slightly due to the effect of mandates reducing transmission in a number of countries including France, Belgium, Netherlands, Czechia, Ireland, Scotland, and Wales. Despite this progress, we expect daily deaths to continue increasing and reach a peak in mid-January at over 7,000 deaths a day. Hospital systems in most countries will be under high to extreme stress through most of the winter months. Expanding mask use from the current 67% to 95% can save 221,000 lives by March 1.

Current situation

- Daily reported cases in the last week increased to 270,000 per day on average compared to 237,000 the week before (Figure 1), a smaller week-on-week percentage increase than the week before.
- Daily deaths in the last week increased to 4,300 per day on average compared to 3,800 the week before (Figure 2). This makes COVID-19 the number 2 cause of death in the European Region this week (Table 1).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in most countries (Figure 3). Notably, effective R is now below 1 in France, Belgium, the Netherlands, Ireland, Wales, and Scotland, after having been above 1 for many weeks.
- We estimated that 7% of people in the European Region have been infected as of November 16. Among countries in the region, this ranged from 1% in Tajikistan to 21% in North Macedonia (Figure 4).
- The daily death rate is greater than 4 per million in Armenia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, France, Georgia, Greece, Hungary, Italy, Luxembourg, Malta, Montenegro, North Macedonia, Poland, Portugal, Republic of Moldova, Romania, Slovenia, Spain, Switzerland, Ukraine, and United Kingdom (Figure 6).

Trends in drivers of transmission

- Austria and Slovenia imposed new mandates while Slovakia lifted any business restrictions. Notably, Estonia, Finland, San Marino, and Sweden have only one mandate in place (Table 2).
- Mobility has continued the steady increase seen since mid-September, reaching 27% lower than the pre-COVID-19 baseline (Figure 8). Mobility is near baseline (within 10%) in Armenia, Azerbaijan, Estonia, Hungary, Kazakhstan, Slovakia, Turkmenistan, and Uzbekistan.

- Mobility is lower than 30% of baseline in Andorra, Belgium, Cyprus, Czechia, France, Greece, Iceland, Ireland, Israel, Italy, Lithuania, Luxembourg, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovenia, Spain, and United Kingdom.
- Mask use has been increasing since early September. As of November 16, we estimated that 67% of people always wore a mask when leaving their home (Figure 9).
- Mask use is lower than 50% in Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Denmark, Finland, Iceland, Kyrgyzstan, Latvia, Malta, Montenegro, Netherlands, North Macedonia, Norway, Serbia, and Sweden.
- Diagnostic tests per capita continue to increase reaching 250 per 100,000 people on November 16 (Figure 10).

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, we project 1,023,000 cumulative deaths by March 1, 2021. Daily deaths will reach nearly 7,000 per day in mid-January, falling to 5,000 deaths per day on March 1, 2021 (Figures 12 and 13).
- The reference scenario assumes that most countries will have to re-impose a broad package of social distancing mandates in the winter months (Figure 15).
- If universal mask coverage (95%) were attained in the next week, our model projects 221,000 fewer cumulative deaths on March 1, 2021.
- Under our **mandates easing scenario**, our model projects 1,693,000 cumulative deaths by March 1, 2021.
- Figure 18 compares the publicly archived forecasts of other models and our model. Forecasts for the region diverge profoundly. Imperial estimates more than 18,000 deaths per day by the end of the year. MIT (Delphi) forecasts just over 10,000 deaths per day by late December. USC (SIKJalpha) and Los Alamos National Labs projects deaths will decline from here forward.
- Figures 19 and 20 show that hospital stress will be at high or extreme levels, particularly for ICU beds, in most of December through February for nearly all countries in the region.

Model updates

We have substantially revised the infection-fatality rate (the IFR) used in the model. To date, we had used an infection-fatality rate that was derived from an analysis of population representative antibody surveys where we disaggregated prevalence by age and matched COVID-19 death rates. The age-specific IFR from this analysis was assumed to be the same across locations and time.

We have now accumulated considerable empirical evidence that suggests that 1) the IFR has been declining since March/April due to improvements in the clinical management of patients, and 2) the IFR varies as a function of the level of obesity in a community.
The evidence supporting these observations includes:

- An analysis of detailed clinical records of more than 15,000 individuals from a COVID-19 registry organized by the American Heart Association. This registry covers patients in more than 150 hospitals. Our analysis suggests that after controlling for age, sex, comorbidities, and disease severity at admission, the hospital-fatality rate has declined by about 30% since March/April.

- An analysis of more than 250,000 individuals admitted to hospitals in Brazil with COVID-19 shows that after controlling for age, sex, obesity, and oxygenation at admission, the hospital-fatality rate has declined by about 30% since March/April.

- An analysis of age-standardized IFRs from more than 300 surveys also suggests that the population-level trends in the IFR are consistent with a 30% decline since March/April. These data also suggest that the prevalence of obesity at the population level is associated with a higher IFR and that the magnitude of the effect is similar to that found in the individual-level analysis.

Based on these empirical findings, we have switched to a new estimated infection-fatality rate. The new IFR varies over time (declining since March/April by approximately 0.19% per day until the beginning of September), varies across locations as a function of obesity prevalence, and varies across locations (as before) as a function of the population distribution by age. The implication of lower IFRs over time is that for a given number of observed deaths there are more cumulative infections.

For all COVID-19 resources at IHME, visit http://www.healthdata.org/covid.

Questions? Requests? Feedback? Please contact us at https://www.healthdata.org/covid/contact-us.

Current situation

Figure 1. Reported daily COVID-19 cases

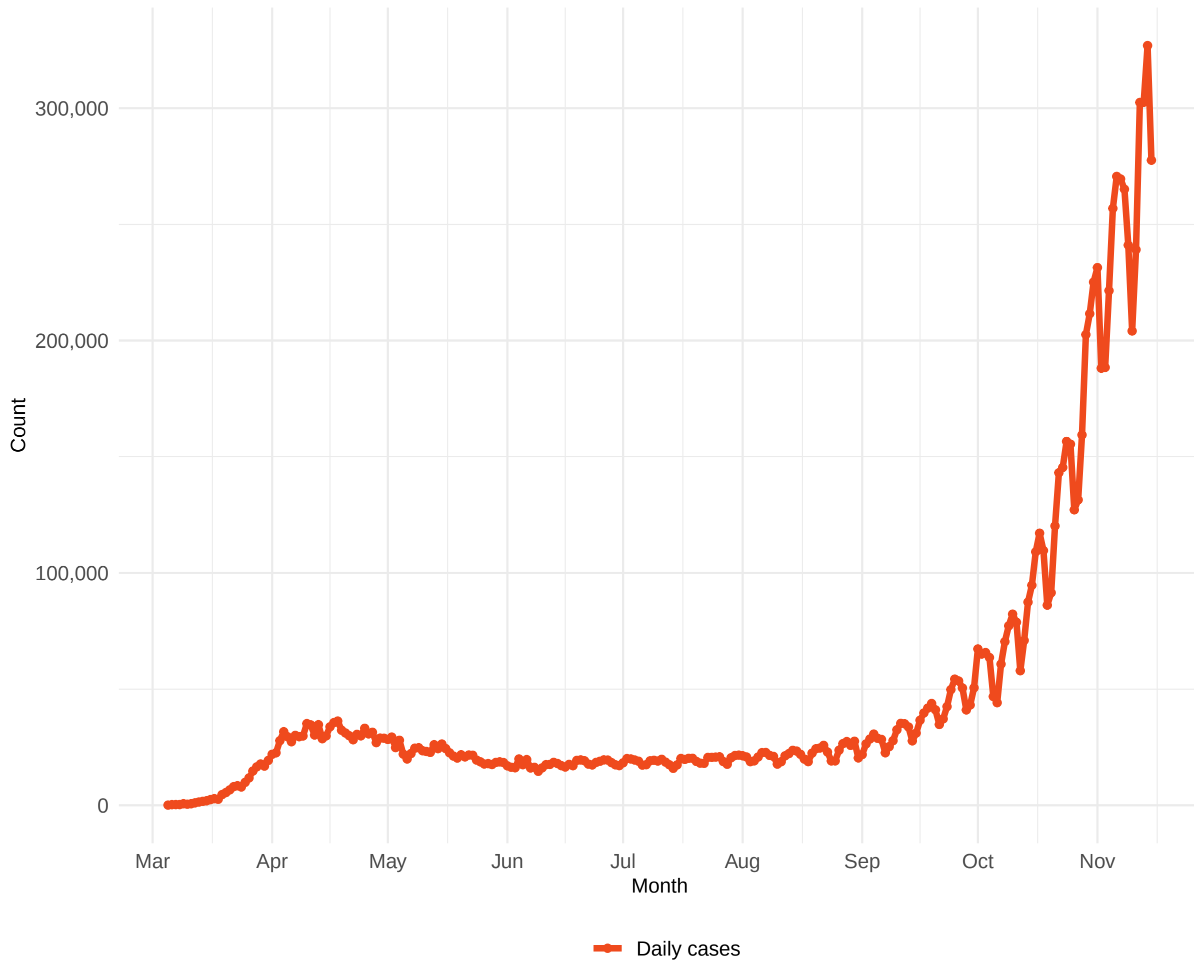


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	44,253	1
COVID-19	29,858	2
Stroke	22,622	3
Tracheal, bronchus, and lung cancer	8,918	4
Alzheimer's disease and other dementias	8,022	5
Chronic obstructive pulmonary disease	6,719	6
Colon and rectum cancer	5,881	7
Lower respiratory infections	5,254	8
Cirrhosis and other chronic liver diseases	4,290	9
Hypertensive heart disease	3,949	10

Figure 2a. Reported daily COVID-19 deaths.

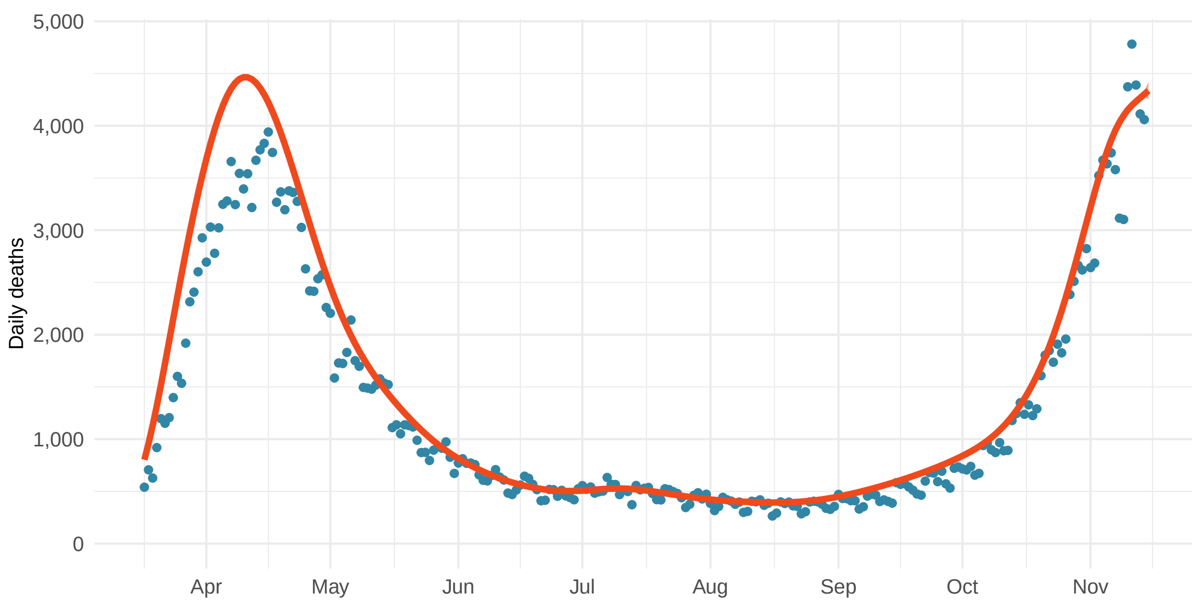


Figure 2b. Estimated cumulative deaths by age group

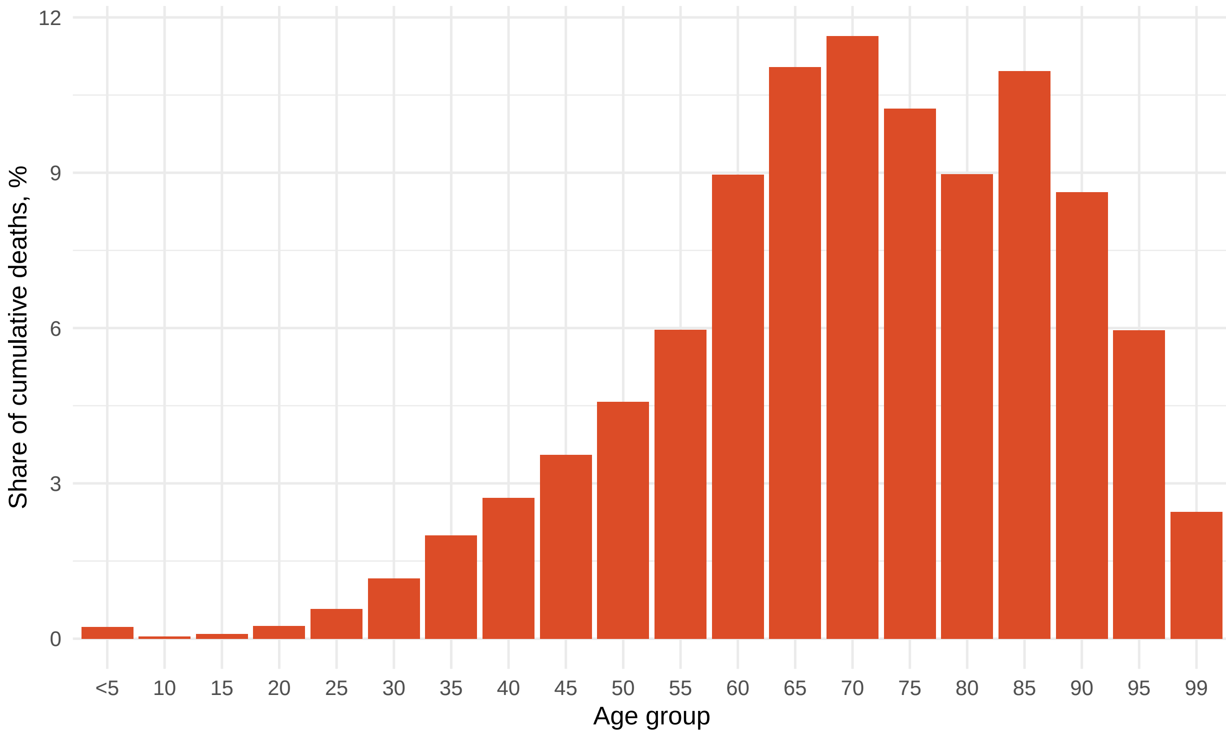


Figure 3. Mean effective R on November 05, 2020. The estimate of effective R is based on the combined analysis of deaths, case reporting and hospitalizations where available. Current reported cases reflect infections 11-13 days prior so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline all other things being held the same.

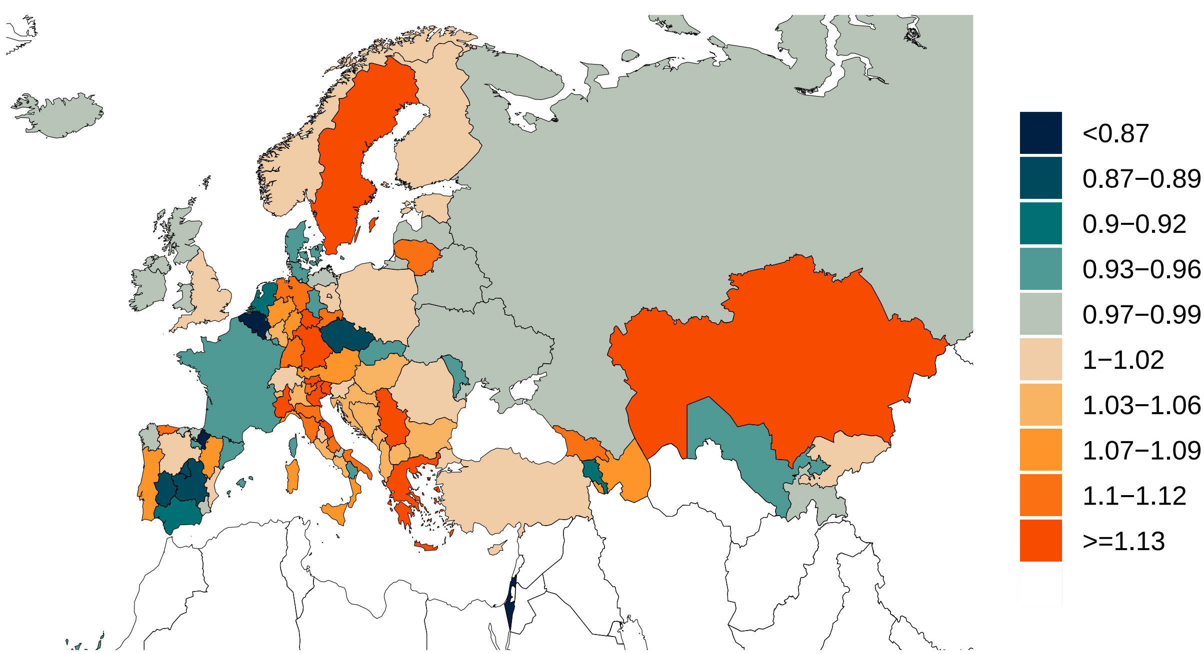


Figure 4. Estimated percent of the population infected with COVID-19 on November 16, 2020

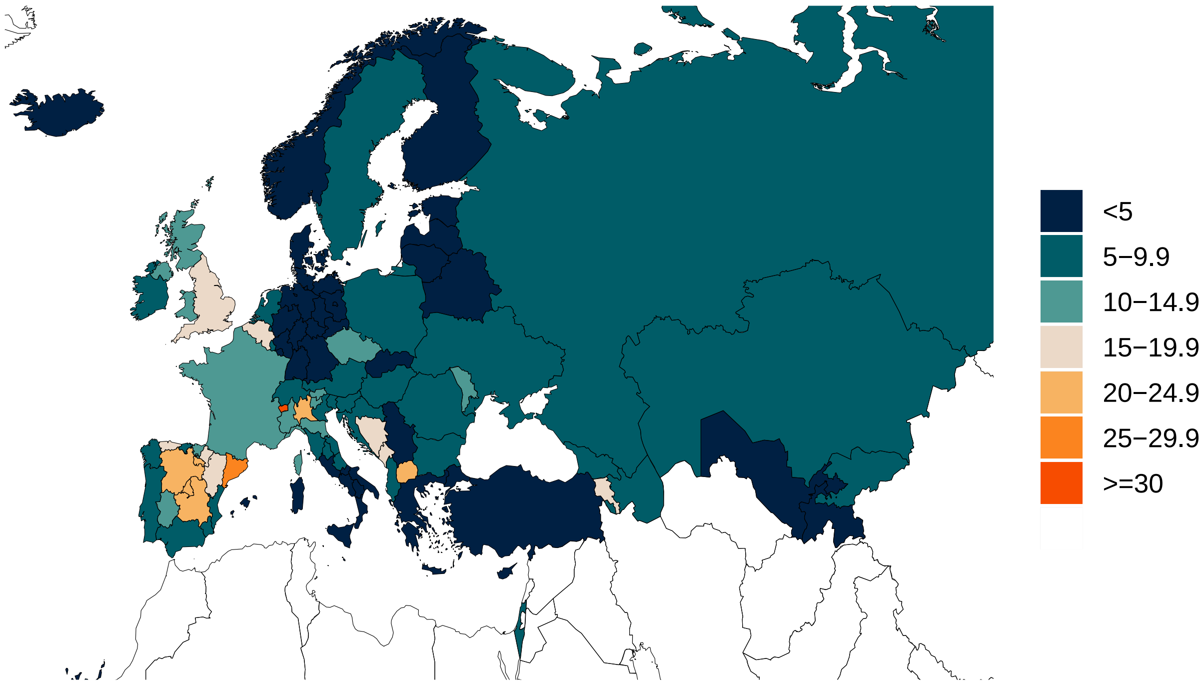


Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.

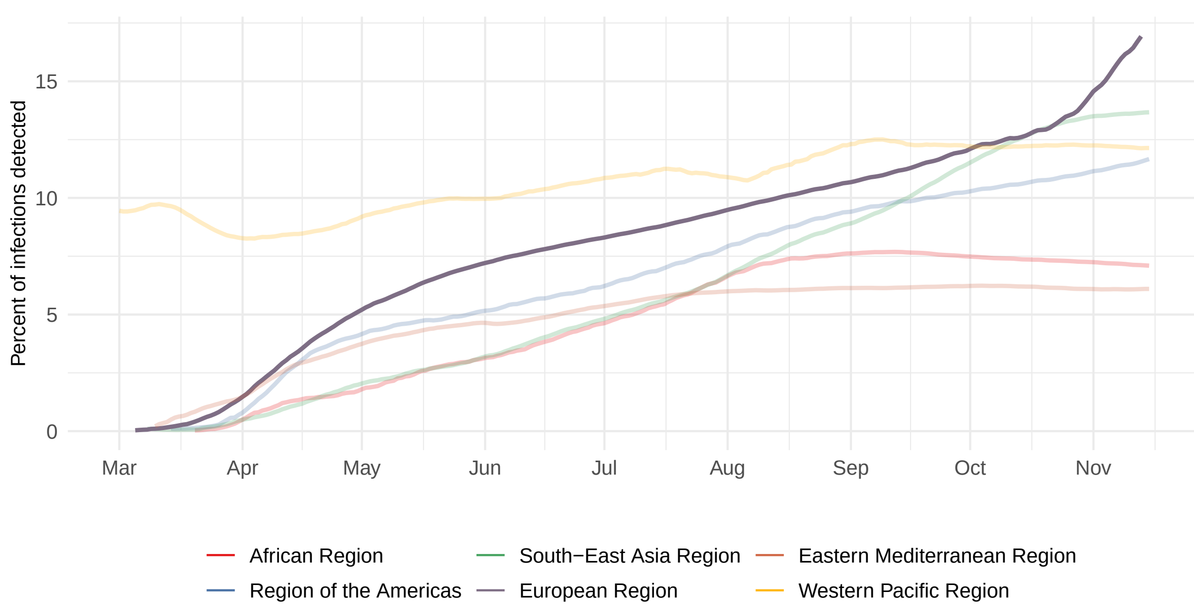
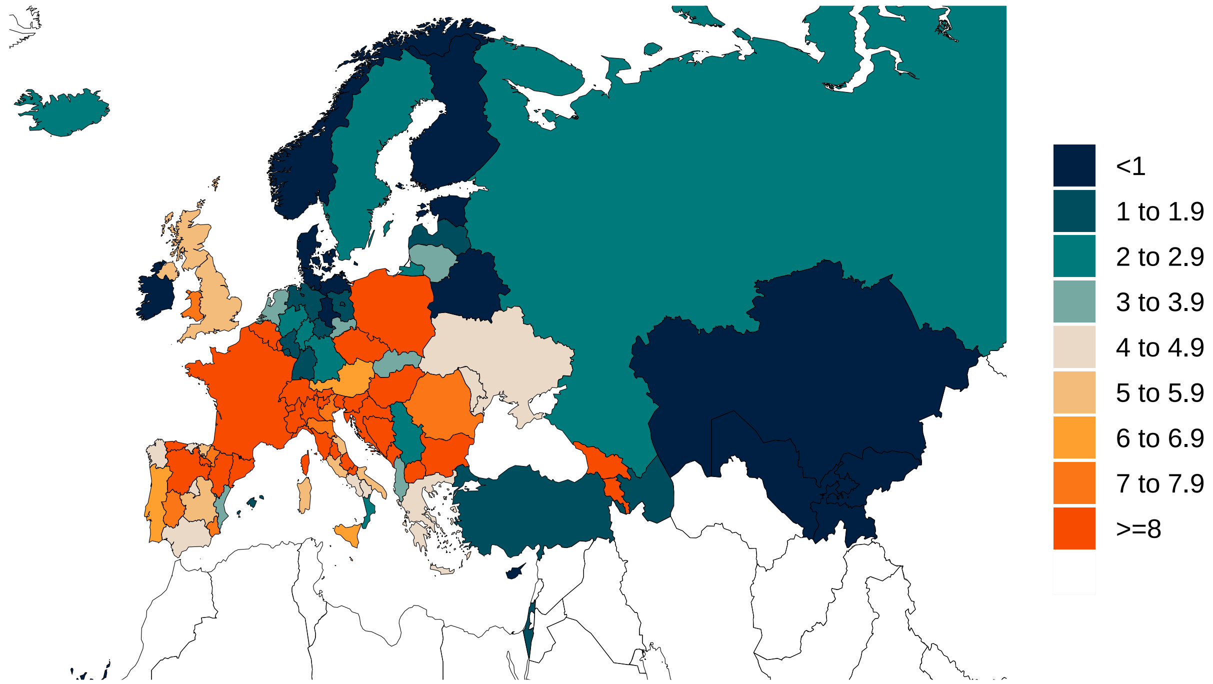


Figure 6. Daily COVID-19 death rate per 1 million on November 16, 2020



Critical drivers

Table 2. Current mandate implementation

	All nonessential businesses closed	Any businesses restricted	Any gatherings restricted	Mask use	School closure	Stay home order	Travel limits
Albania	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Andorra	No mandate	Mandate in place	No mandate	Mandate in place	No mandate	No mandate	No mandate
Armenia	No mandate	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate	No mandate
Austria	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Azerbaijan	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Belarus	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate
Belgium	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Bosnia and Herzegovina	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Bulgaria	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	Mandate in place
Croatia	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Cyprus	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Czechia	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Denmark	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate
Estonia	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Finland	No mandate	No mandate	Mandate in place	No mandate	No mandate	No mandate	No mandate
France	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	Mandate in place	Mandate in place
Georgia	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Germany	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Greece	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	Mandate in place
Hungary	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Iceland	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Ireland	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate
Israel	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Italy	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Kazakhstan	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Kyrgyzstan	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Latvia	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Lithuania	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Luxembourg	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Malta	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Montenegro	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Netherlands	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
North Macedonia	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Norway	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate
Poland	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Portugal	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Republic of Moldova	No mandate	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate	No mandate
Romania	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
Russian Federation	No mandate	Mandate in place	No mandate	Mandate in place	No mandate	No mandate	No mandate
San Marino	No mandate	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate
Serbia	No mandate	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate	No mandate
Slovakia	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Slovenia	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Spain	No mandate	No mandate	Mandate in place	No mandate	Mandate in place	No mandate	No mandate
Sweden	No mandate	No mandate	Mandate in place	No mandate	No mandate	No mandate	No mandate
Switzerland	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Tajikistan	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Turkey	No mandate	Mandate in place	No mandate	Mandate in place	Mandate in place	No mandate	No mandate
Turkmenistan	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Ukraine	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate
United Kingdom	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate
Uzbekistan	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place

Mandate in place   No mandate

Figure 7. Total number of social distancing mandates (including mask use)

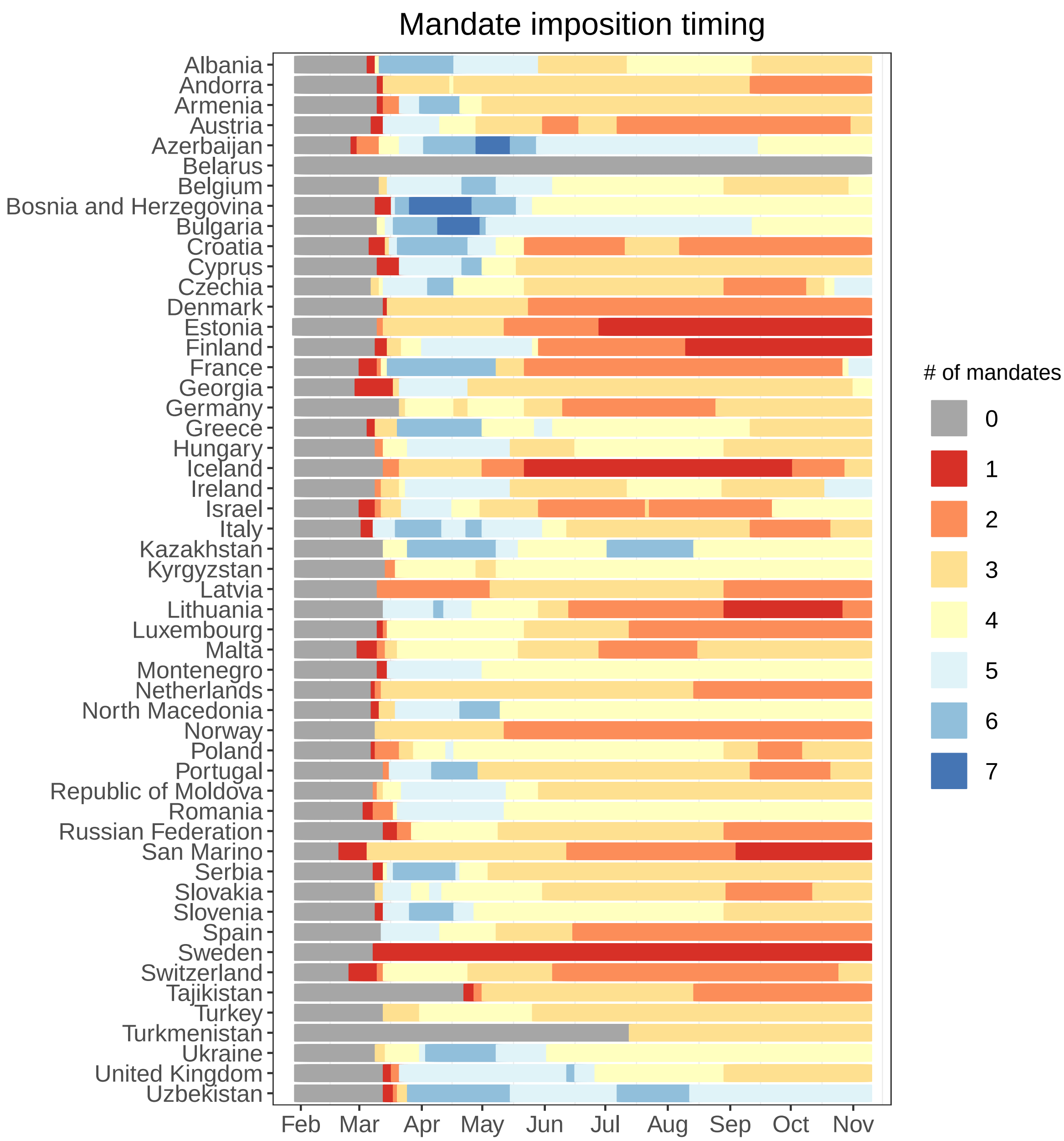


Figure 8a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

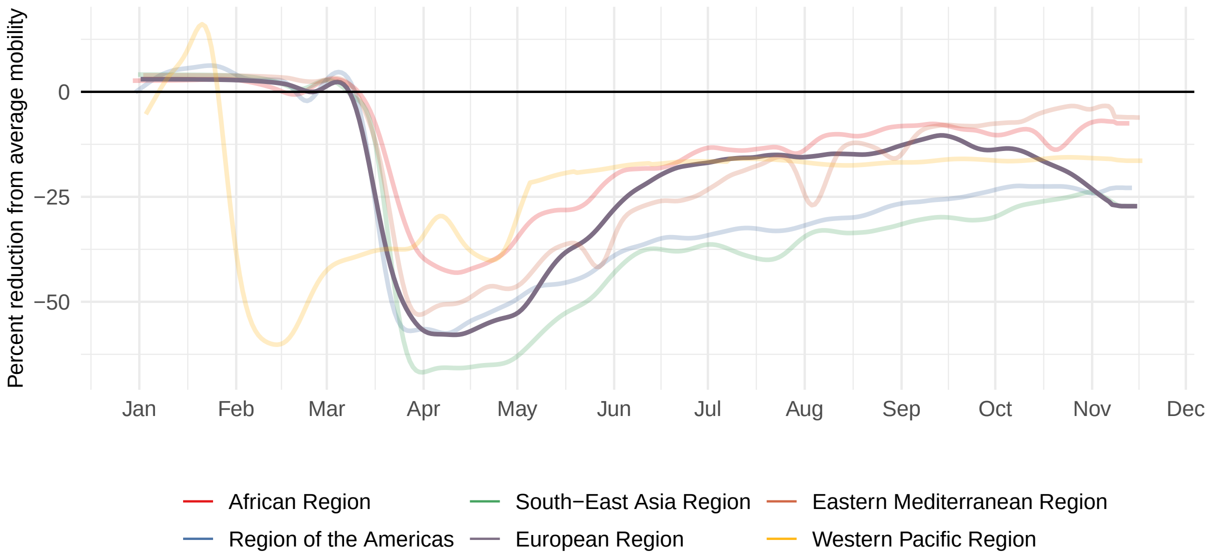


Figure 8b. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on November 16, 2020

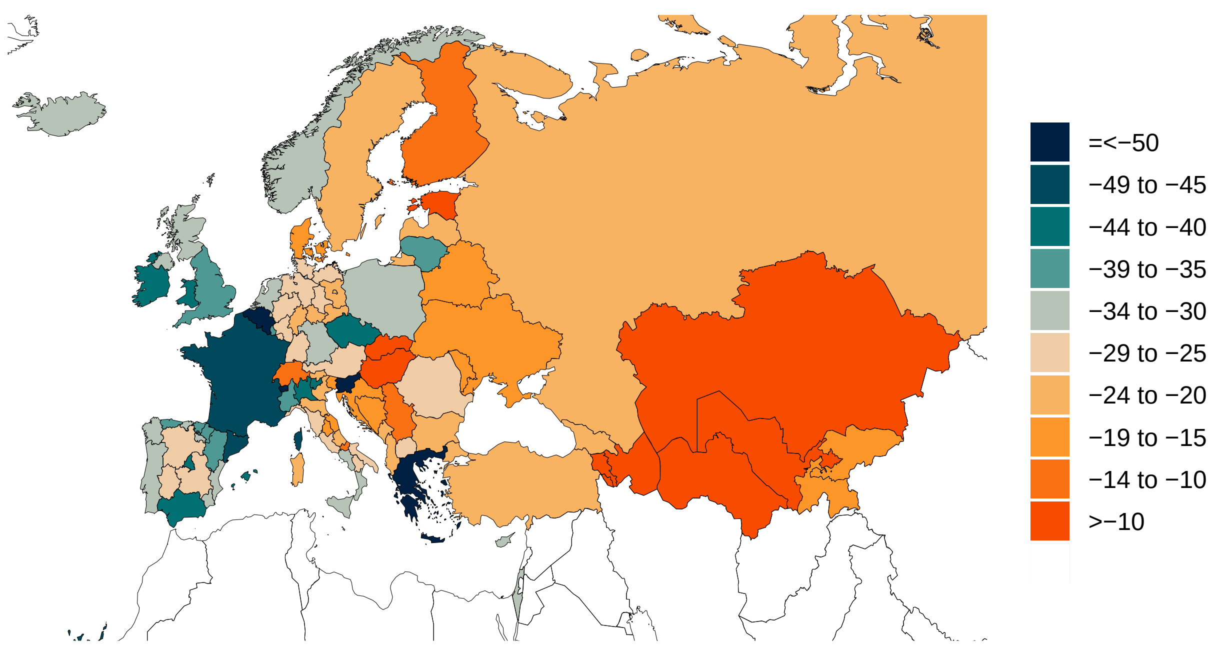


Figure 9a. Trend in the proportion of the population reporting always wearing a mask when leaving home

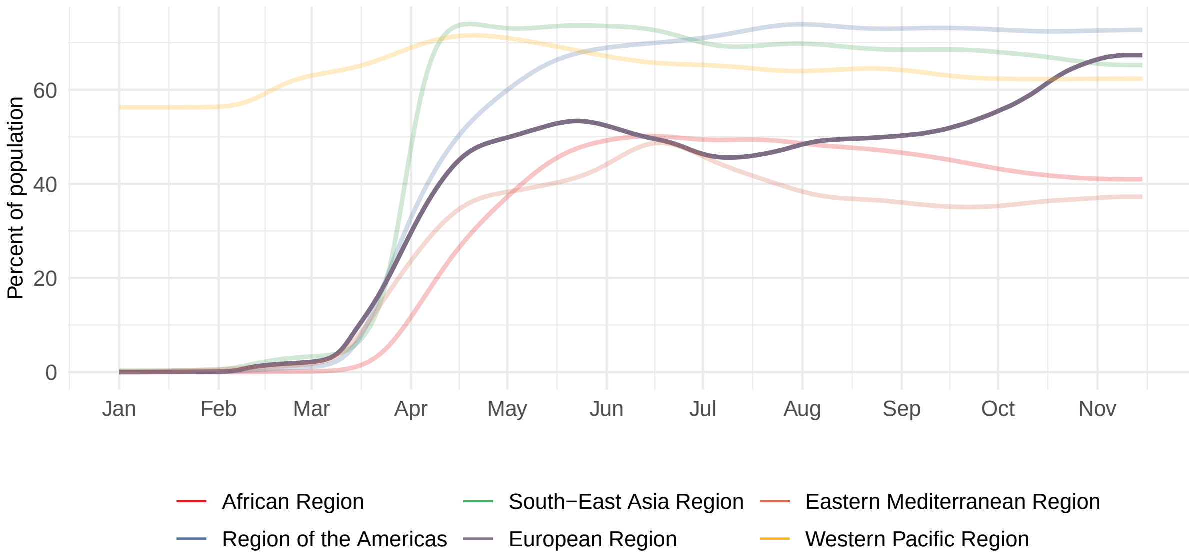


Figure 9b. Proportion of the population reporting always wearing a mask when leaving home on November 16, 2020

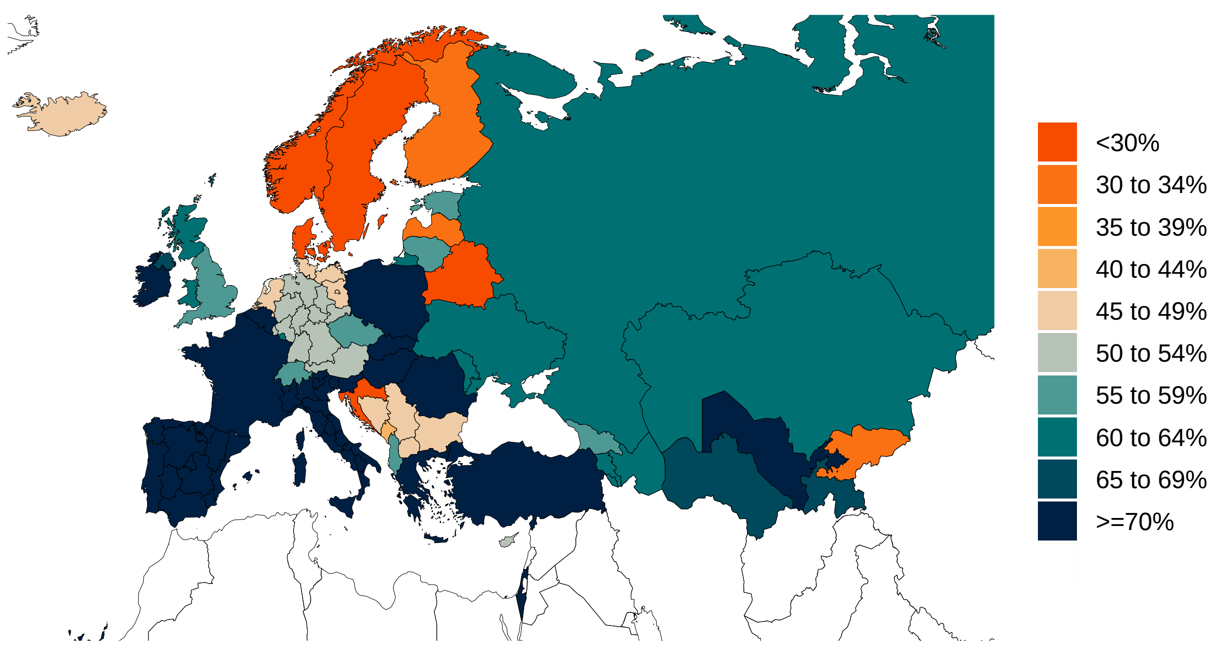


Figure 10a. Trend in COVID-19 diagnostic tests per 100,000 people

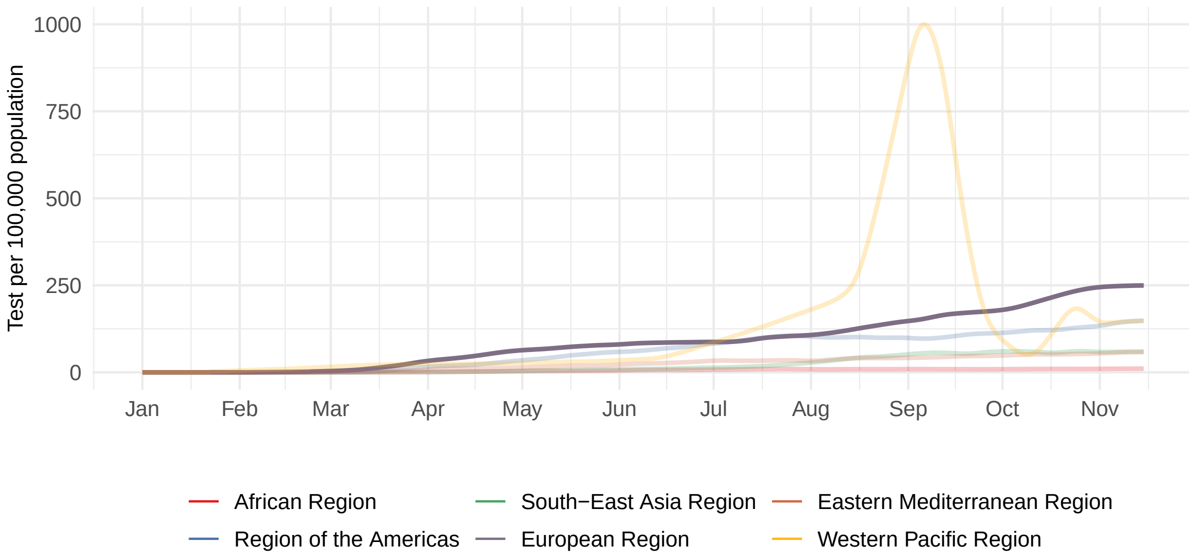


Figure 10b. COVID-19 diagnostic tests per 100,000 people on November 13, 2020

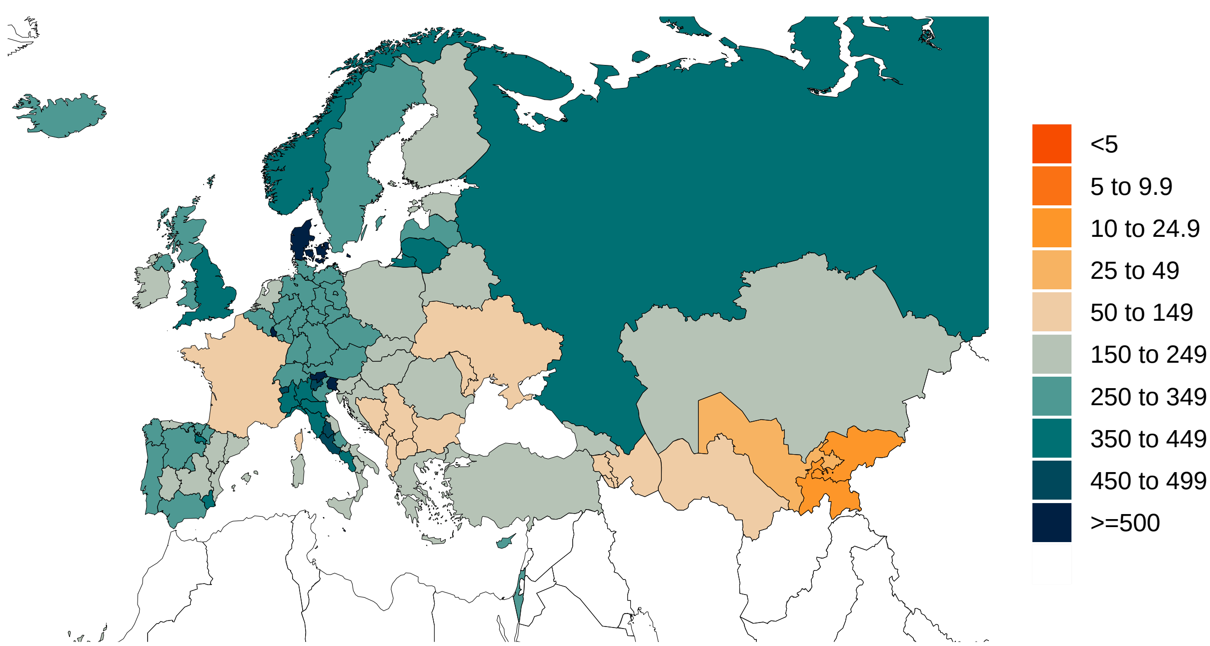
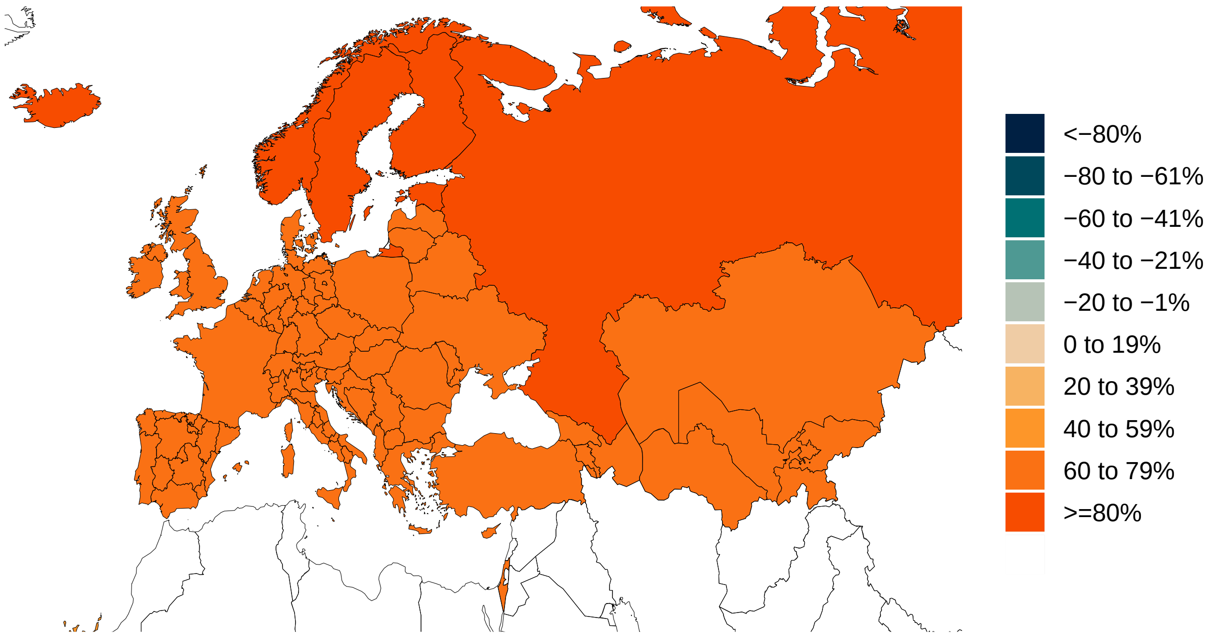


Figure 11. Increase in the risk of death due to pneumonia on February 1 compared to August 1



Projections and scenarios

We produce three scenarios when projecting COVID-19. The reference scenario is our forecast of what we think is most likely to happen. We assume that if the daily mortality rate from COVID-19 reaches 8 per million, social distancing (SD) mandates will be re-imposed. The mandate easing scenario is what would happen if governments continue to ease social distancing mandates with no re-imposition. The universal mask mandate scenario is what would happen if mask use increased immediately to 95% and social distancing mandates were re-imposed at 8 deaths per million.

Figure 12. Cumulative COVID-19 deaths until March 01, 2021 for three scenarios.

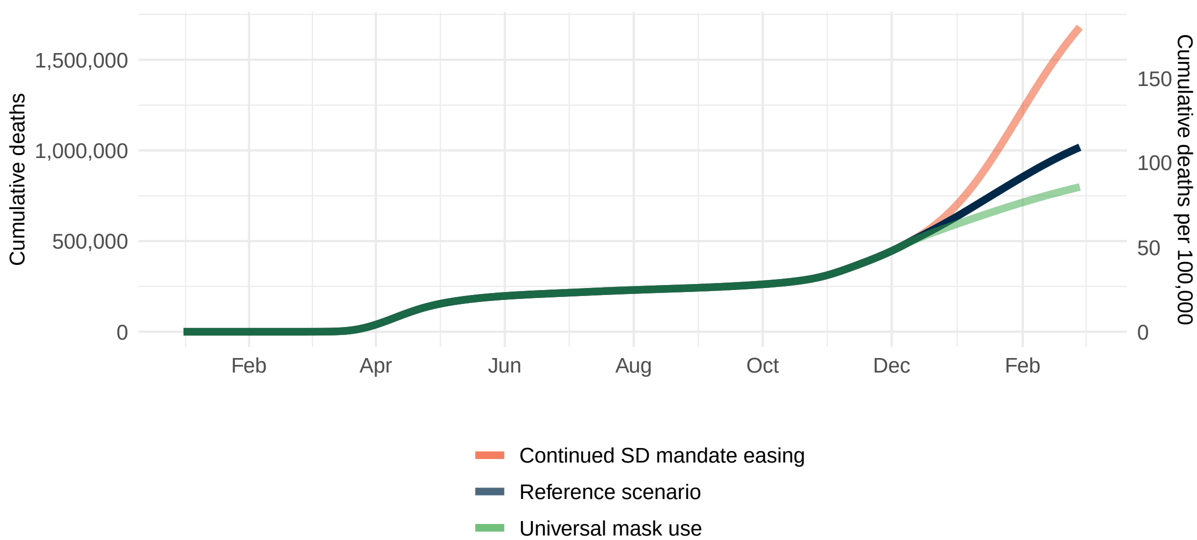


Fig 13. Daily COVID-19 deaths until March 01, 2021 for three scenarios.

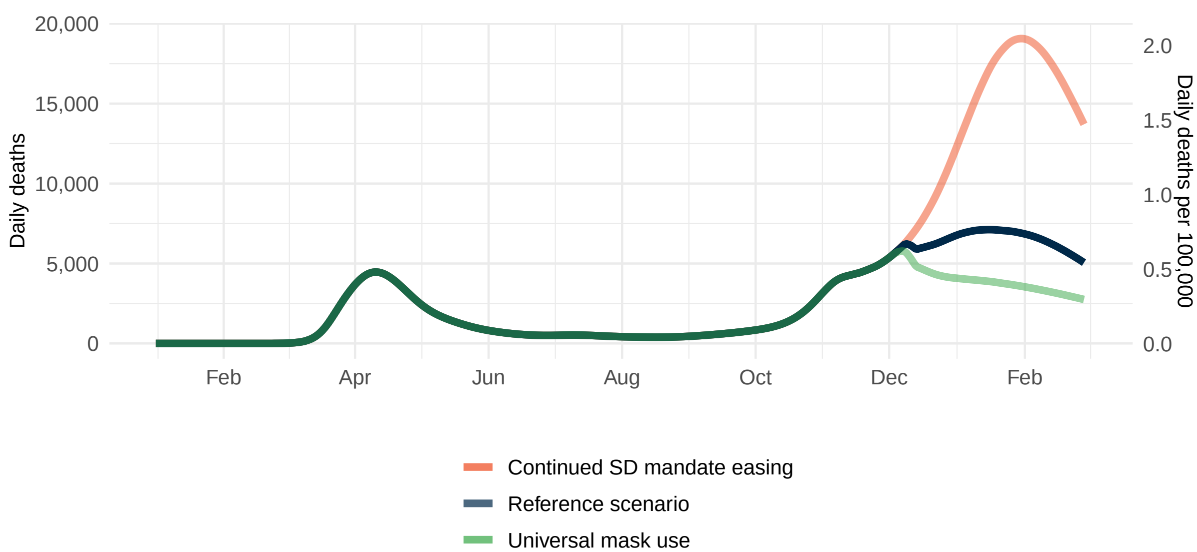


Fig 14. Daily COVID-19 infections until March 01, 2021 for three scenarios.

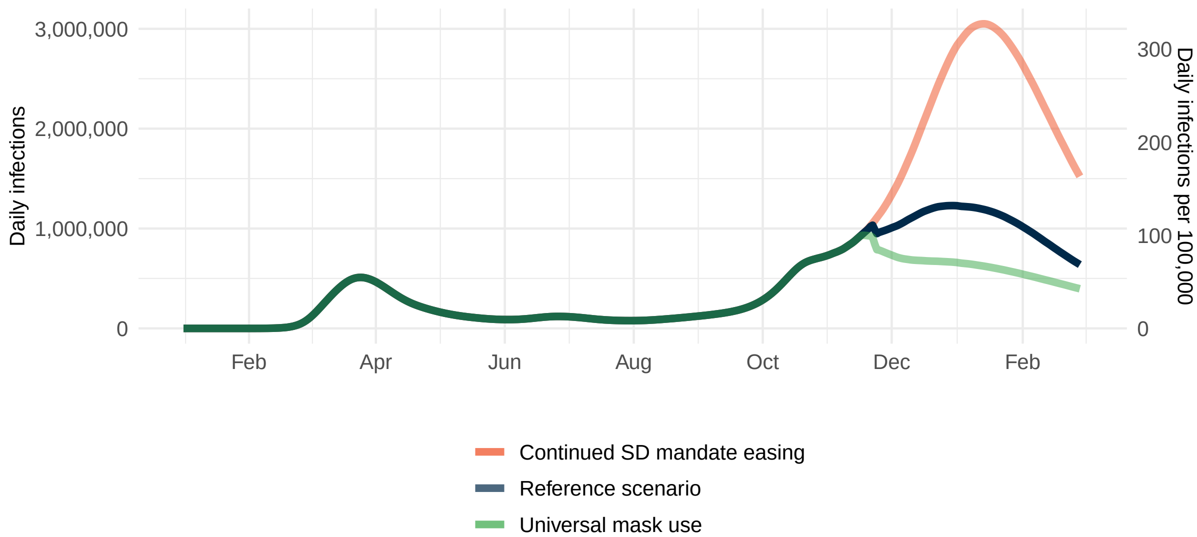


Fig 15. Month of assumed mandate re-implementation. (Month when daily death rate passes 8 per million, when reference scenario model assumes mandates will be re-imposed.)

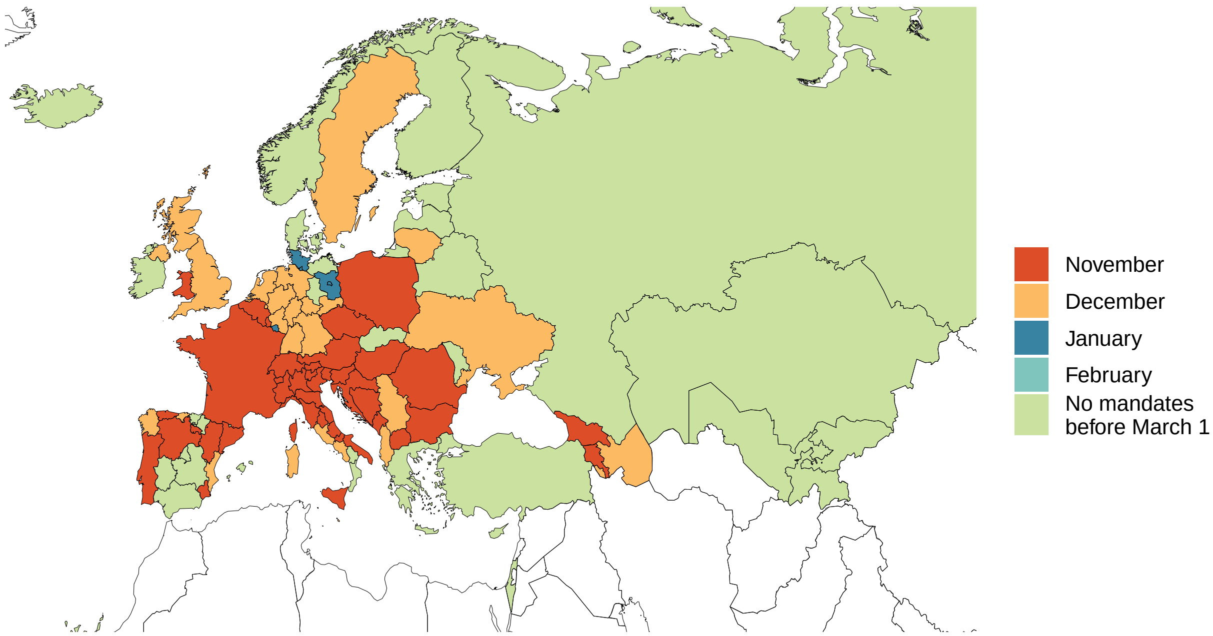


Figure 16. Forecasted percent infected with COVID-19 on March 01, 2021

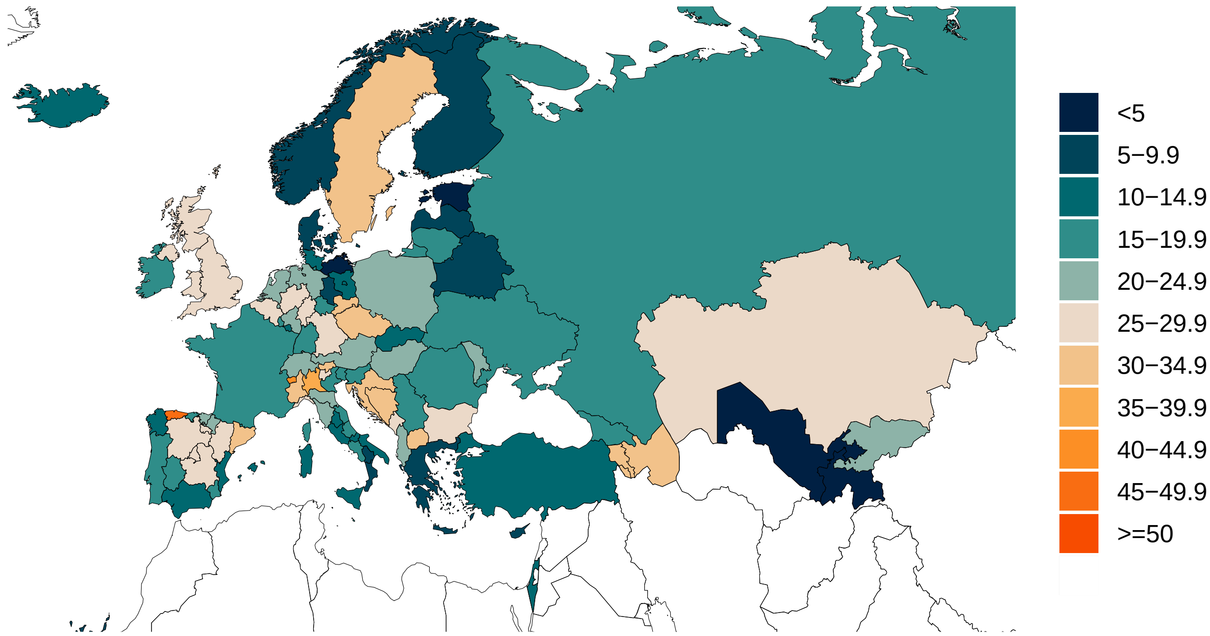


Figure 17. Daily COVID-19 deaths per million forecasted on March 01, 2021 in the reference scenario

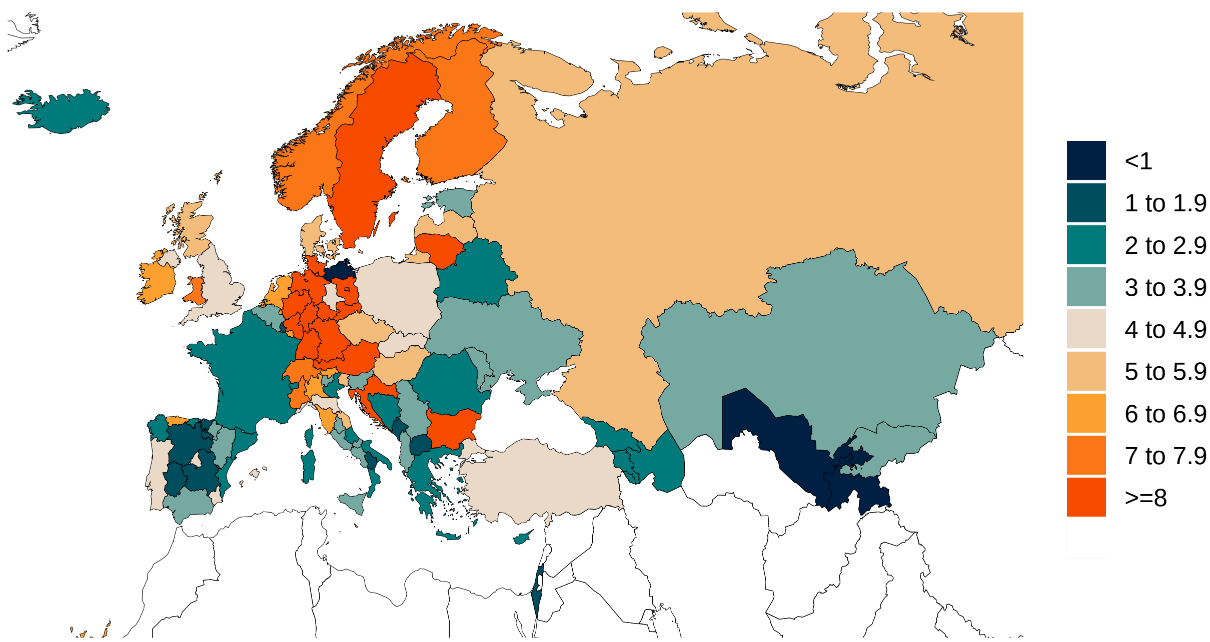


Figure 18. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), Imperial College London (Imperial; https://www.covidsim.org), The Los Alamos National Laboratory (LANL; https://covid-19.bsvgateway.org/), and the SI-KJalpha model from the University of Southern California (SIKJalpha; https://github.com/scc-usc/ReCOVER-COVID-19). Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from availble locations in that region.

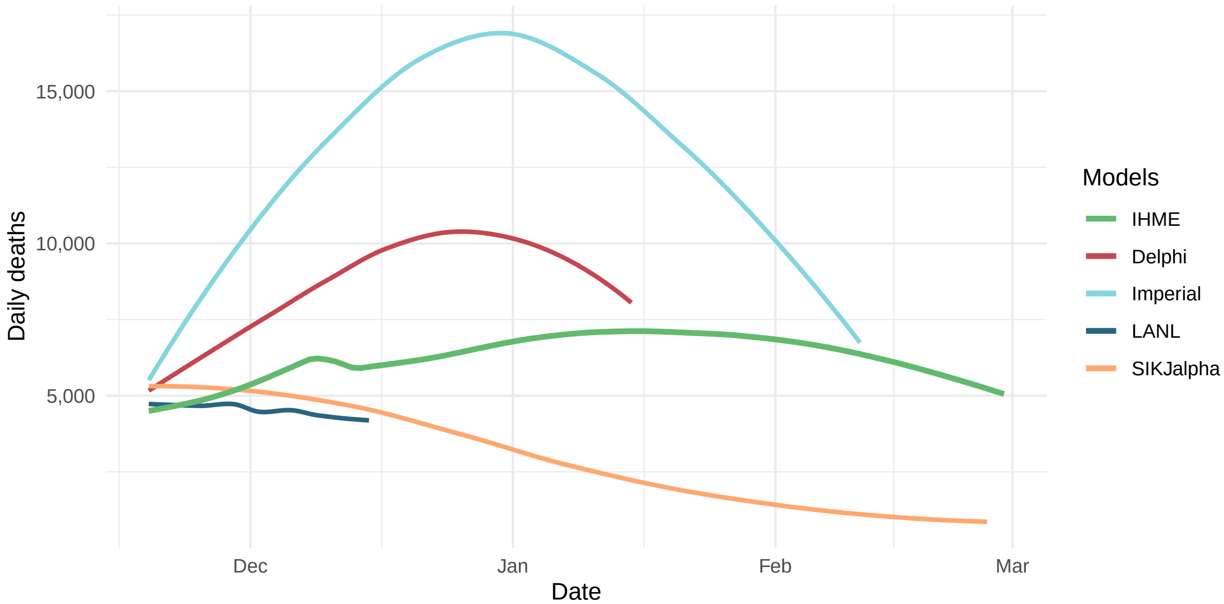


Figure 19. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress* and greater than 20% is considered *extreme stress*.

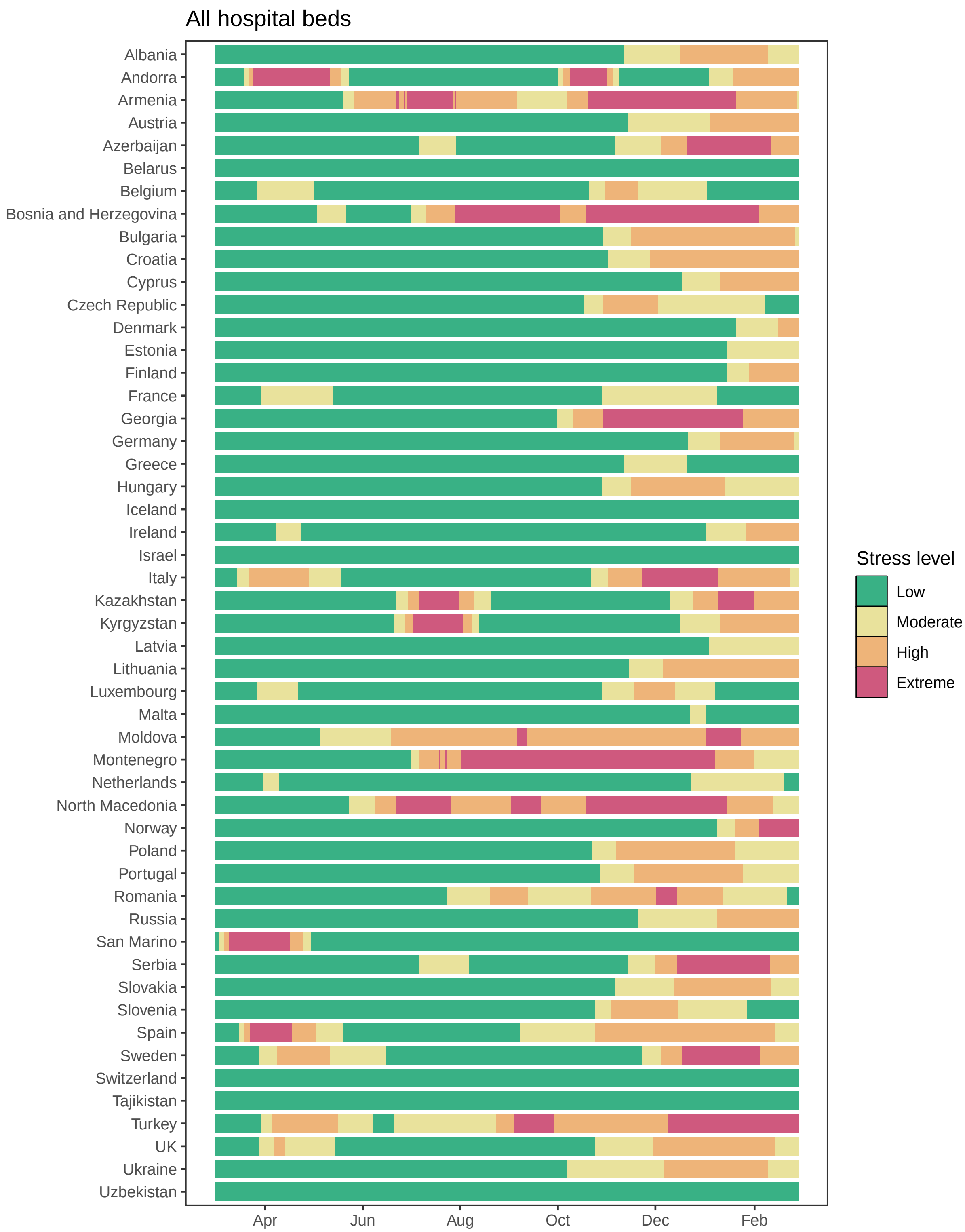


Figure 20. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *moderate stress*, 30-59% is considered *high stress* and greater than 60% is considered *extreme stress*.

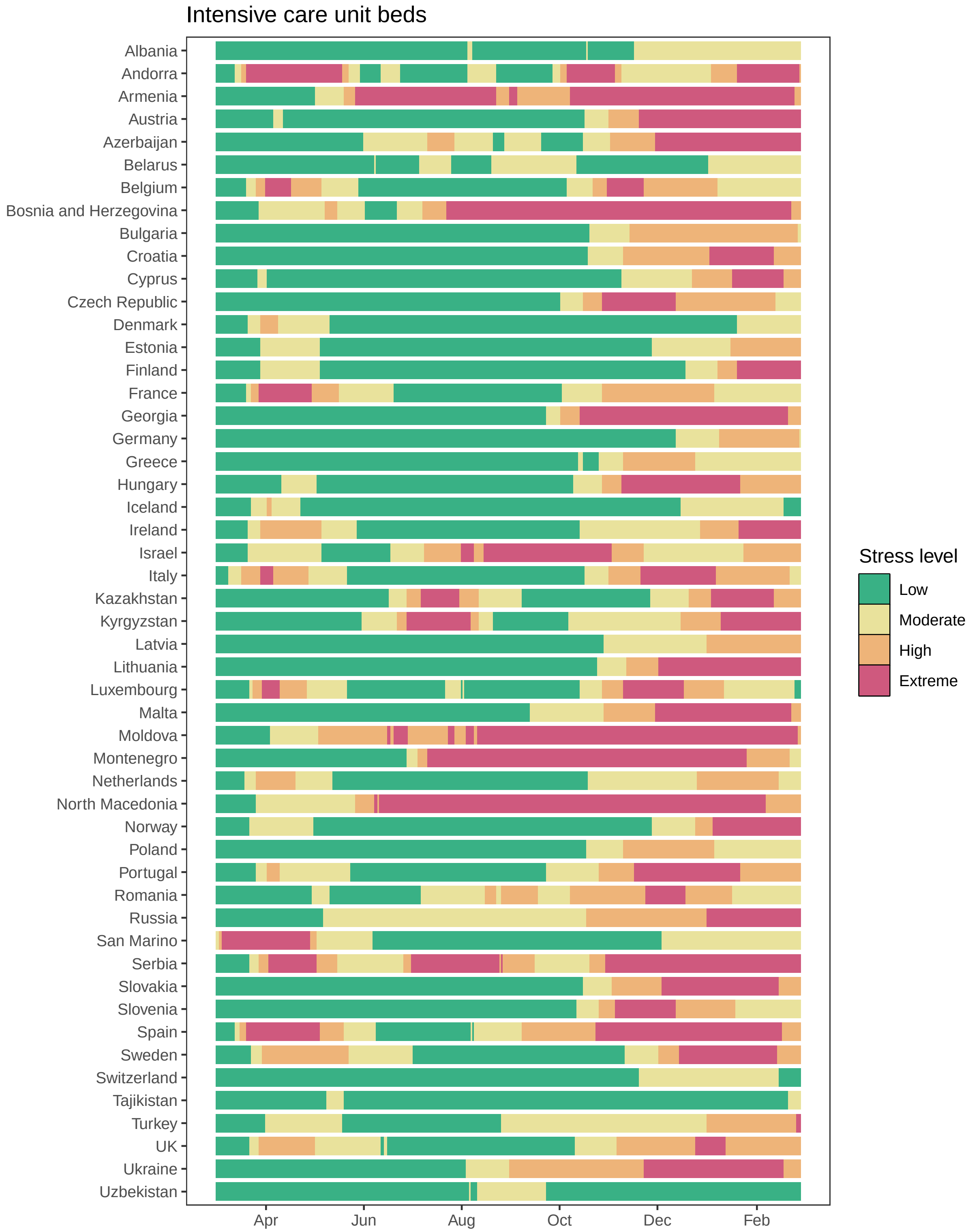


Table 3. Ranking of COVID-19 among the leading causes of mortality in the full year 2020. Deaths from COVID-19 are projections of cumulative deaths on Jan 1, 2021 from the reference scenario. Deaths from other causes are from the Global Burden of Disease study 2019 (rounded to the nearest 100).

Cause name	Annual deaths	Ranking
Ischemic heart disease	2,301,100	1
Stroke	1,176,300	2
COVID-19	636,927	3
Tracheal, bronchus, and lung cancer	463,800	4
Alzheimer's disease and other dementias	417,200	5
Chronic obstructive pulmonary disease	349,400	6
Colon and rectum cancer	305,800	7
Lower respiratory infections	273,200	8
Cirrhosis and other chronic liver diseases	223,100	9
Hypertensive heart disease	205,400	10

Table 4. Table of the number of deaths at varying levels of the cumulative percent of the population that is infected with COVID-19. The infection fatality rate can be used to figure out how many people may eventually die from COVID-19 before a community arrives at herd immunity. Since we do not know the level at which herd immunity may be reached for COVID-19, the table below shows the total number of deaths that would be expected in the European Region for various levels of herd immunity. These estimates assume that there does not exist an effective vaccine and that no significant improvements in treatment will be made. We estimated that the all age infection fatality ratio as of November 18, 2020 in the European Region was 0.4%.

Cumulative incidence	Deaths
30%	1,565,000
35%	1,826,000
40%	2,087,000
45%	2,348,000
50%	2,609,000
55%	2,870,000
60%	3,131,000
65%	3,392,000
70%	3,652,000
75%	3,913,000
80%	4,174,000
85%	4,435,000
90%	4,696,000
95%	4,957,000

Recognition and thanks

Mask data sources:

PREMISE; Facebook Global symptom survey (This research is based on survey results from University of Maryland Social Data Science Center) and the Facebook United States symptom survey (in collaboration with Carnegie Mellon University); Kaiser Family Foundation; YouGov COVID-19 Behaviour Tracker survey.

A note of thanks:

We would like to extend a special thanks to the Pan American Health Organization (PAHO) for key data sources; our partners and collaborators in Argentina, Brazil, Bolivia, Chile, Colombia, Cuba, the Dominican Republic, Ecuador, Egypt, Honduras, Israel, Japan, Malaysia, Mexico, Moldova, Panama, Peru, the Philippines, Russia, Serbia, South Korea, Turkey, and Ukraine for their support and expert advice; and to the tireless data collection and collation efforts of individuals and institutions throughout the world.

In addition, we wish to express our gratitude for efforts to collect social distancing policy information in Latin America to University of Miami Institute for Advanced Study of the Americas (Felicia Knaul, Michael Touchton), with data published here: http://observcovid.miami.edu/; Fundación Mexicana para la Salud (Héctor Arreola-Ornelas) with support from the GDS Services International: Tómatelo a Pecho A.C.; and Centro de Investigaciones en Ciencias de la Salud, Universidad Anáhuac (Héctor Arreola-Ornelas); Lab on Research, Ethics, Aging and Community-Health at Tufts University (REACH Lab) and the University of Miami Institute for Advanced Study of the Americas (Thalia Porteny).

Further, IHME is grateful to the Microsoft AI for Health program for their support in hosting our COVID-19 data visualizations on the Azure Cloud. We would like to also extend a warm thank you to the many others who have made our COVID-19 estimation efforts possible.