COVID-19 Results Briefing

The European Region

March 6, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in the WHO European Region. The model was run on March 6, 2021, with data through March 1, 2021.

Daily cases have started to increase again, after declining steadily since early January. The increases are occurring despite declining seasonality and rising vaccination rates. The most likely explanation is that the spread of the B.1.1.7 variant, declining mask use, and increasing mobility are increasing transmission, particularly in countries in Central and Eastern Europe. These increases in transmission are likely to lead to increases in daily deaths during the month of March given the lag between transmission and death, and the increase in the infection-fatality rate driven by the B.1.1.7 variant. This week, our model includes reduced cross-variant immunity between ancestral variants and B.1.1.7 with the escape variants (B.1.351 and P1). This reduced protection from natural infection will have a substantial impact on the epidemic later in the year – as the escape variants increase in prevalence – but it does not have a major effect in the next four months. In our reference scenario, we predict 404,000 additional deaths from now until July 1. With faster declines in mask use and increases in mobility, this number could easily reach 509,000 on July 1. Strategies to reduce the death toll include increasing vaccination, reversing the decline in mask use, and encouraging the public to continue avoiding high transmission risk settings through social distancing mandates and public messaging. Given that so many countries are near an effective R of 1, even small changes in behavior could alter the trajectory of the epidemic.

Current situation

- Daily reported cases in the last week increased to 150,800 per day on average, compared to 139,200 the week before (Figure 1).
- Daily deaths in the last week decreased to 4,200 per day on average compared to 4,700 the week before (Figure 2). **This makes COVID-19 the number 2 cause of death in the European Region this week** (Table 1).
- The daily death rate is greater than 4 per million in 19 countries (Figure 3).
- We estimated that 12% of people in the European Region have been infected as of March 1 (Figure 4).
- The infection-detection rate in the region remains near 40% (Figure 5), currently the highest in the world.
- The prevalence of B.1.1.7 continues to spread in the region (Figure 6). The prevalence of B.1.351 remains low.

- The infection-fatality rate based on seroprevalence surveys and reported COVID-19 deaths varies considerably across the region, with the highest rates observed in Ireland and the Italian region of Sardinia (Figure 7).

Trends in drivers of transmission

- New mandates have been imposed in Bosnia and Herzegovina, Croatia, Cyprus, Slovenia, and Uzbekistan.
- Mobility has been increasing slowly since early January, reaching 32% lower than the pre-COVID-19 baseline (Figure 8). Mobility was lower than 30% of the January 2020 baseline in 29 countries or regions in Spain, Italy, and Germany.
- Mask use has been slowly declining since early January. On March 1, the proportion of the population always wearing a mask when leaving home was at 67% (Figure 10). Mask use was lower than 50% in Armenia, Bosnia and Herzegovina, Croatia, Denmark, Georgia, Kyrgyzstan, Norway, Sweden, and parts of Germany (Figure 11).
- There were 266 diagnostic tests per 100,000 people on March 1 (Figure 12).
- In the European Region, 70.8% of people say they would accept or would probably accept a vaccine for COVID-19. The fraction of the population open to receiving a COVID-19 vaccine ranges from 37% in Armenia to 93% in Denmark (Figure 15).
- In our current reference scenario, we expect that 633.10 million will be vaccinated by July 1 (Figure 16).

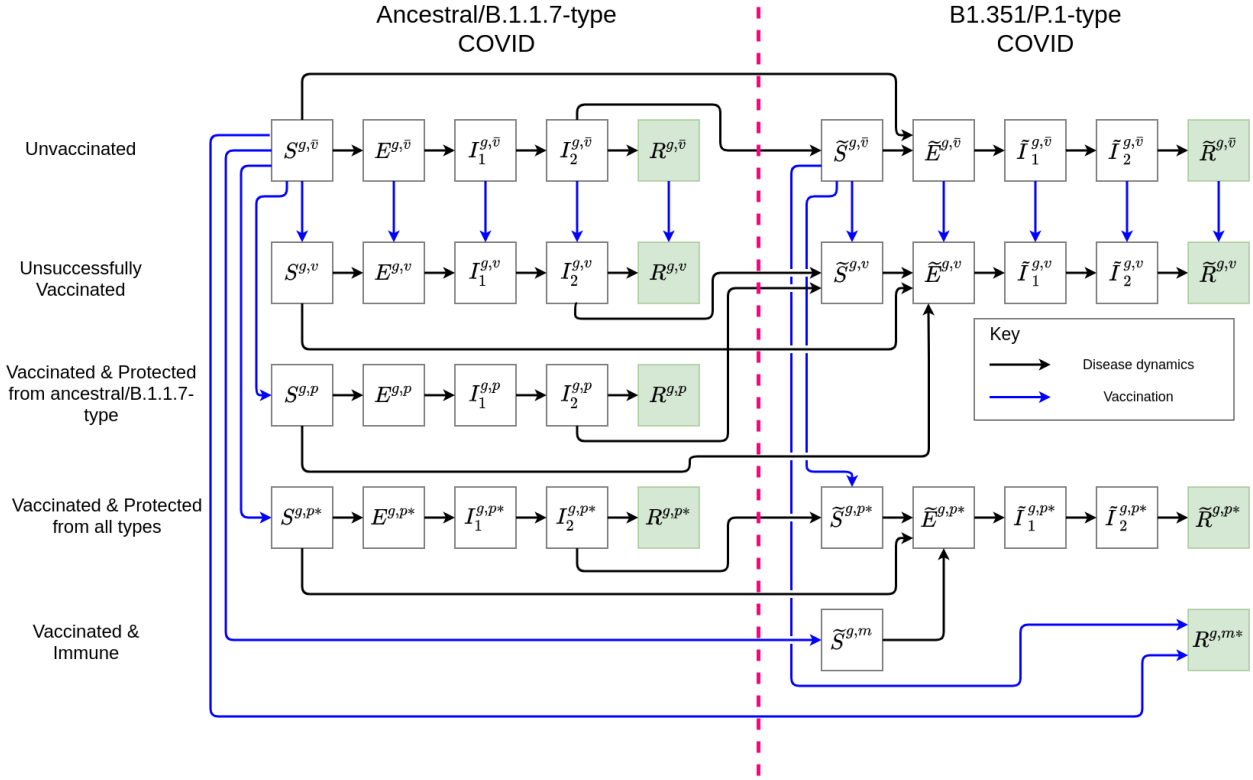
Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 1,514,000 cumulative deaths on July 1, 2021. This represents 404,000 additional deaths from March 1 to July 1 (Figure 17). **Daily deaths are expected to begin increasing, reaching a peak in early April (Figure 18)**.
- By July 1, 2021, we project that 122,300 lives could be saved by the projected vaccine rollout. This does not include lives saved through vaccination that has already occurred.
- If **universal mask coverage (95%)** were attained in the next week, our model projects 100,000 fewer cumulative deaths compared to the reference scenario on July 1, 2021 (Figure 17).
- Under our **worse scenario**, our model projects 1,619,000 cumulative deaths on July 1, 2021 (Figure 17). This represents 105,000 more deaths compared to the reference scenario.
- Daily infections in the reference scenario are expected to start declining in early April and then decline through to July 1. In the worse scenario, daily infections remain above 200,000 through to July 1.
- Figure 20 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent over the next two months across the models.

- At some point from March 1 through July 1, 17 countries in the region will have high or extreme stress on hospital beds (Figure 21). At some point from March 1 through July 1, 14 countries in the region will have high or extreme stress on ICU capacity (Figure 22).

Model updates

This week we have modified our SEIR model to allow for reduced cross-variant immunity. The placebo arm of the Novavax South African trial suggests that infection with ancestral variants provided no protection against B.1.351. Over the last three months, the epidemic in Amazonas, Brazil – where more than 70% of the population were previously infected – also suggests that the P.1 variant is likely infecting at high rates those individuals who were previously infected with ancestralvariants. Based on these observations, we have modified the SEIR framework to allow for no or partial protection from infection with ancestral variants or B.1.1.7 against B.1.351 or P.1. In this more elaborated model, two critical assumptions substantially determine the impact of new variant scale-up: 1) protection against B.1.351 or P.1 from ancestral or B.1.1.7 infection, and 2) the increase in transmissibility of B.1.351 or P.1 compared to the increment seen in B.1.1.7. The elaborated SEIR model has the compartments shown below. The actual number of compartments is larger, since we track high-risk and low-risk individuals separately.



In our reference scenario, or what we think is most likely to occur, we sample from auniform distribution ranging from 25% to 50% cross-variant immunity. In the worse scenario, we sample from a uniform distribution ranging from 0% to 50% cross-variant immunity. In the reference scenario, we also assume that the probability of transmission for B.1.351 and P.1 is 25%–75% that of the increase of B.1.1.7 over ancestral variants. This range has been selected to approximate the observed scale-up of the B.1.351 variant in South Africa under conditions of reduced cross-variant immunity. In the worse scenario, the probability of transmission for B.1.351 and P.1 is assumed to be 0–50% of the increase of B.1.17 over ancestral variants. The introduction of reduced cross-variant immunity has important impacts in the next four months in settings (such as Brazil) with high ancestral variant cumulative infection and the presence of B.1.351 or P.1. In other settings, with lower cumulative infection from ancestral variants and low prevalence of these escape variants, the impact in our forecasts over the next four months is less pronounced.

Figure 1. Reported daily COVID-19 cases

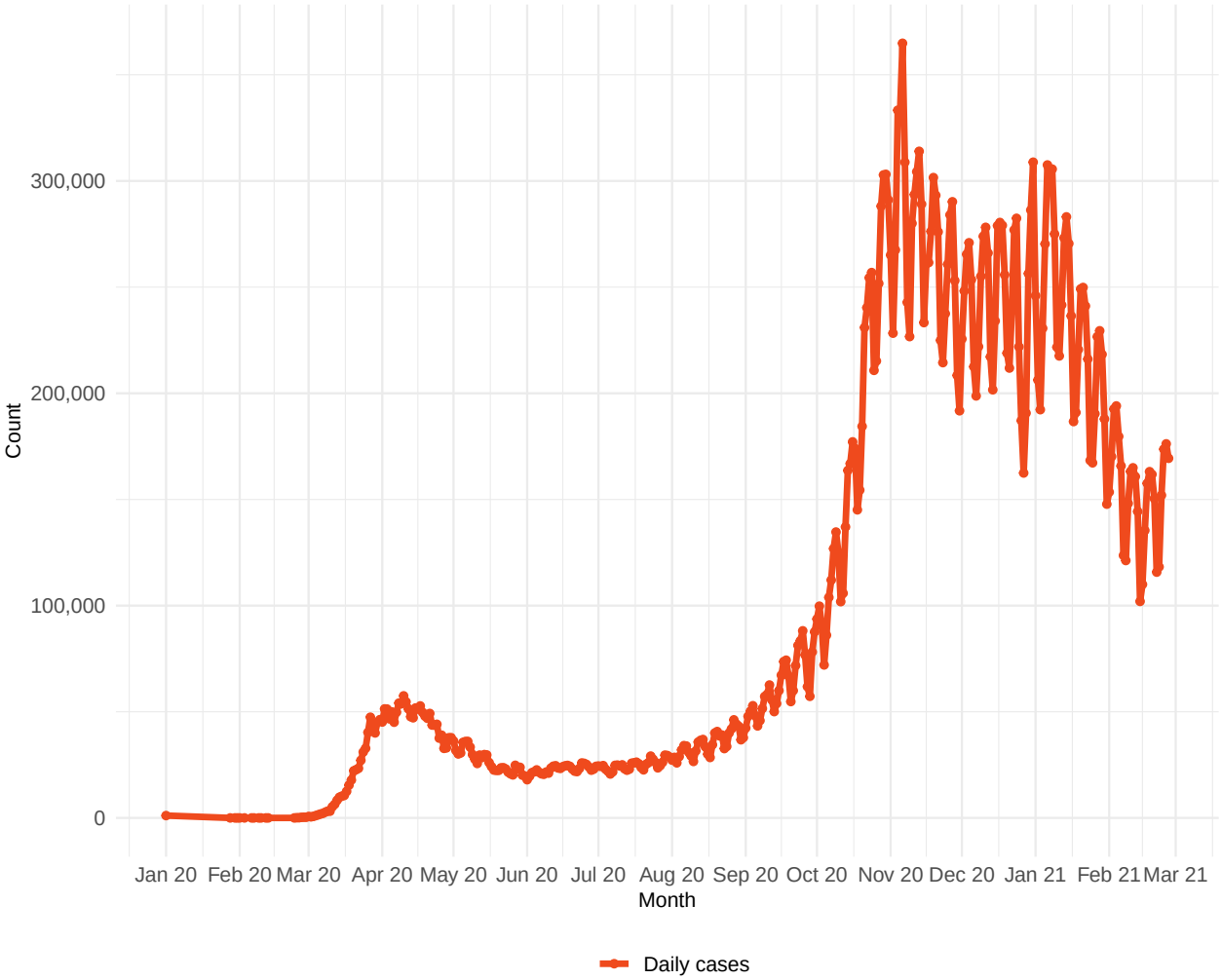


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	44,253	1
COVID-19	29,201	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 2. Reported daily COVID-19 deaths

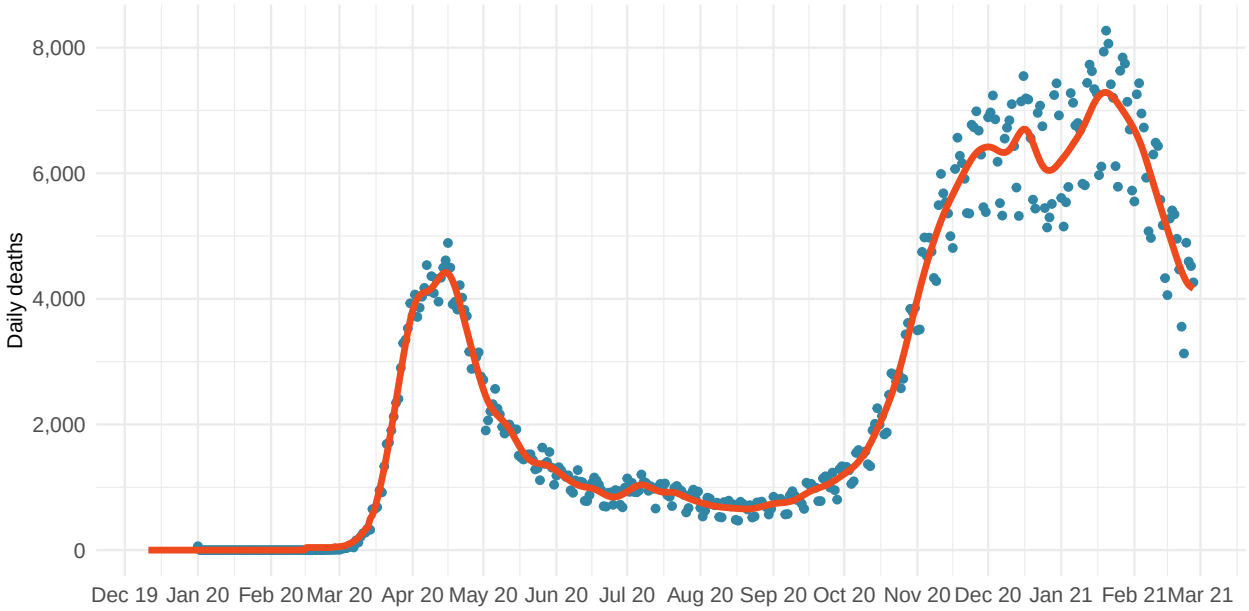


Figure 3. Daily COVID-19 death rate per 1 million on March 01, 2021

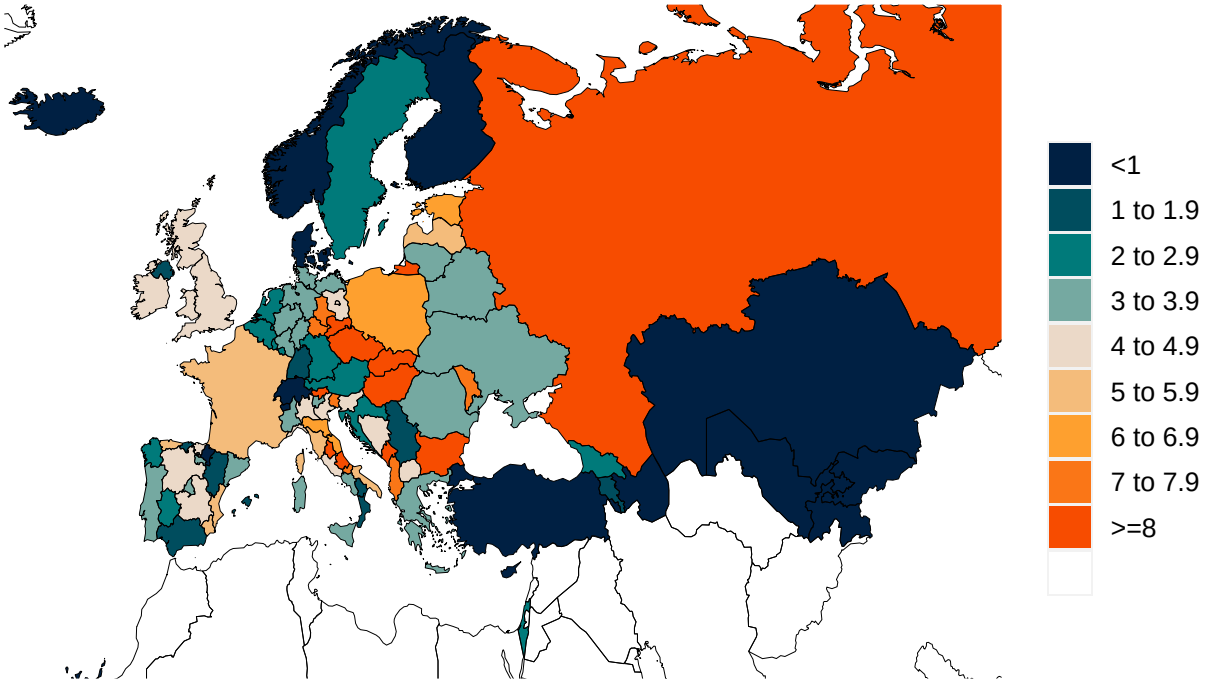


Figure 4. Estimated percent of the population infected with COVID-19 on March 01, 2021

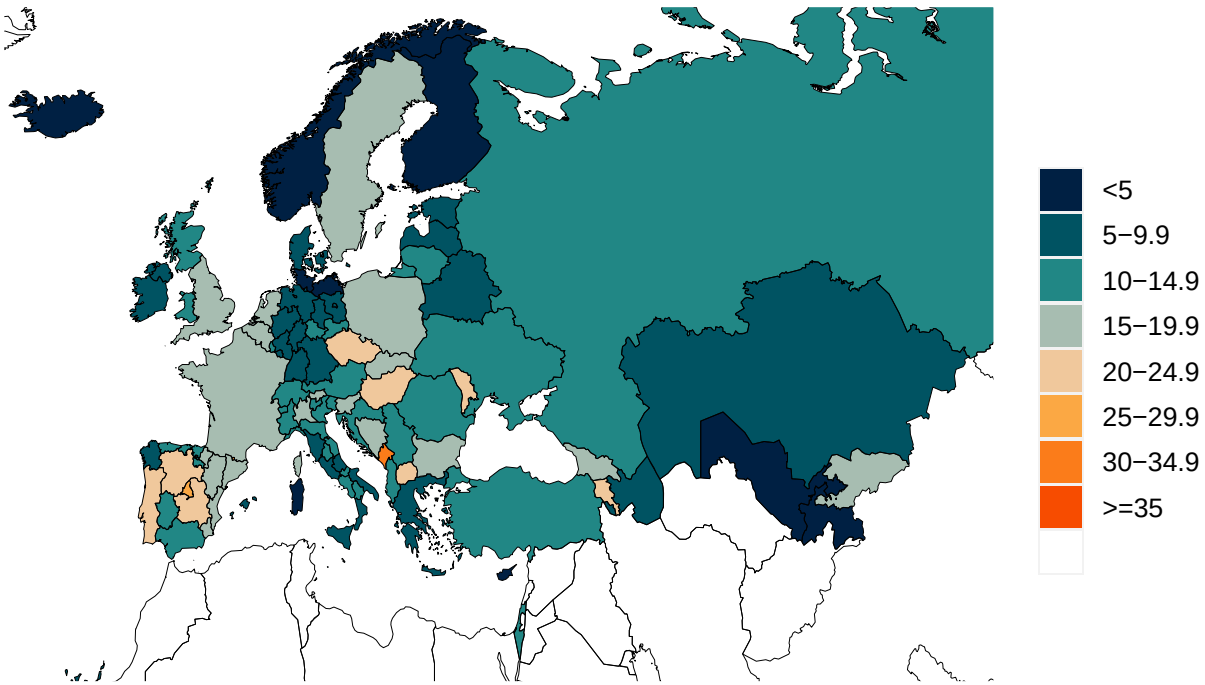
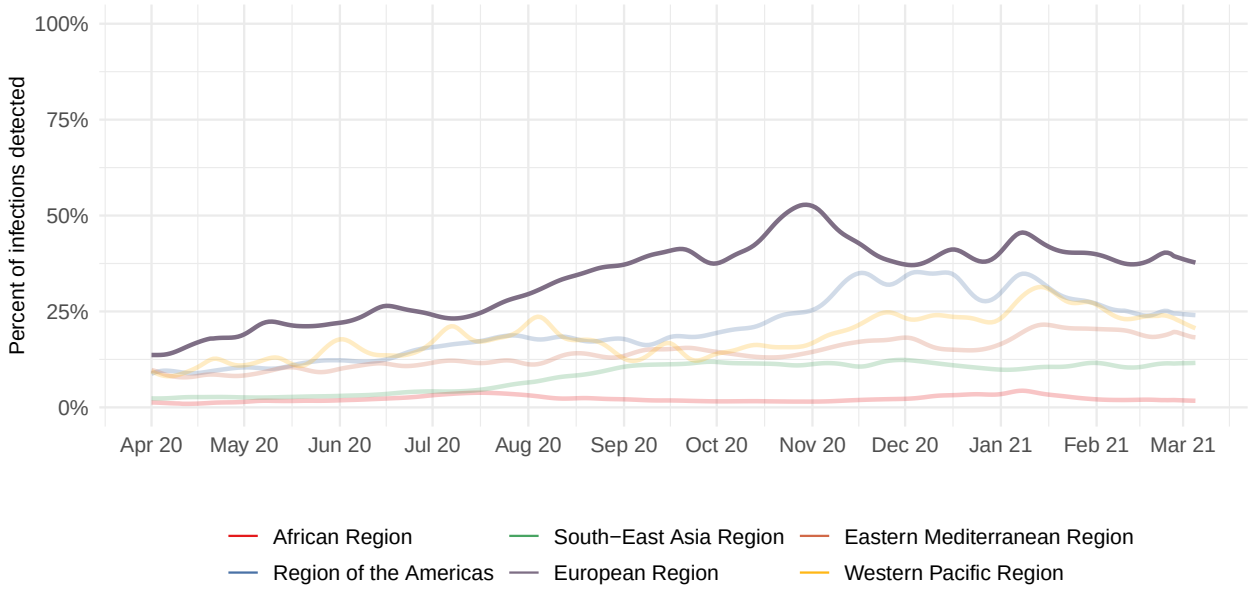


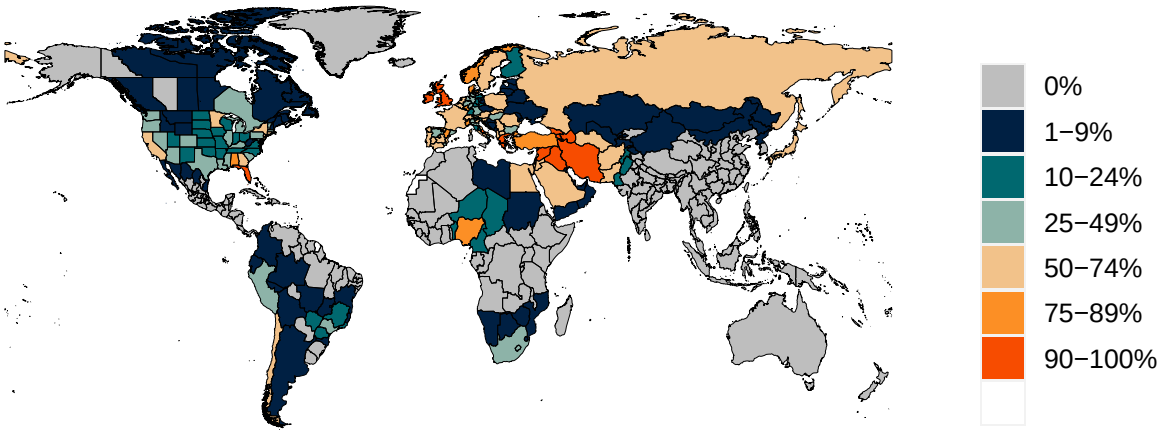
Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.



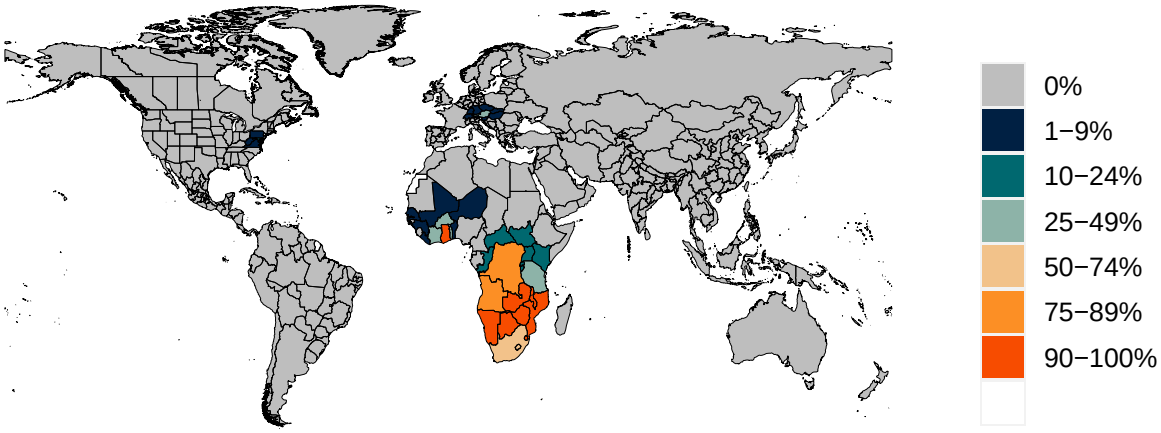
*Due to measurement errors in cases and testing rates, the infection to detection rate (IDR) can exceed 100% at particular points in time.

Figure 6. Percent of circulating SARS-CoV-2 for 3 primary variants on March 1, 2021.

A. Percent B.1.1.7 variant



B. Percent B.1.351 variant



C. Percent P1 variant

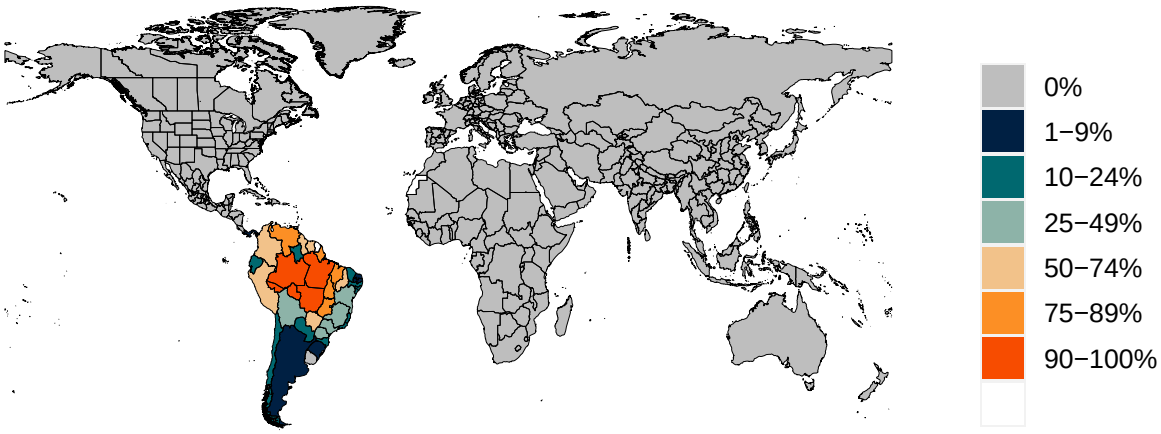
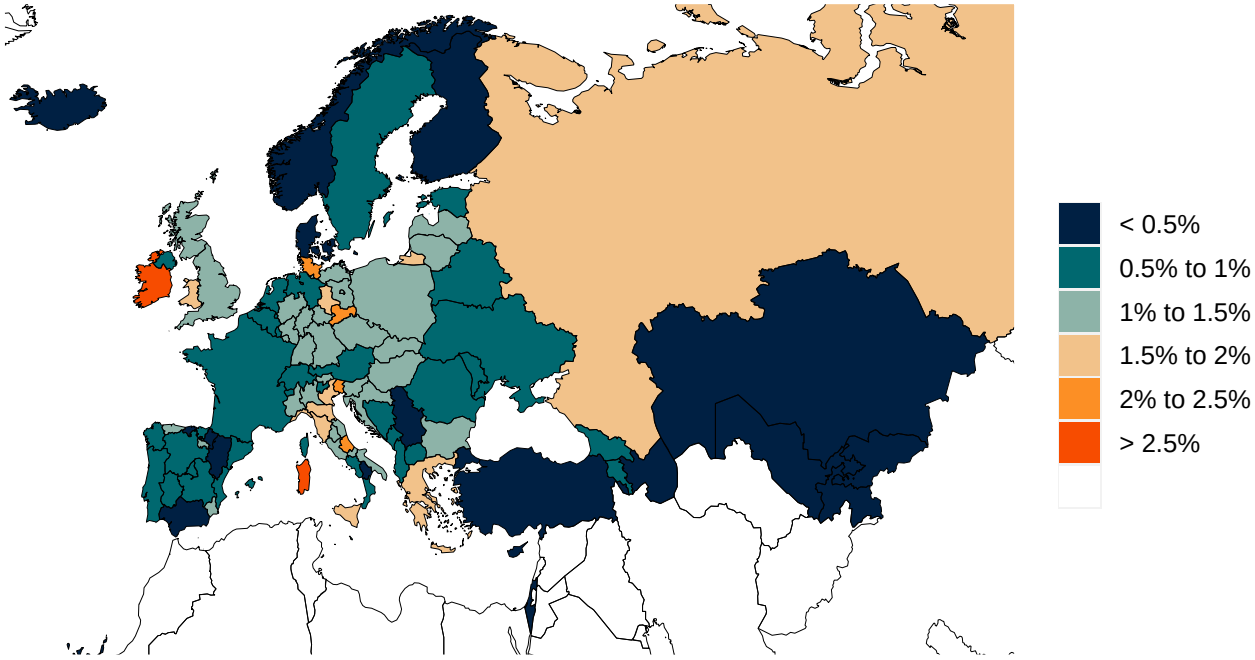
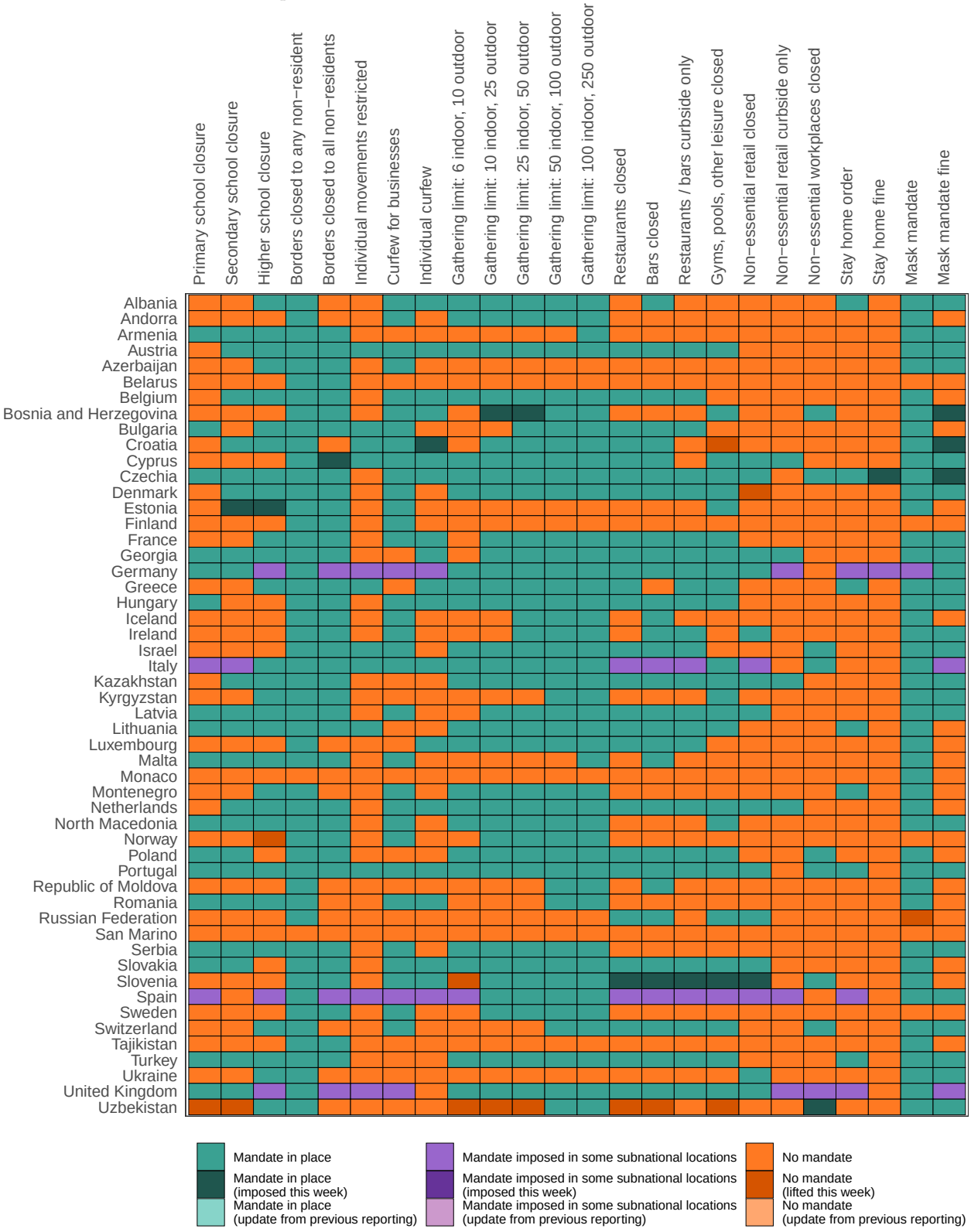


Figure 7. Infection fatality ratio on March 01, 2021. This is estimated as the ratio of COVID-19 deaths to infections based on the SEIR disease transmission model.



Critical drivers

Table 2. Current mandate implementation



*Not all locations are measured at the subnational level.

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

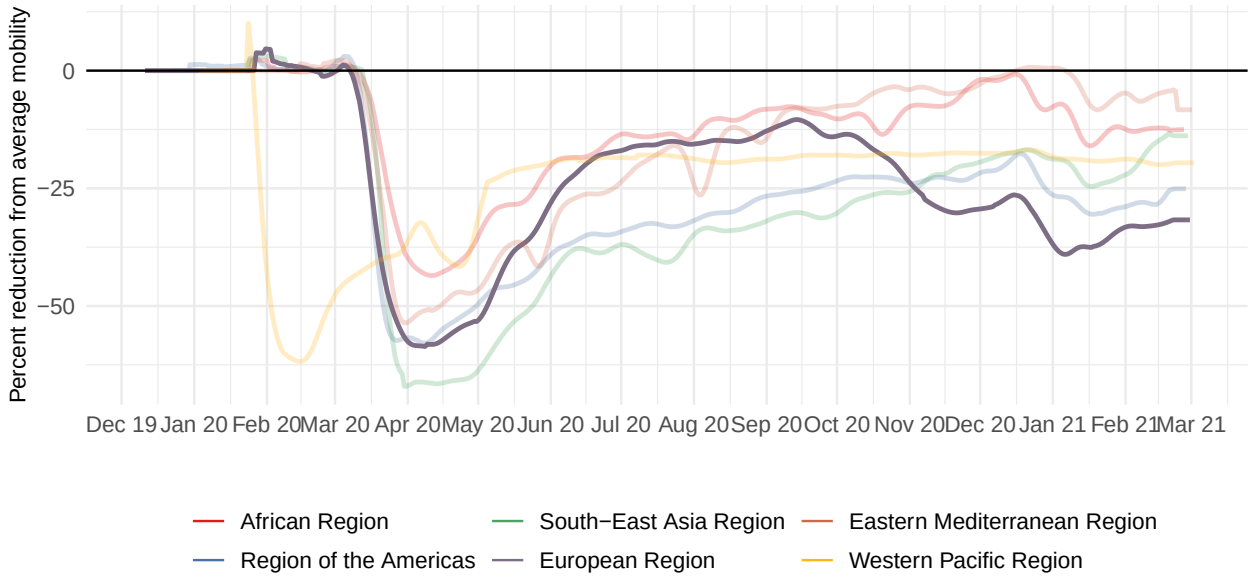


Figure 9. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on March 01, 2021

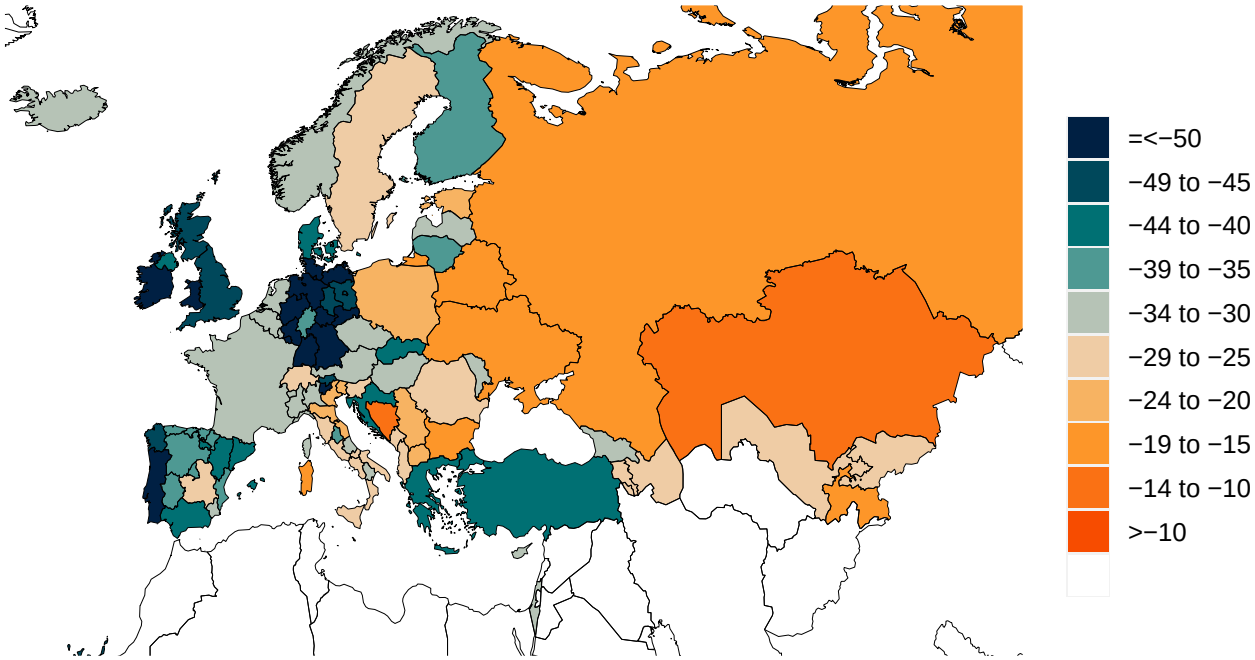


Figure 10. Trend in the proportion of the population reporting always wearing a mask when leaving home

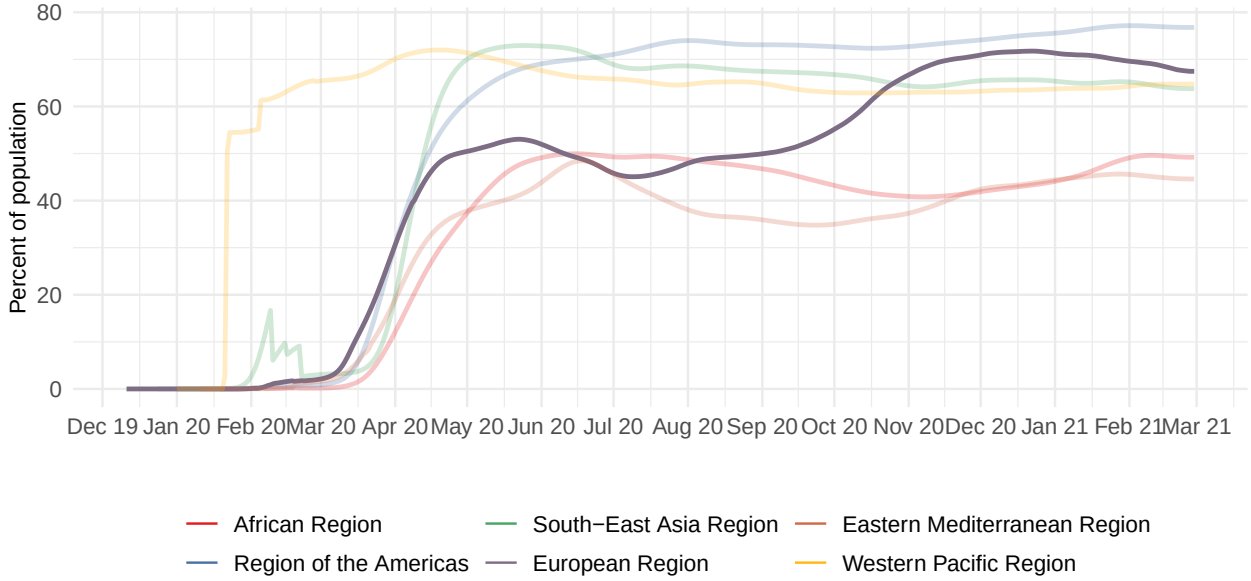


Figure 11. Proportion of the population reporting always wearing a mask when leaving home on March 01, 2021

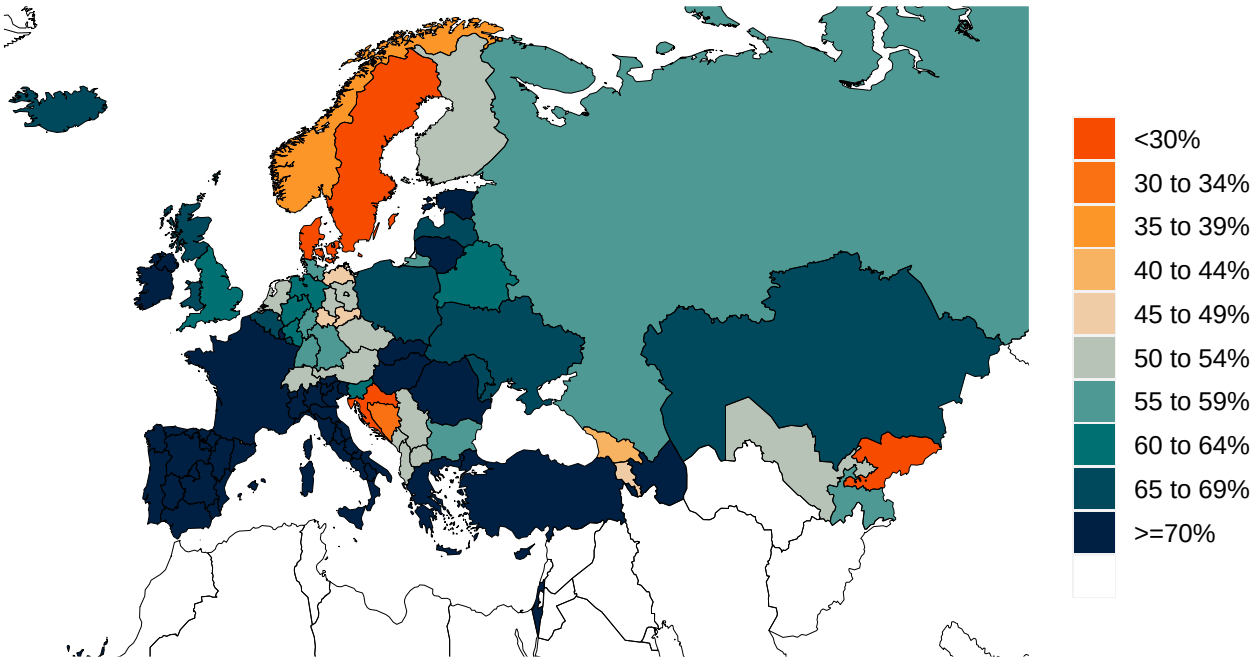


Figure 12. Trend in COVID-19 diagnostic tests per 100,000 people

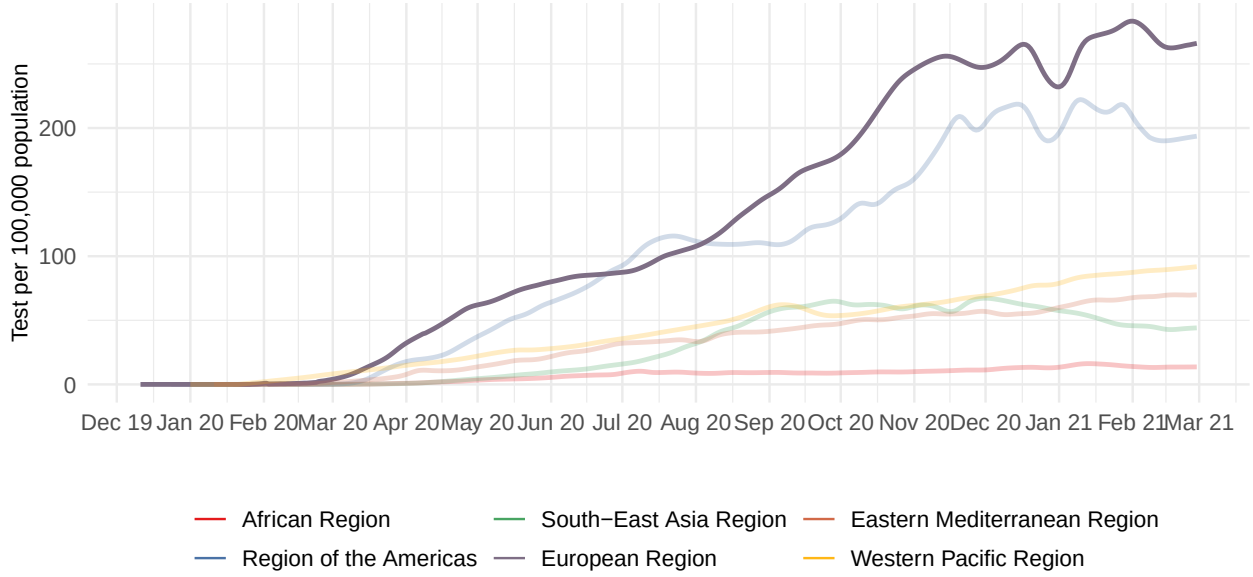


Figure 13. COVID-19 diagnostic tests per 100,000 people on March 01, 2021

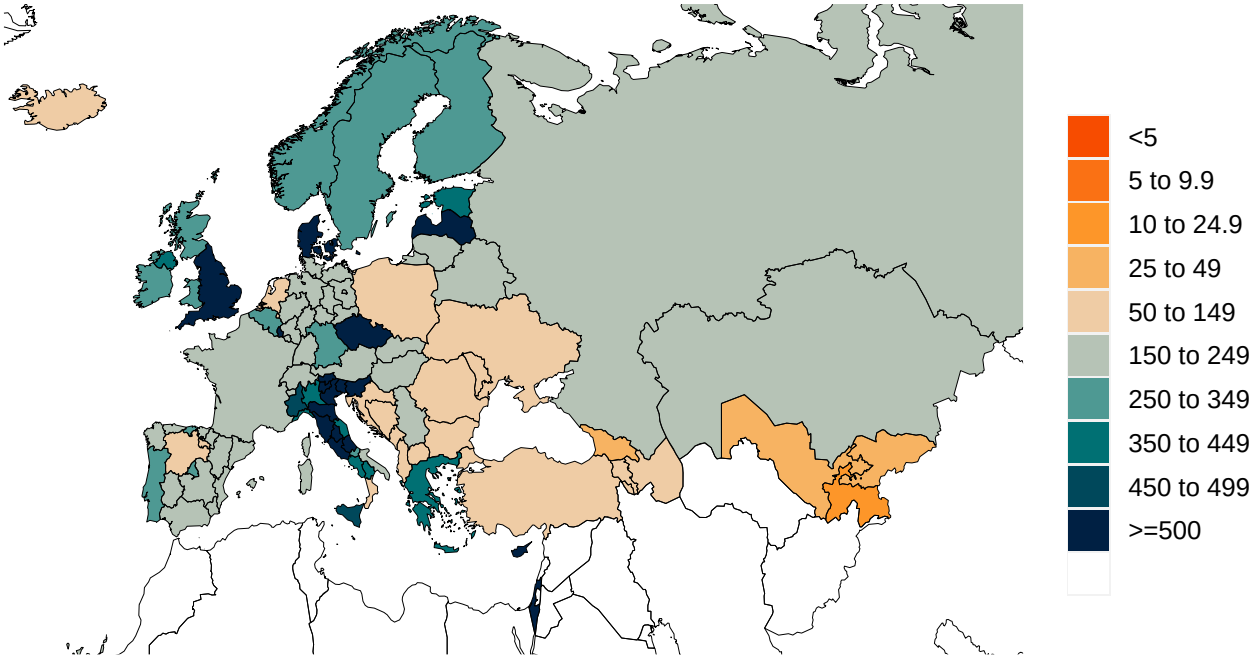


Figure 14. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

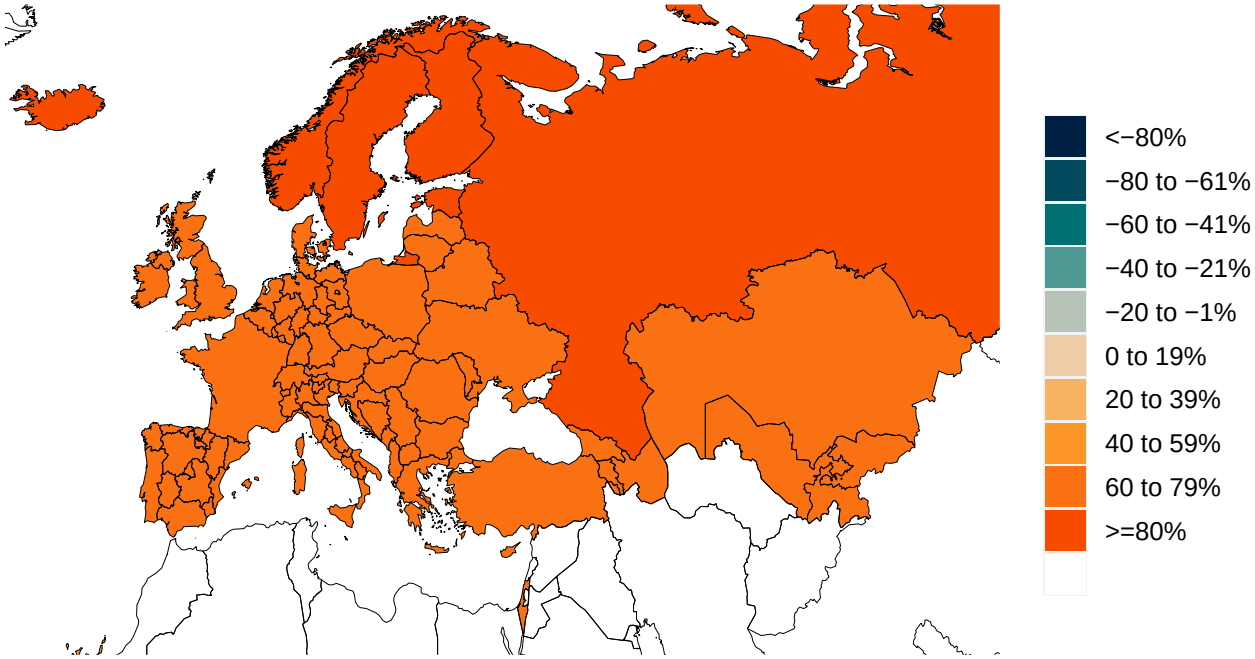


Figure 15. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and yes, probably).

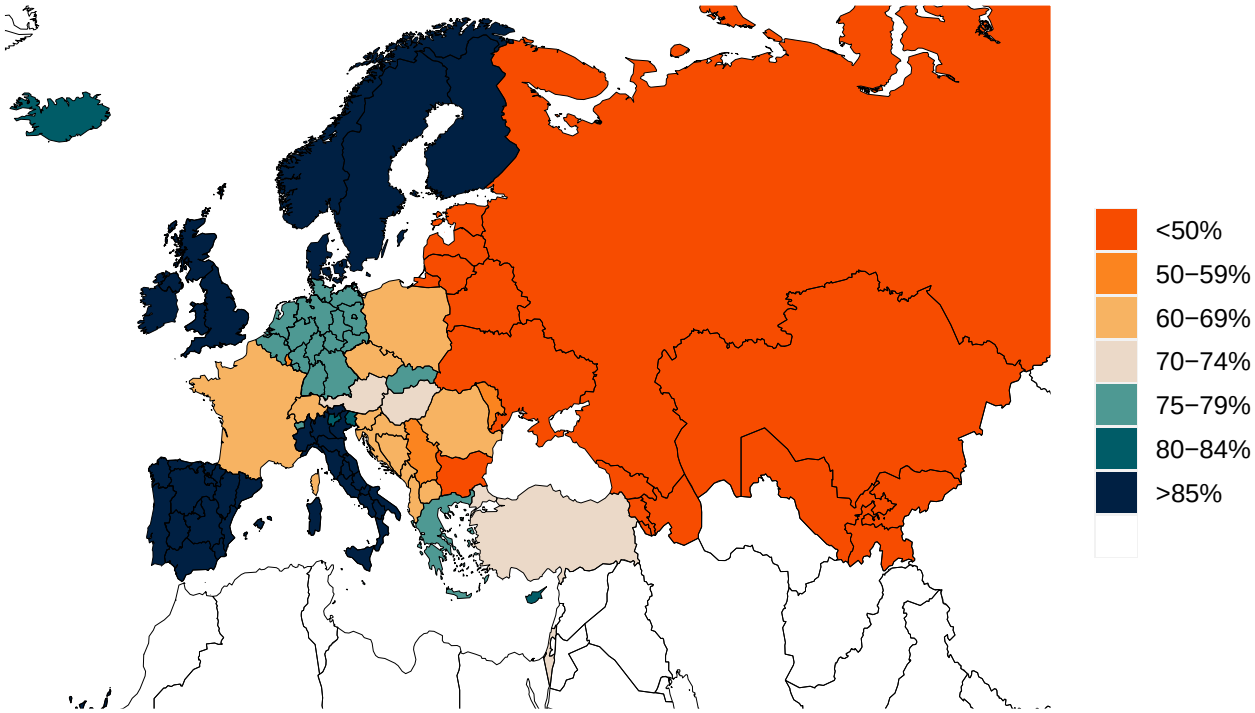
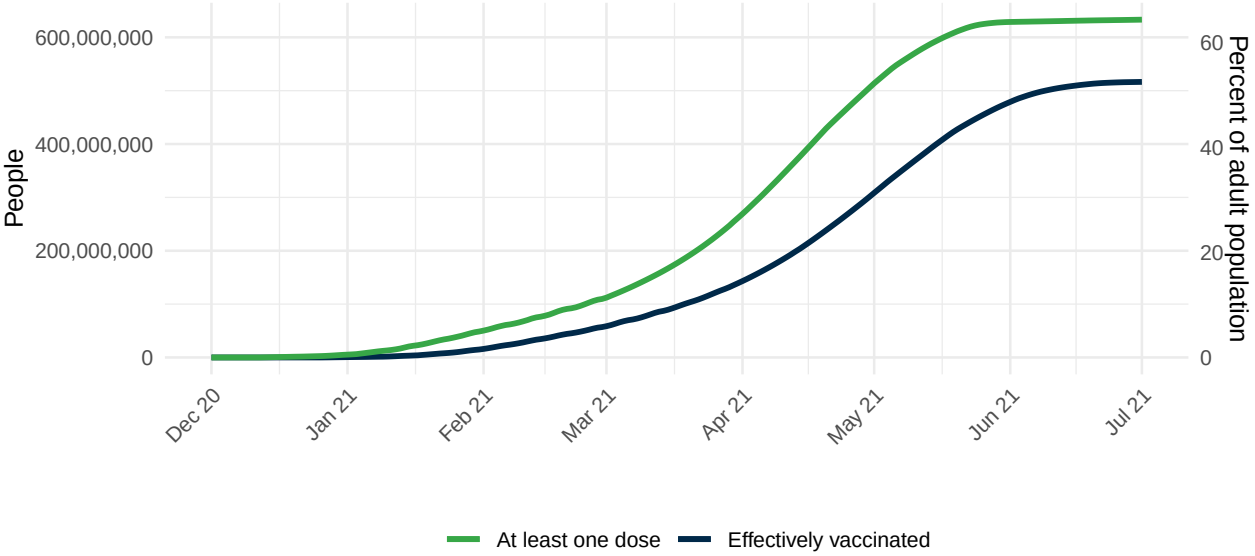


Figure 16. The number of people who receive any vaccine and those who are effectively vaccinated and protected against disease, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses.



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:

- Vaccines are distributed at the expected pace.
- Governments adapt their response by re-imposing social distancing mandates for 6 weeks whenever daily deaths reach 8 per million, unless a location has already spent at least 7 of the last 14 days with daily deaths above this rate and not yet re-imposed social distancing mandates. In this case, the scenario assumes that mandates are re-imposed when daily deaths reach 15 per million.
- Variants B.1.1.7 (first identified in the UK), B.1.351 (first identified in South Africa), and P1 (first identified in Brazil) continue to spread from locations with (a) more than 5 sequenced variants, and (b) reports of community transmission, to adjacent locations following the speed of variant scale-up observed in the regions of the UK.
- In one-quarter of those vaccinated, mobility increases toward pre-COVID-19 levels.

The **worse scenario** modifies the reference scenario assumptions in three ways:

- First, it assumes that variants B.1.351 or P1 begin to spread within 3 weeks in adjacent locations that do not already have B.1.351 or P1 community transmission.
- Second, it assumes that all those vaccinated increase their mobility toward pre-COVID-19 levels.
- Third, it assumes that among those vaccinated, mask use starts to decline exponentially one month after completed vaccination.

The **universal masks scenario** makes all the same assumptions as the reference scenario but also assumes 95% of the population wear masks in public in every location.

Figure 17. Cumulative COVID-19 deaths until July 01, 2021 for three scenarios

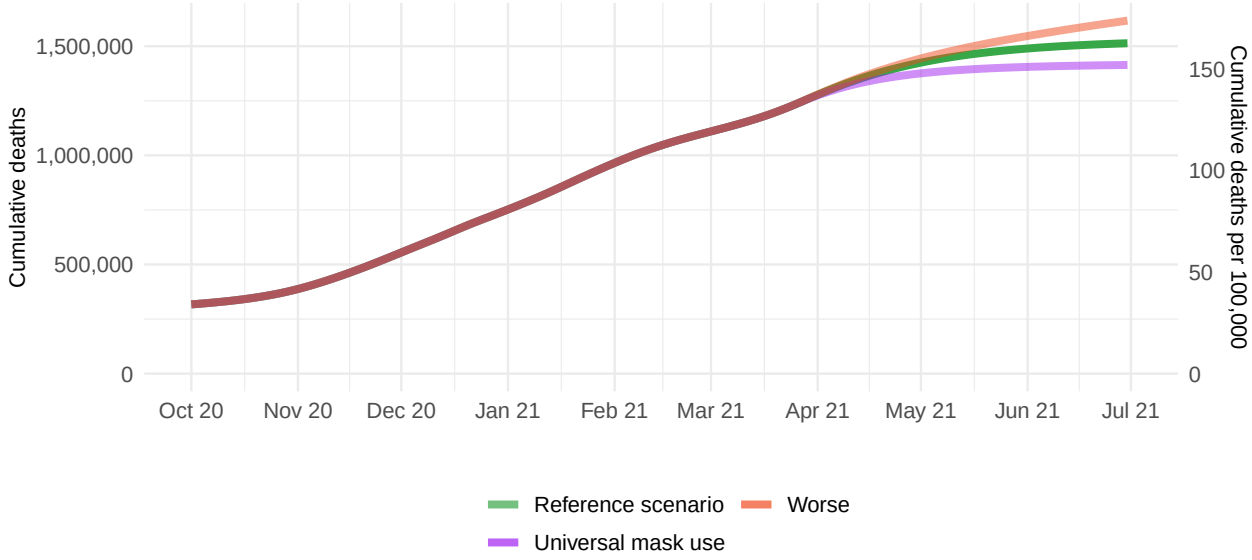


Figure 18. Daily COVID-19 deaths until July 01, 2021 for three scenarios

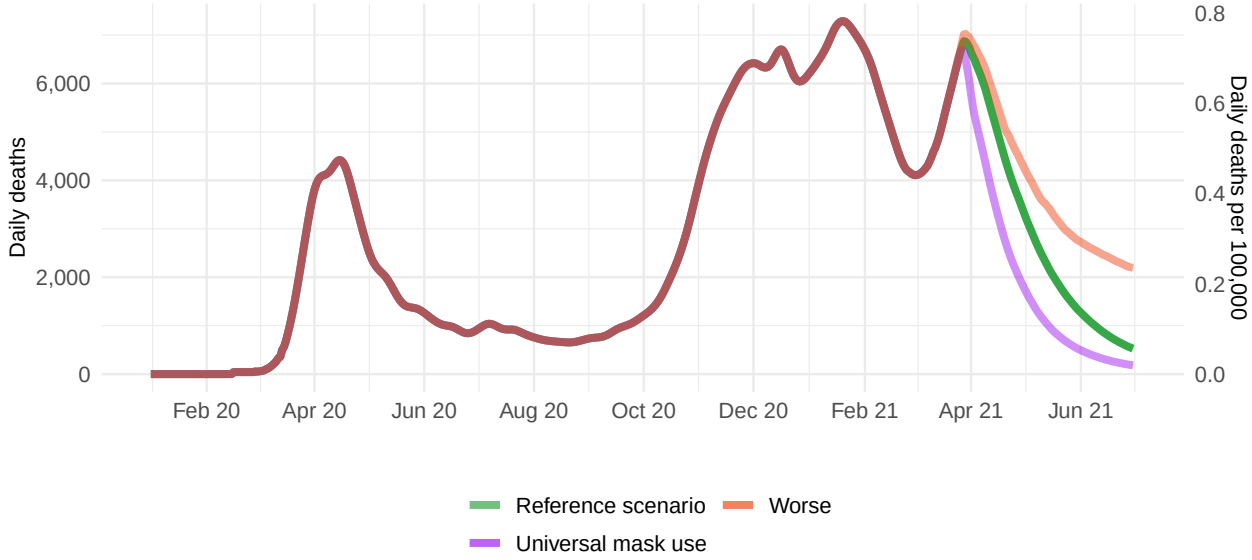


Figure 19. Daily COVID-19 infections until July 01, 2021 for three scenarios

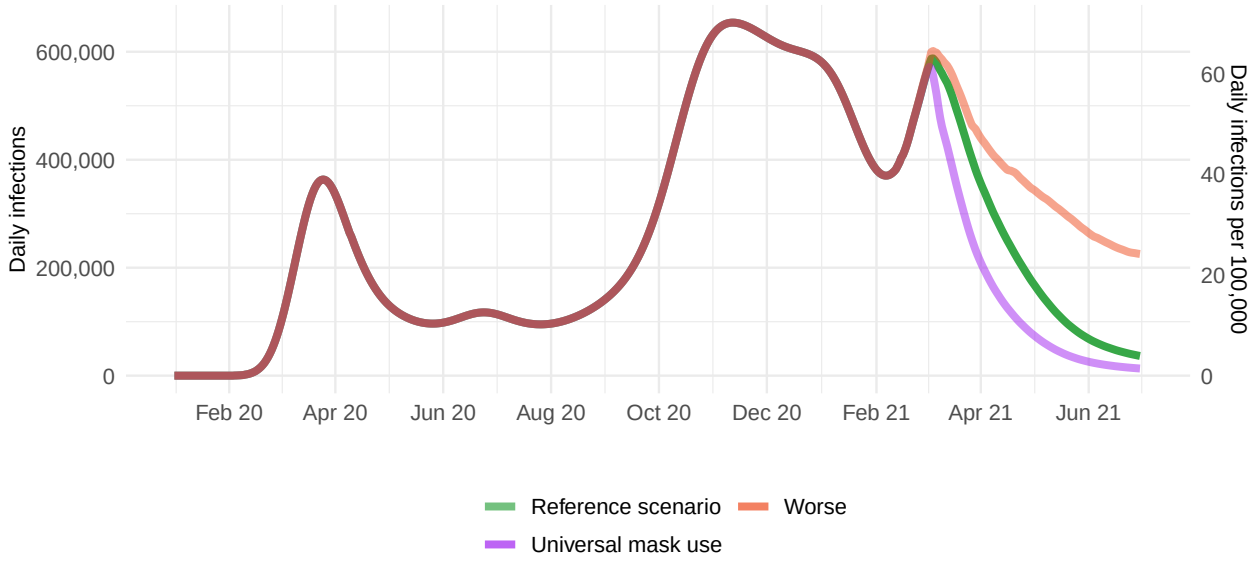


Figure 20. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), 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.

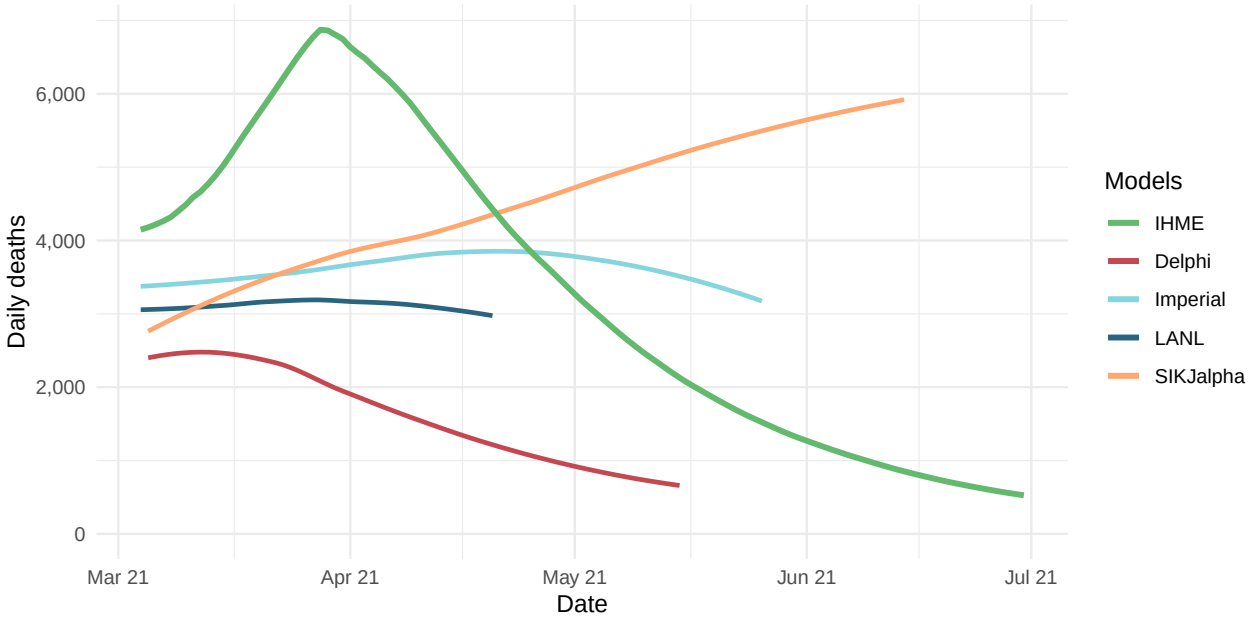
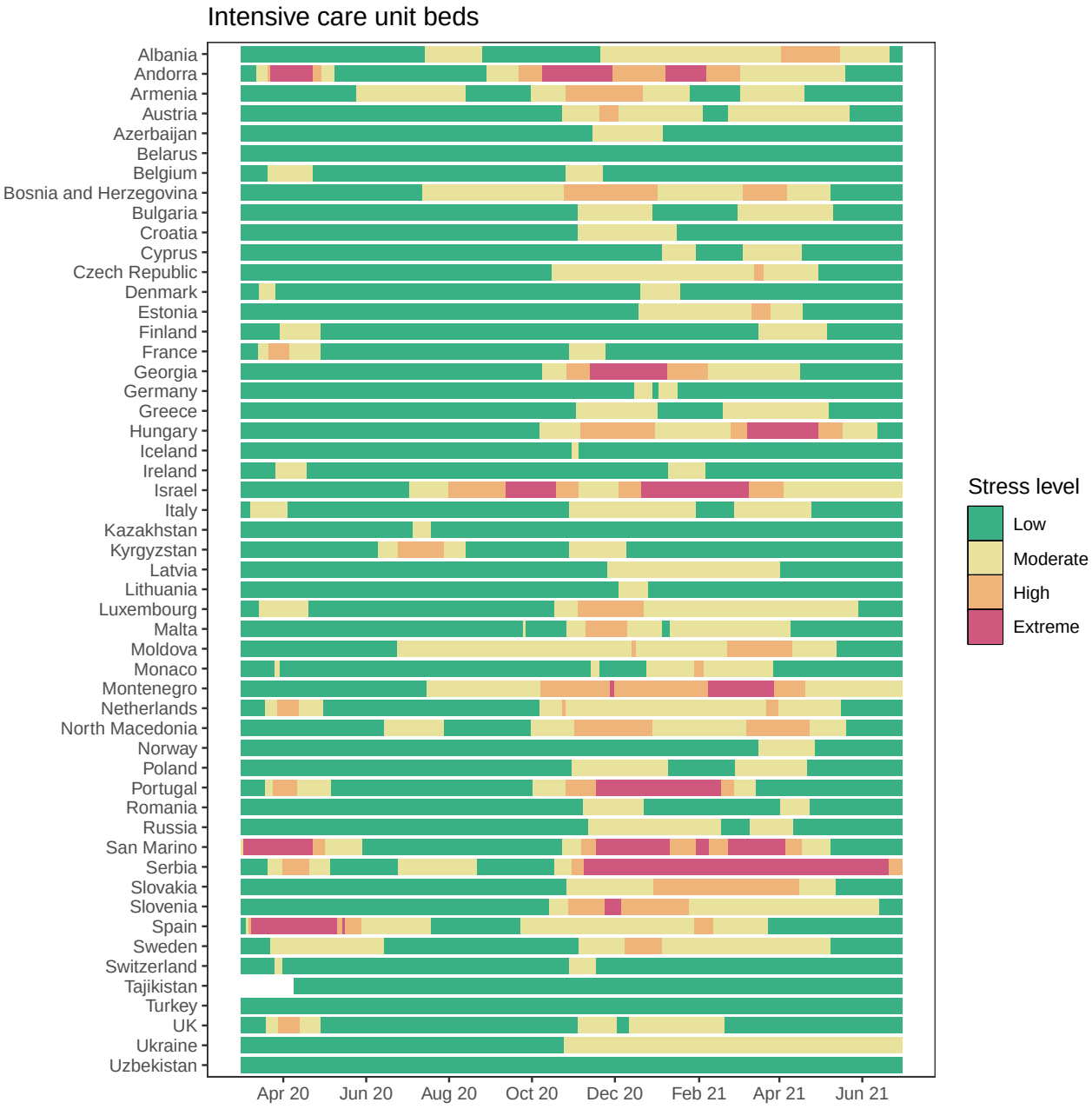


Figure 21. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and greater than 20% is considered *extreme stress*.

Figure 22. 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*.



More information

Data sources:

Mask use data sources include 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.

Vaccine hesitancy data are from the COVID-19 Beliefs, Behaviors, and Norms Study, a survey conducted on Facebook by the Massachusetts Institute of Technology (https://covidsurvey.mit.edu/).

Data on vaccine candidates, stages of development, manufacturing capacity, and pre-purchasing agreements are primarily from Linksbridge and supplemented by Duke University.

A note of thanks:

We wish to warmly acknowledge the support of these and others who have made our COVID-19 estimation efforts possible.

More information:

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.