COVID-19 Results Briefing

The European Region

December 15, 2022

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 December 15, 2022, with data through December 12, 2022.

With the onset of winter, COVID-19 transmission has been increasing in most countries in the region. While transmission is increasing, so far the increase in severe cases, hospitalizations, and deaths has been minimal. In our reference scenario, we expect transmission to peak in mid-January with a peak of daily deaths in February.

Our reference scenario suggests a mild winter in comparison to previous winters with COVID-19. Two critical issues drive the future impact of COVID-19. First, waning vaccine-derived and infection-acquired immunity is enough, particularly for infection, that BA.5 can continue to circulate at a high level in the region. Ongoing Omicron infection acts to maintain high levels of immunity in the population, especially as uptake of boosters remains low. This level of ongoing infection means that for a variant to replace the Omicron subvariants requires a considerable degree of immune escape. Our reference scenario does not include the possibility of a new variant with sufficient immune escape and increased severity.

Individuals and state governments need to track the likely levels of immunity in the population. As more and more individuals had their last vaccination many months ago, the fraction of the population that is susceptible will rise. While Omicron on average is one-tenth as severe as the Delta variant, the challenge will be if population levels of immunity drop to a low level at a time when a new, more severe variant with immune escape emerges. While the most likely outcome is relatively low levels of hospitalization and death due to COVID-19, health services and public health authorities need to monitor for the emergence anywhere in the globe of a new variant with immune escape and increased severity and act accordingly.

Current situation

- Estimated daily infections in the last week increased to 3,014,000 per day on average compared to 2,856,000 the week before (Figure 1.1).
- Daily reported cases in the last week increased to 182,000 per day on average compared to 163,000 the week before (Figure 2.1).
- Estimated daily hospital census in the last week (through December 12) increased to 105,000 per day on average compared to 98,000 the week before.
- Reported deaths due to COVID-19 in the last week increased to 660 per day on average compared to 620 the week before (Figure 3.1).

- Total deaths due to COVID-19 in the last week increased to 950 per day on average compared to 910 the week before (Figure 3.1). This makes COVID-19 the number six cause of death in the European Region this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 1.4 times larger than the reported number of deaths.
- The daily rate of reported deaths due to COVID-19 is greater than 4 per million in two countries and one subnational location (Figure 4.1).
- The daily rate of total deaths due to COVID-19 is greater than 4 per million in six countries and six subnational locations (Figure 4.2).
- We estimate that 95% of people in the European Region have been infected at least once as of December 12 (Figure 6.1). Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 39 countries and 44 subnational locations (Figure 7.1).
- The infection-detection rate in the European Region was close to 8% on December 12 (Figure 8.1).
- Based on the GISAID and various national databases, combined with our variant spread model, we estimate the current prevalence of variants of concern (Figures 9.1-9.6). The BA.5 Omicron subvariant remains the dominant cause of COVID-19.

Trends in drivers of transmission

- Based on self-reported mask use data collected in the COVID-19 Trends and Impact Survey, an estimated 6% of people are projected to always wear a mask when leaving their home. Mask use after June 24, 2022, is a statistical forecast.
- As of December 12, 24 countries and 57 subnational locations have reached 70% or more of the population who have received at least one vaccine dose, and 20 countries and 54 subnational locations have reached 70% or more of the population who are fully vaccinated (Figures 12.1 and 12.2). 68% of people in the European Region have received at least one vaccine dose, and 63% are fully vaccinated.
- In our current reference scenario, we expect that 636.3 million people will be vaccinated with at least one dose by April 1 (Figure 14.1). We expect that 64% of the population will be fully vaccinated by April 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:

- Vaccines are distributed at the expected pace. Brand- and variant-specific vaccine efficacy is updated using the latest available information from peer-reviewed publications and other reports.
- Future mask use will decline to 50% of the minimum level it reached between January 1, 2021, and May 1, 2022. This decline begins after the last observed data point in each location and transitions linearly to the minimum over a period of six weeks.

- Mobility increases as vaccine coverage increases.
- Mandates will be reimposed at the maximum level of mandates in the post-ancestral period once the death rate has reached an algorithmic minimum threshold of daily reported deaths for a given location.
- 80% of those who are fully vaccinated (two doses for most vaccines, or one dose for Johnson & Johnson) receive an additional dose six months after becoming fully vaccinated, and 80% of those who receive an additional dose receive a second additional dose six months later.
- Antiviral utilization for COVID-19 risk prevention has reached 80% in high-risk populations and 50% in low-risk populations between March 1, 2022, and June 1, 2022. This applies in high-income countries, but not low- and middle-income countries, and this rollout assumption follows a similar pattern to global vaccine rollouts.

The **80% mask use scenario** makes all the same assumptions as the reference scenario but assumes all locations reach 80% mask use within seven days. If a location currently has higher than 80% use, mask use remains at the current level.

The **antiviral access scenario** makes all the same assumptions as the reference scenario but assumes globally distributed antivirals and extends coverage to all low- and middle-income countries between August 15, 2022, and September 15, 2022.

Infections

- Daily estimated infections in the **reference scenario** will rise to 3,586,430 by mid-January 2023 (Figure 16.1).
- Daily estimated infections in the **80% mask use scenario** will decline to 1,523,860 by mid-January 2023 (Figure 16.1).
- Daily estimated infections in the **antiviral access scenario** will rise to level seen in the reference scenario (Figure 16.1).

Cases

- Daily estimated cases in the **reference scenario** will rise to 250,080 by January 6, 2023 (Figure 16.2).
- Daily estimated cases in the **80% mask use scenario** will rise to 205,040 by December 21, 2022 (Figure 16.2).
- Daily estimated cases in the **antiviral access scenario** will rise to 250,080 by January 6, 2023 (Figure 16.2).

Hospitalizations

- Daily hospital census in the **reference scenario** will rise to 125,890 by January 15, 2023 (Figure 16.3). At some point from December through April 1, one country will have high or extreme stress on hospital beds (Figure 18.1). At some point from December through April 1, 14 countries will have high or extreme stress on intensive care unit (ICU) capacity (Figure 19.1).

- Daily hospital census in the **80% mask use scenario** will rise to 112,160 by December 22, 2022 (Figure 16.3).
- Daily hospital census in the **antiviral access scenario** will rise to 123,320 by January 9, 2023 (Figure 16.3).

Deaths

- In our **reference scenario**, our model projects 2,678,000 cumulative reported deaths due to COVID-19 on April 1. This represents 90,000 additional deaths from December 12 to April 1. Daily reported COVID-19 deaths in the **reference scenario** will rise to 900 by January 30, 2023 (Figure 16.4).
- Under our **reference scenario**, our model projects 3,931,000 cumulative total deaths due to COVID-19 on April 1. This represents 133,000 additional deaths from December 12 to April 1 (Figure 16.5).
- In our **80% mask use scenario**, our model projects 2,638,000 cumulative reported deaths due to COVID-19 on April 1. This represents 50,000 additional deaths from December 12 to April 1. Daily reported COVID-19 deaths in the **80% mask use scenario** will rise to 790 by January 2, 2023 (Figure 16.4).
- In our **antiviral access scenario**, our model projects 2,674,000 cumulative reported deaths due to COVID-19 on April 1. This represents 87,000 additional deaths from December 12 to April 1. Daily reported COVID-19 deaths in the **antiviral access scenario** will rise to 870 by January 23, 2023 (Figure 16.4).
- Figure 17.1 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.

Model updates

We have updated our reference scenario to assume that mandates will be re-imposed at the maximum level of mandates in the post-ancestral period once the death rate has reached an algorithmic minimum threshold of daily reported deaths for a given location.

For the foreseeable future, we will not be updating our model or producing COVID-19 estimates. These will be the final briefing documents we produce until further notice.

Figure 1.1: Daily COVID-19 hospital census and estimated infections

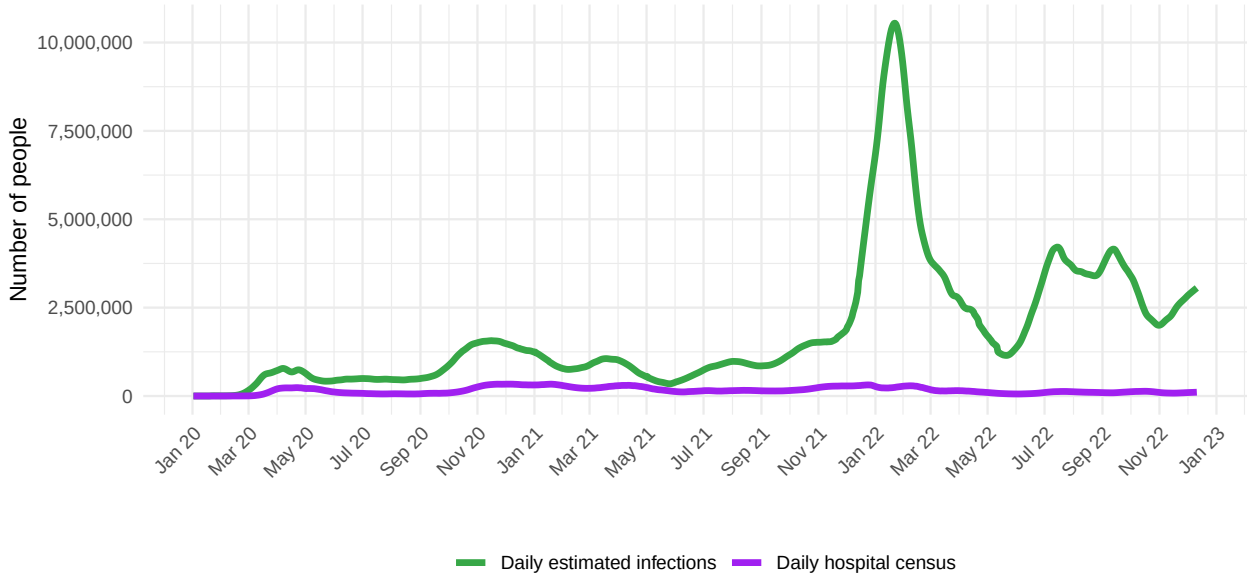


Figure 2.1: Reported daily COVID-19 cases, moving average

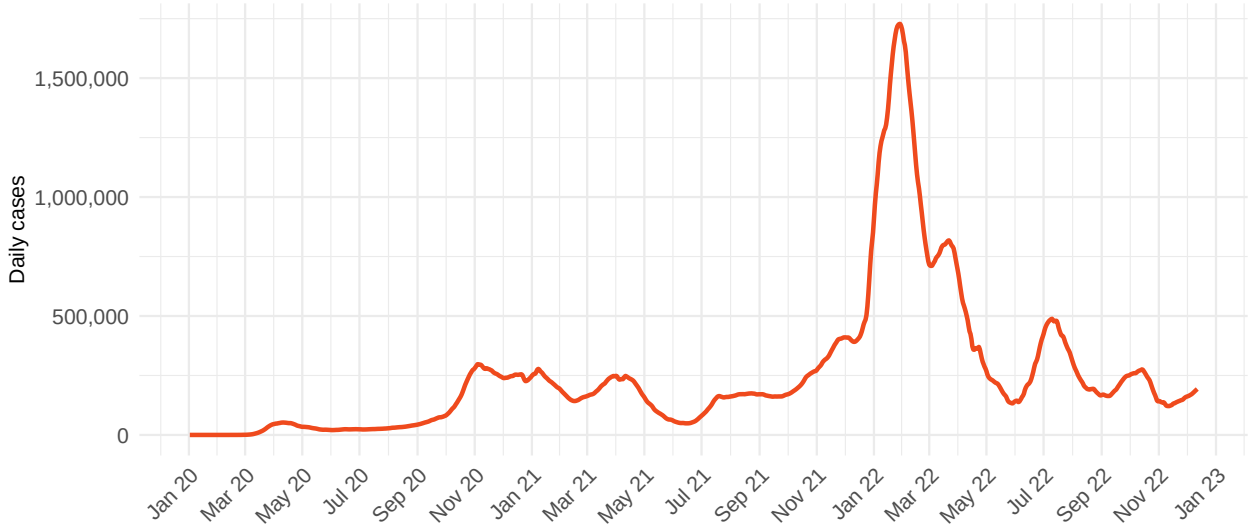
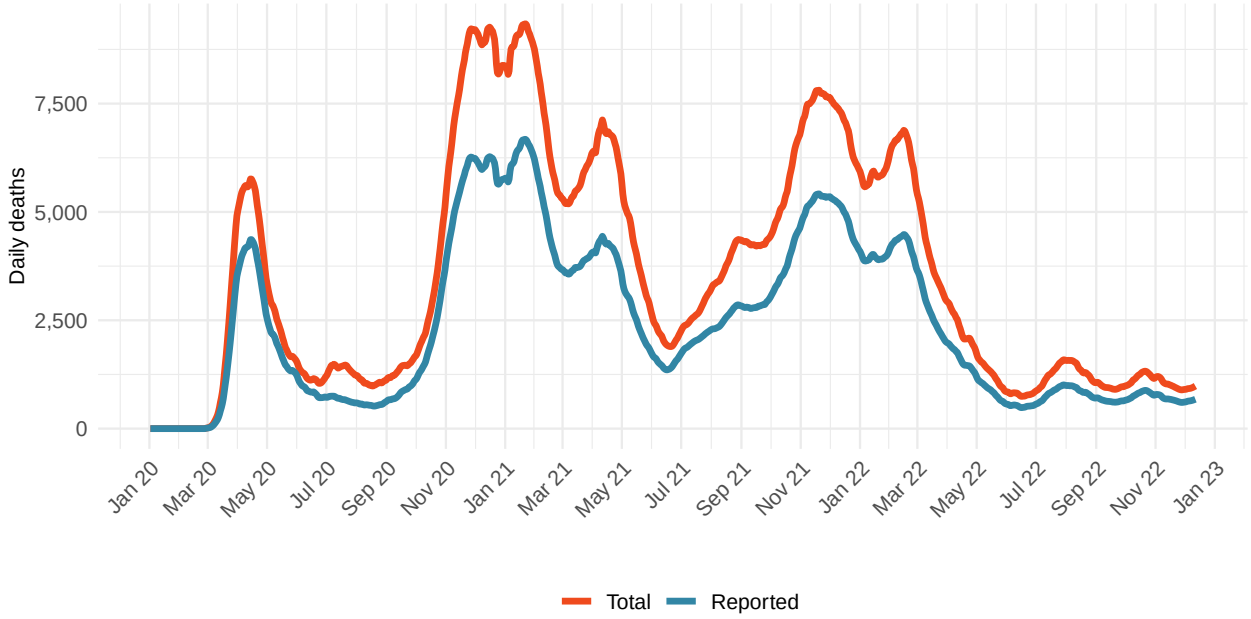


Table 1: Ranking of total deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	44,253	1
Stroke	22,622	2
Tracheal, bronchus, and lung cancer	8,918	3
Alzheimer's disease and other dementias	8,022	4
Chronic obstructive pulmonary disease	6,719	5
COVID-19	6,654	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 3.1: Smoothed trend estimate of daily COVID-19 deaths



Daily COVID-19 death rate per 1 million on December 12, 2022

Figure 4.1: Daily reported COVID-19 death rate per 1 million

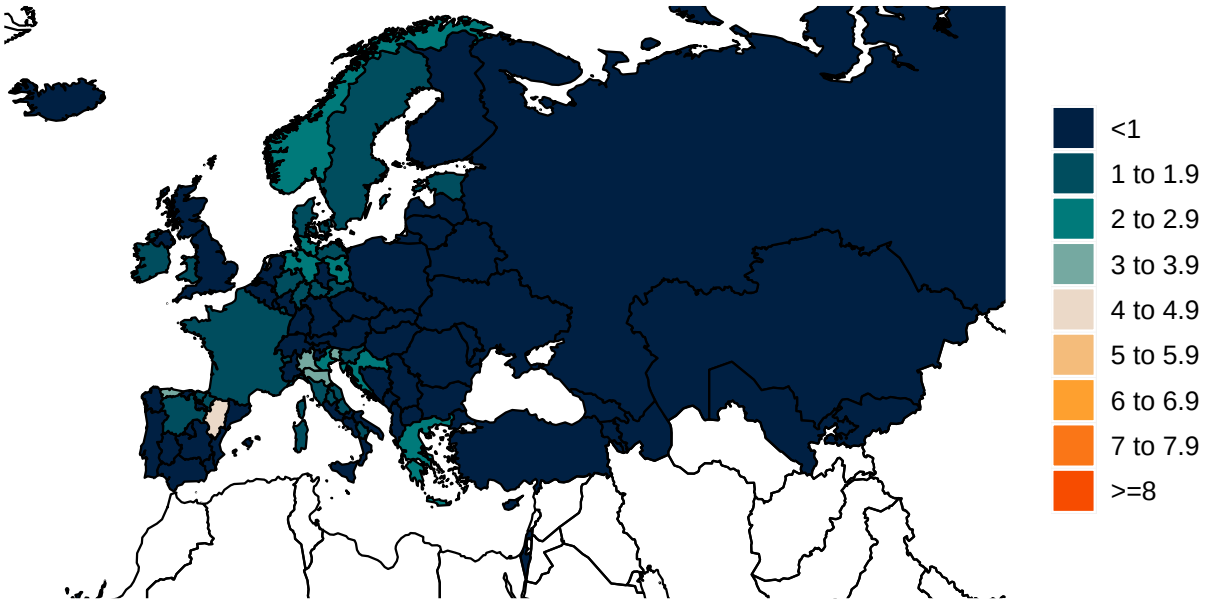
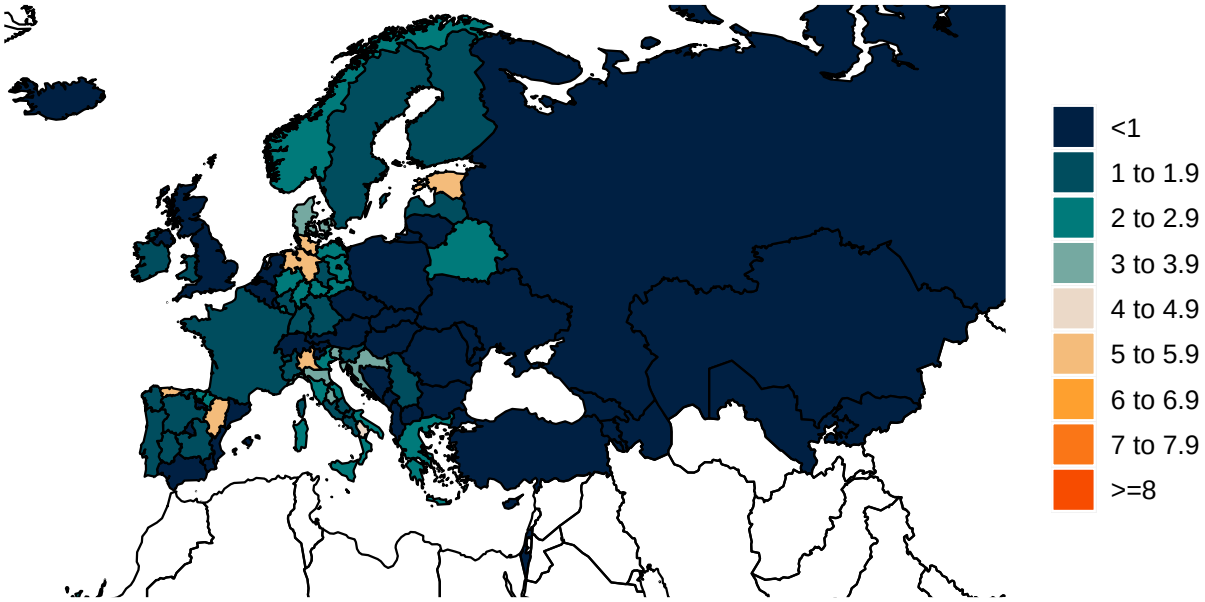


Figure 4.2: Daily total COVID-19 death rate per 1 million



Cumulative COVID-19 deaths per 100,000 on December 12, 2022

Figure 5.1: Reported cumulative COVID-19 deaths per 100,000

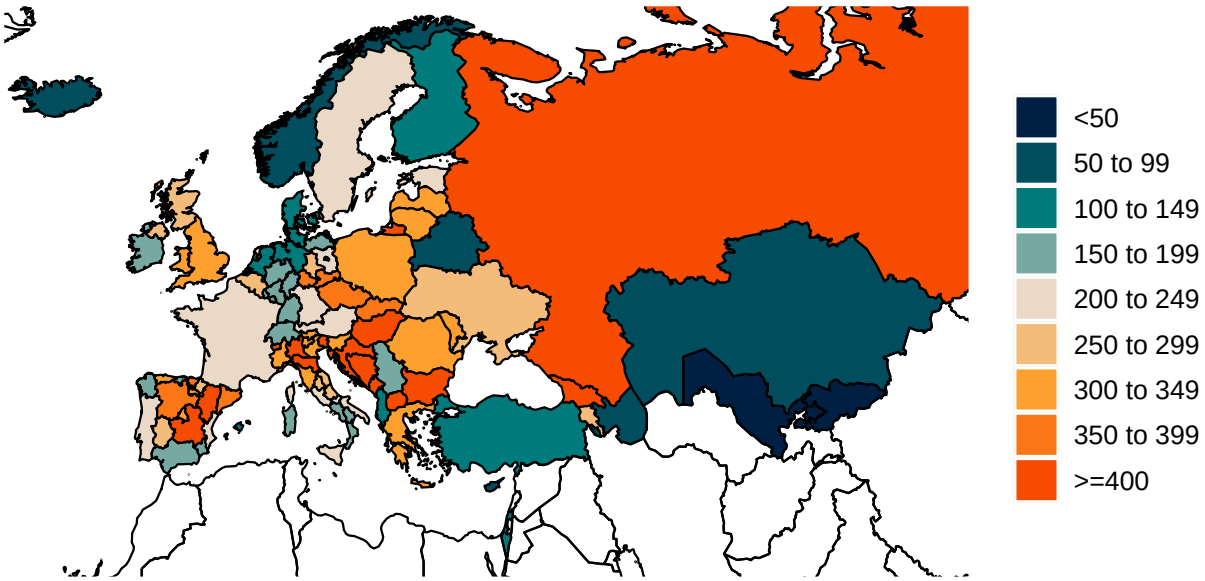


Figure 5.2: Total cumulative COVID-19 deaths per 100,000

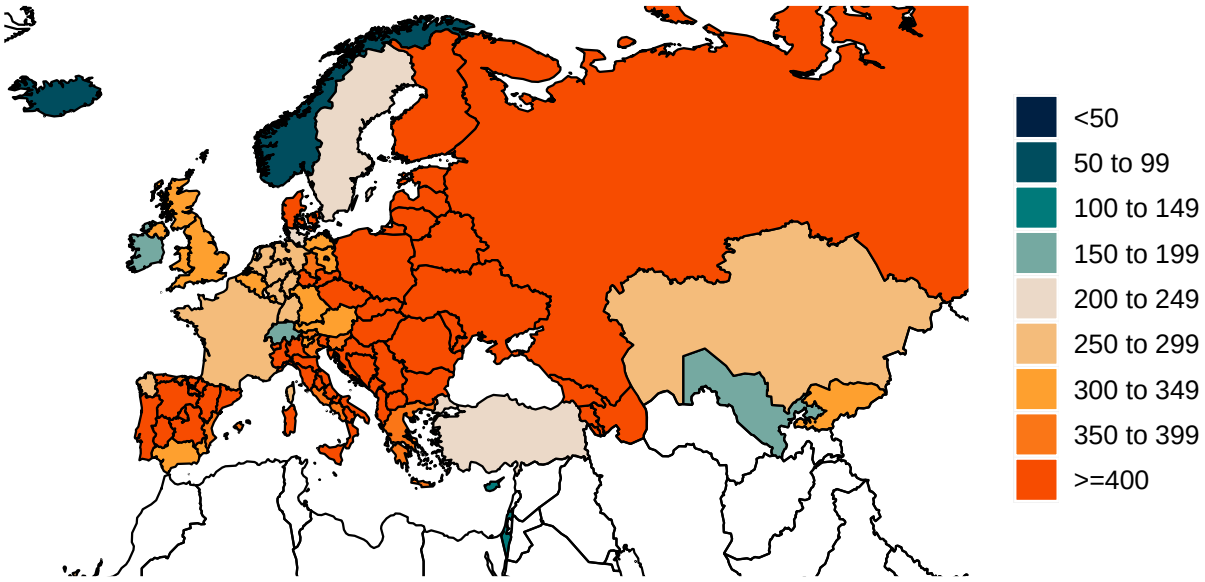


Figure 6.1: Estimated percent of the population infected with COVID-19 on December 12, 2022

Figure 7.1: Mean effective R on December 1, 2022. Effective R less than 1 means that transmission should decline, all other things being held the same. 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.

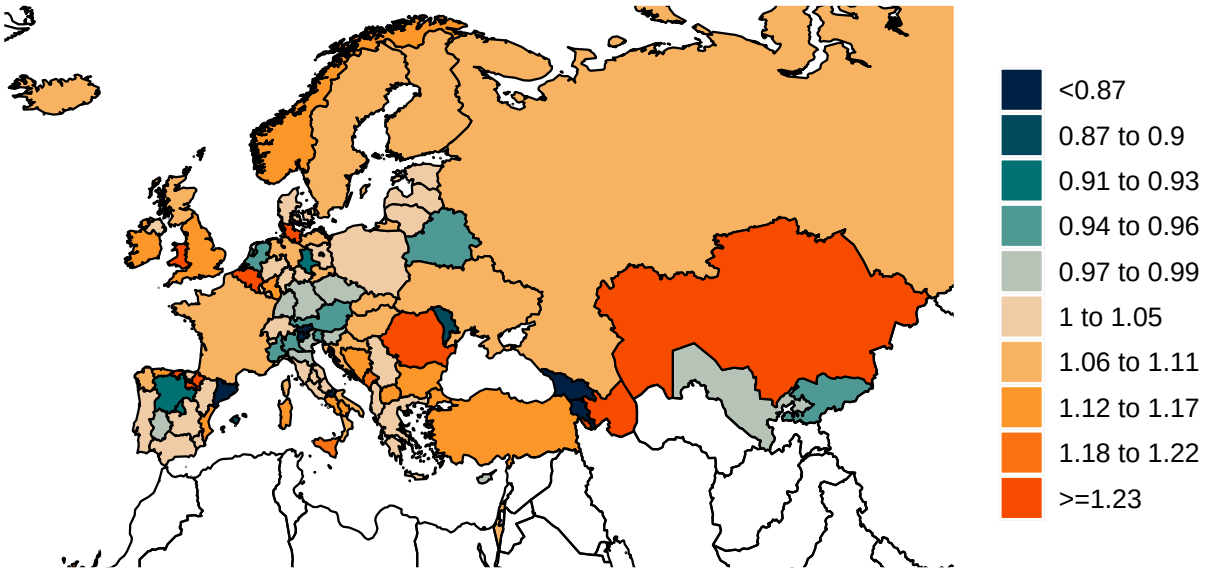
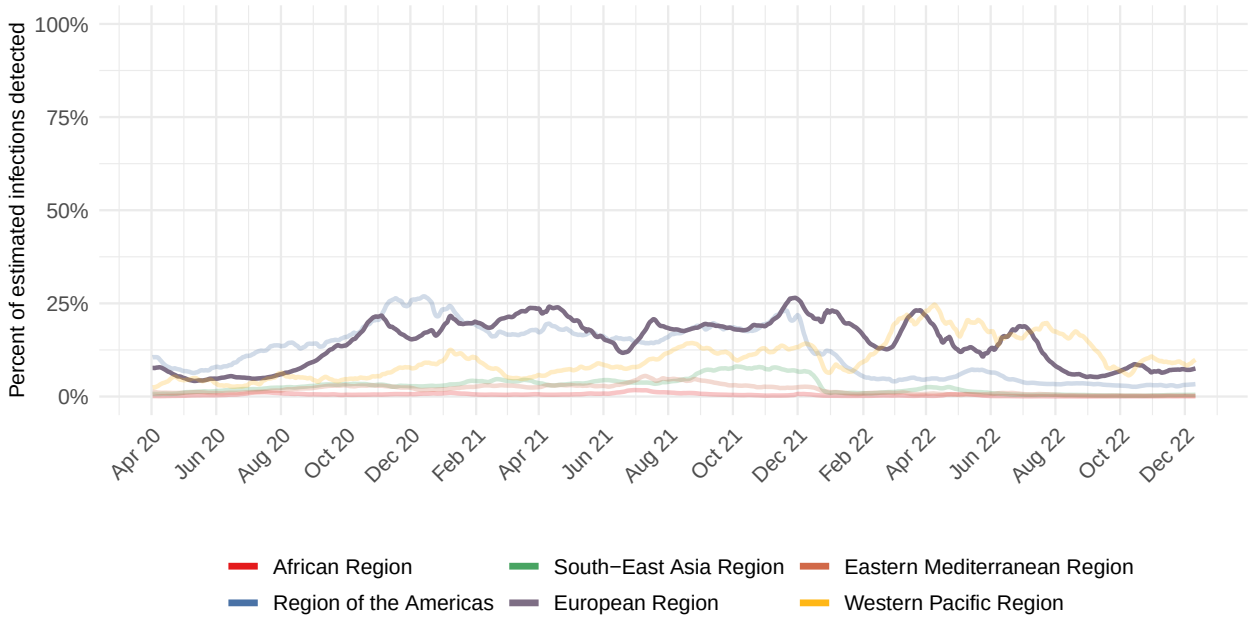


Figure 8.1: Percent of estimated COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100% at particular points in time.



Estimated percent of circulating SARS-CoV-2 for primary variant families on December 12, 2022

Figure 9.1: Estimated percent of new infections that are Alpha variant

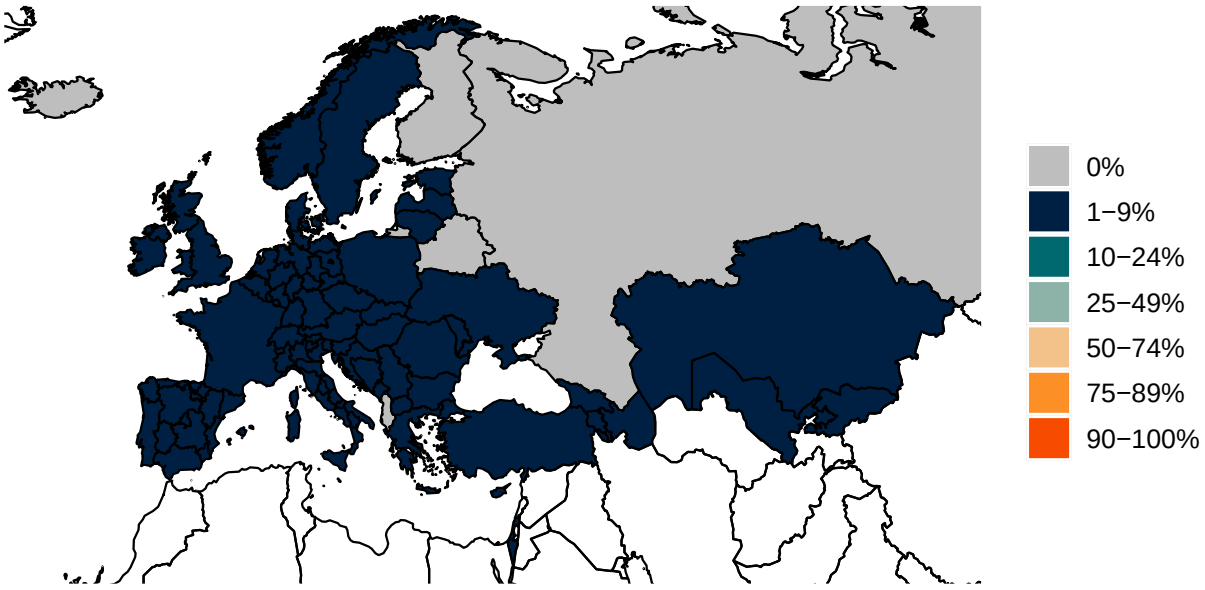


Figure 9.2: Estimated percent of new infections that are Beta variant

Figure 9.3: Estimated percent of new infections that are Delta variant

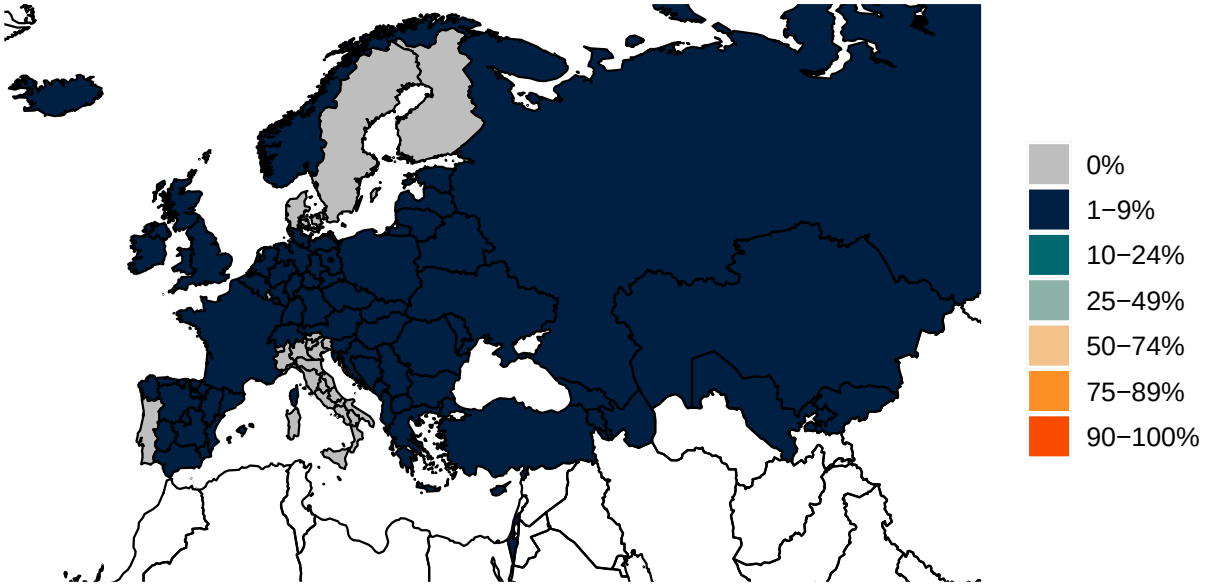


Figure 9.4: Estimated percent of new infections that are Gamma variant

Figure 9.5: Estimated percent of new infections that are BA.1/BA.2 variant

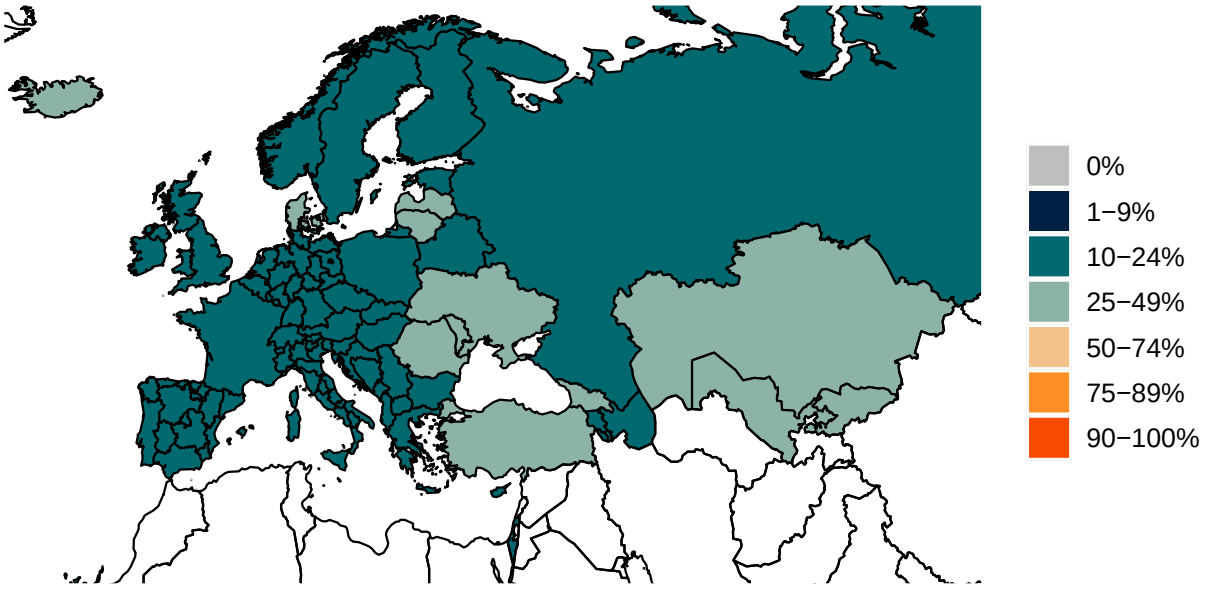


Figure 9.6: Estimated percent of new infections that are BA.5 variant

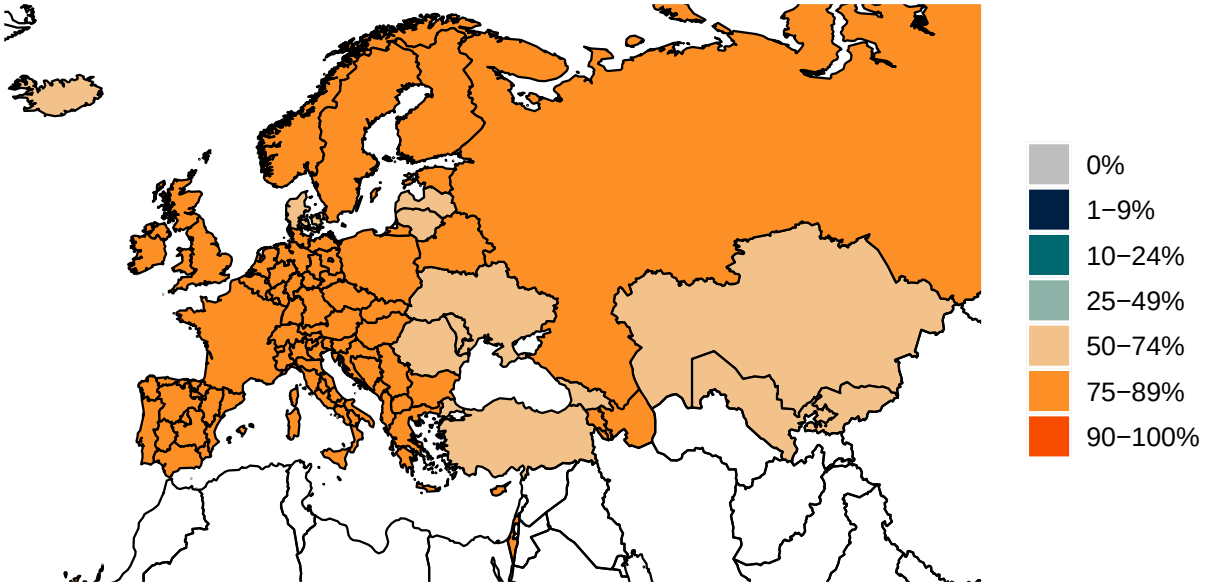
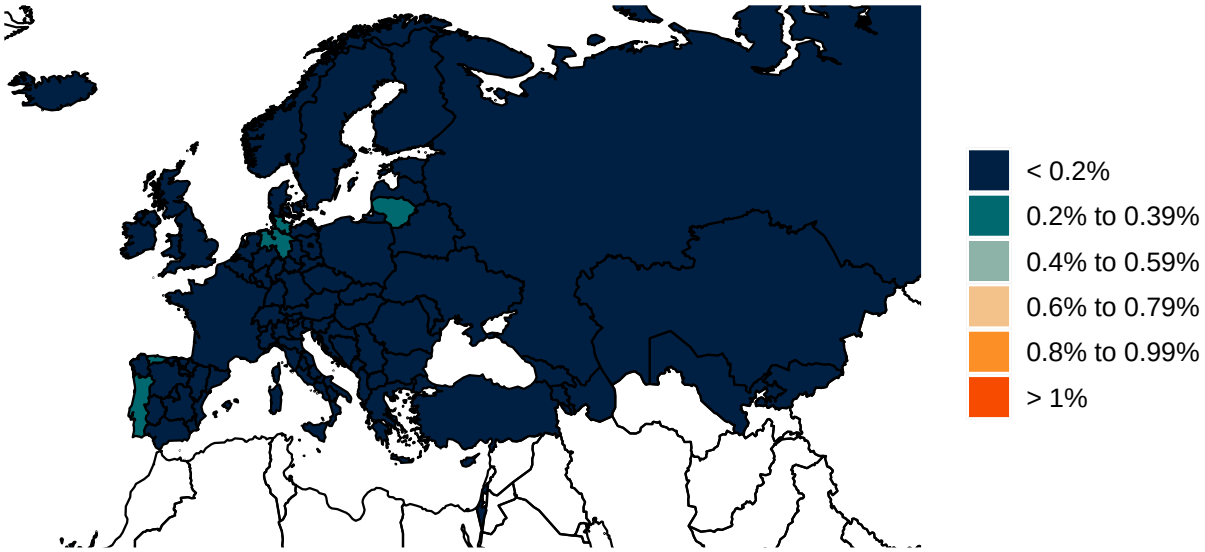
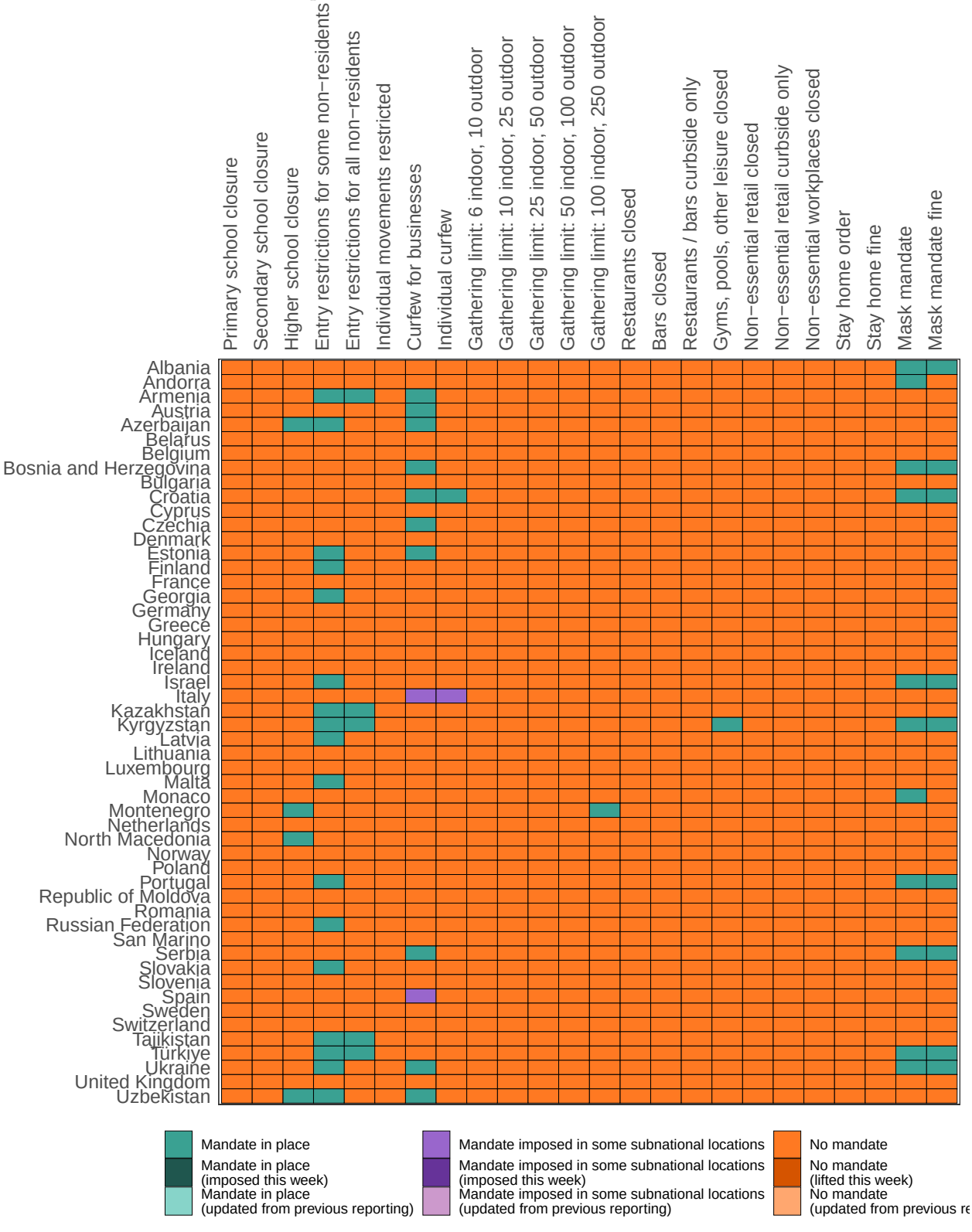


Figure 10.1: Infection-fatality rate on December 12, 2022. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.



Critical drivers

Table 2: Current mandate implementation



*Not all locations are measured at the subnational level.

Figure 11.1: Trend in the proportion of the population reporting always wearing a mask when leaving home

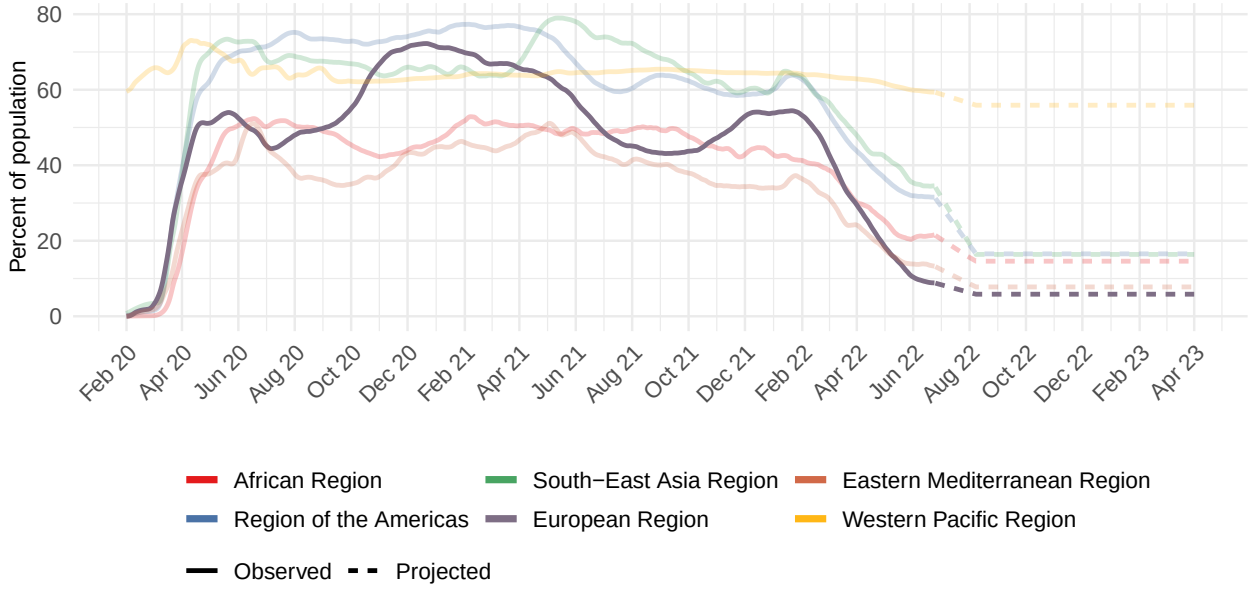


Table 3: Estimates of vaccine effectiveness for specific vaccines used in the model at preventing severe disease and infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our website.

	Effectiveness at preventing													
	Ancestral		Alpha		Beta		Gamma		Delta		BA.1/BA.2		BA.5	
Vaccine	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection
AstraZeneca	94%	63%	94%	63%	94%	69%	94%	69%	94%	69%	71%	36%	71%	36%
CanSino	66%	62%	66%	62%	64%	61%	64%	61%	64%	61%	48%	32%	48%	32%
CoronaVac	50%	47%	50%	47%	49%	46%	49%	46%	49%	46%	37%	24%	37%	24%
Covaxin	78%	73%	78%	73%	76%	72%	76%	72%	76%	72%	57%	38%	57%	38%
Johnson & Johnson	86%	72%	86%	72%	76%	64%	76%	64%	76%	64%	57%	33%	57%	33%
Moderna	97%	92%	97%	92%	97%	91%	97%	91%	97%	91%	73%	48%	73%	48%
Novavax	89%	83%	89%	83%	86%	82%	86%	82%	86%	82%	65%	43%	65%	43%
Pfizer/BioNTech	95%	86%	95%	86%	95%	84%	95%	84%	95%	84%	72%	44%	72%	44%
Sinopharm	73%	68%	73%	68%	71%	67%	71%	67%	71%	67%	53%	35%	53%	35%
Sputnik-V	92%	86%	92%	86%	89%	85%	89%	85%	89%	85%	67%	44%	67%	44%
Other vaccines	75%	70%	75%	70%	73%	69%	73%	69%	73%	69%	55%	36%	55%	36%
Other vaccines (mRNA)	91%	86%	91%	86%	88%	85%	88%	85%	88%	85%	67%	45%	67%	45%

Percent of the population having received at least one dose (12.1) and fully vaccinated against SARS-CoV-2 (12.2) by December 12, 2022

Figure 12.1: Percent of the population having received one dose of a COVID-19 vaccine

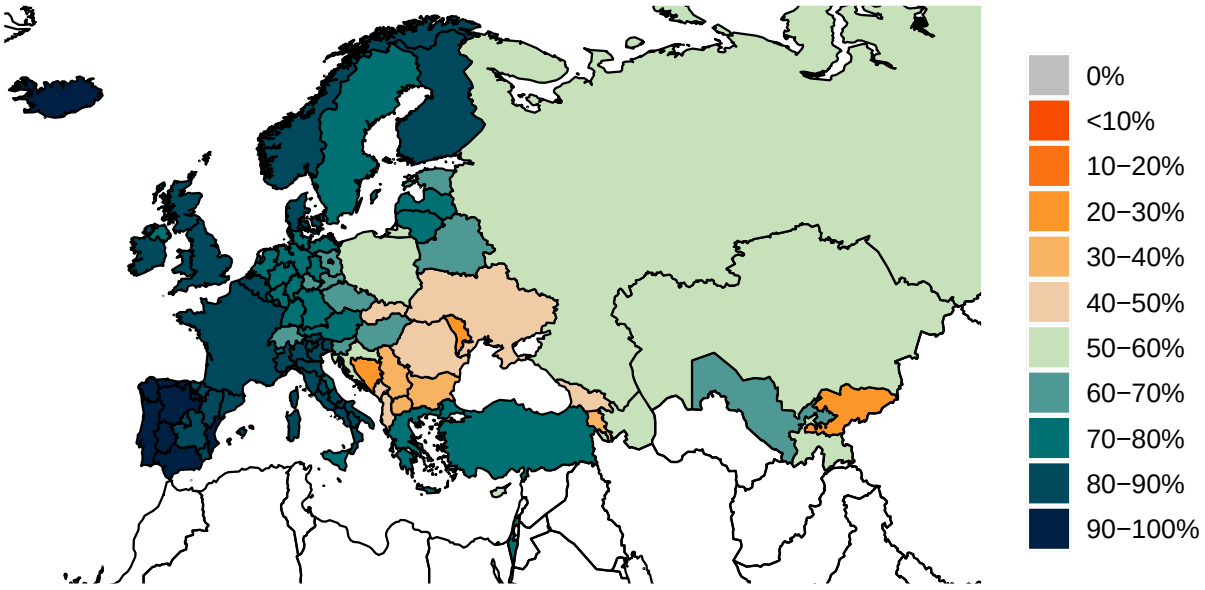


Figure 12.2: Percent of the population fully vaccinated against SARS-CoV-2

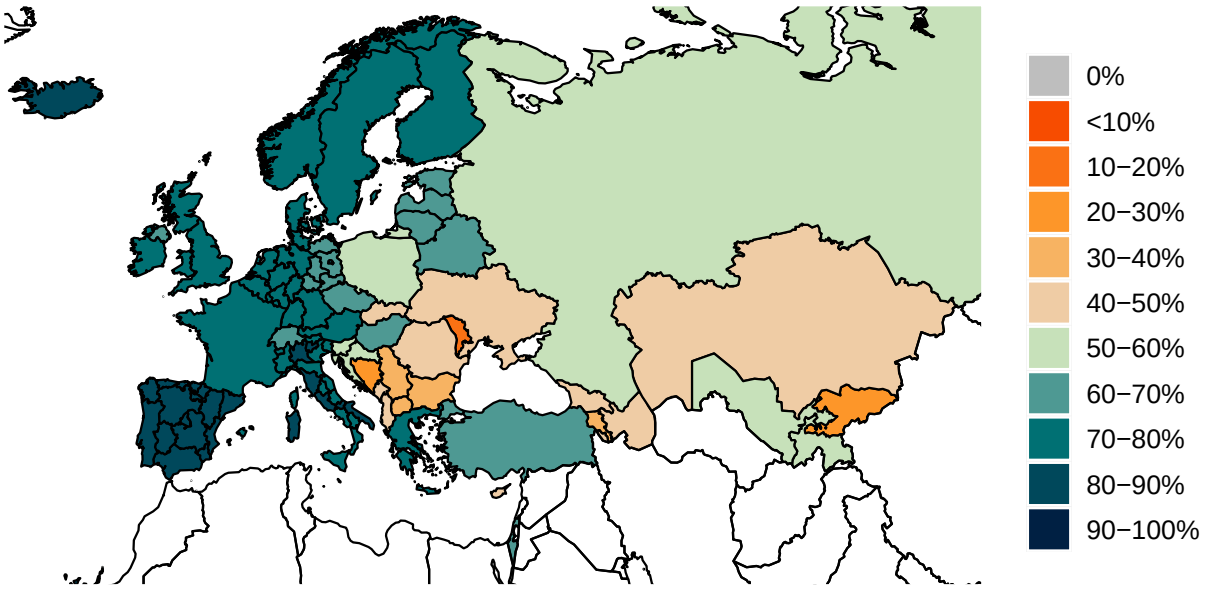


Figure 13.1: Estimated proportion of the total population that is not vaccinated but willing to be vaccinated as of June 24, 2022

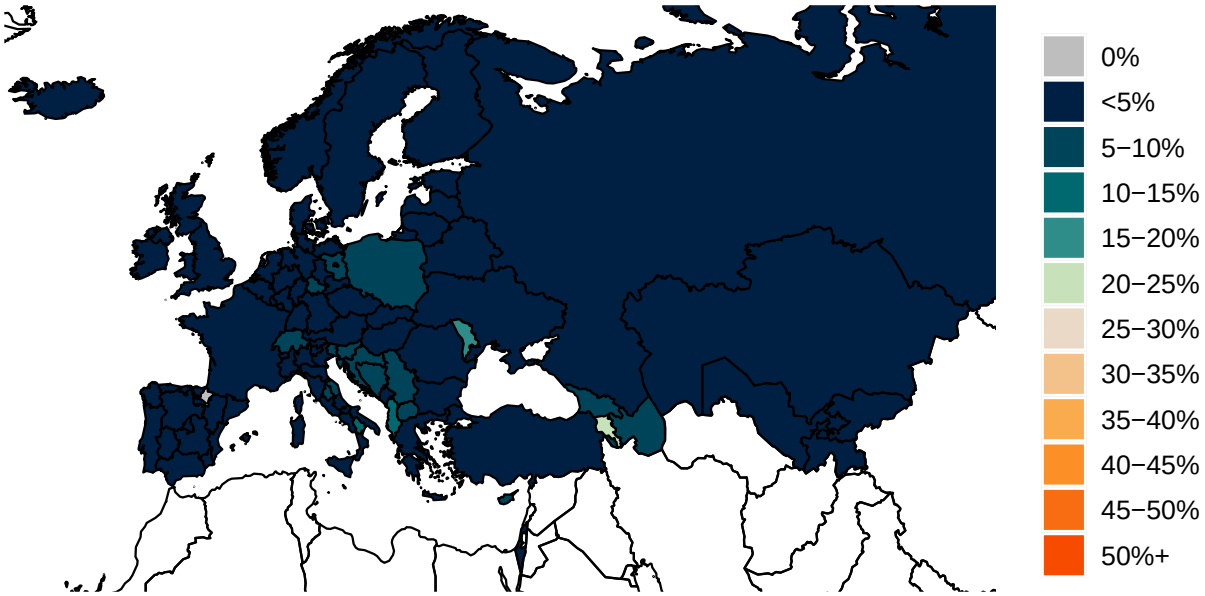
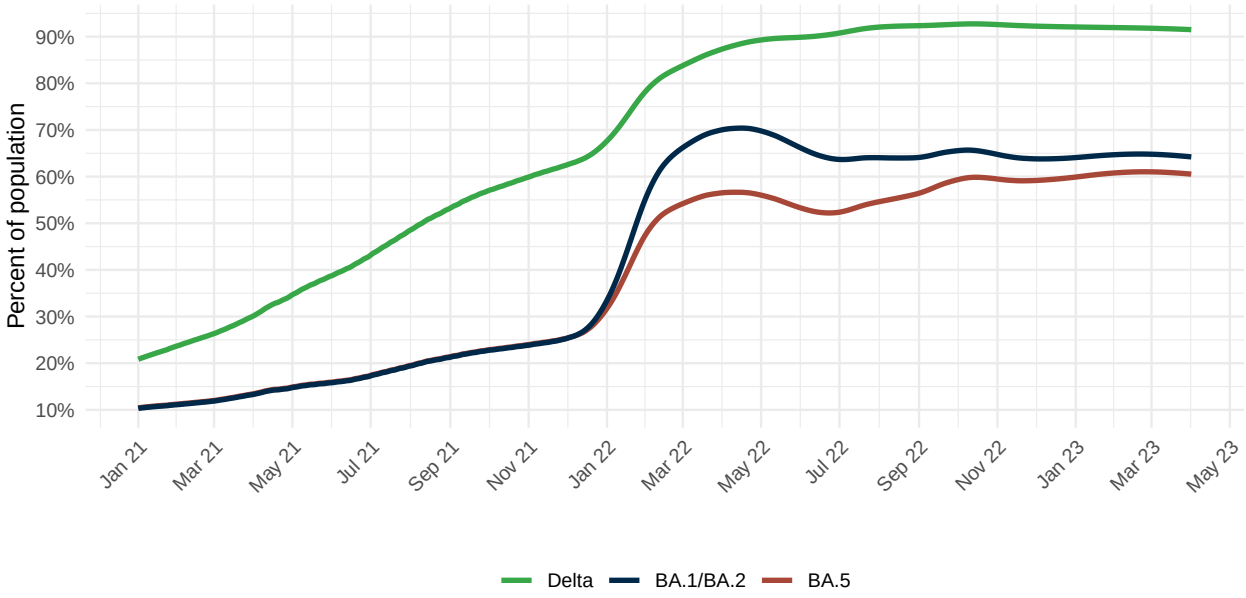


Figure 14.1: Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated

Figure 15.1: Percent of people who are immune to Delta, BA.1/BA.2 or BA.5. Immunity is based on protection due to prior vaccination and infection(s). Moreover, variant-specific immunity is also based on variant-variant specific protection.



Projections and scenarios

Figure 16.1: Daily COVID-19 infections until April 01, 2023 for three scenarios

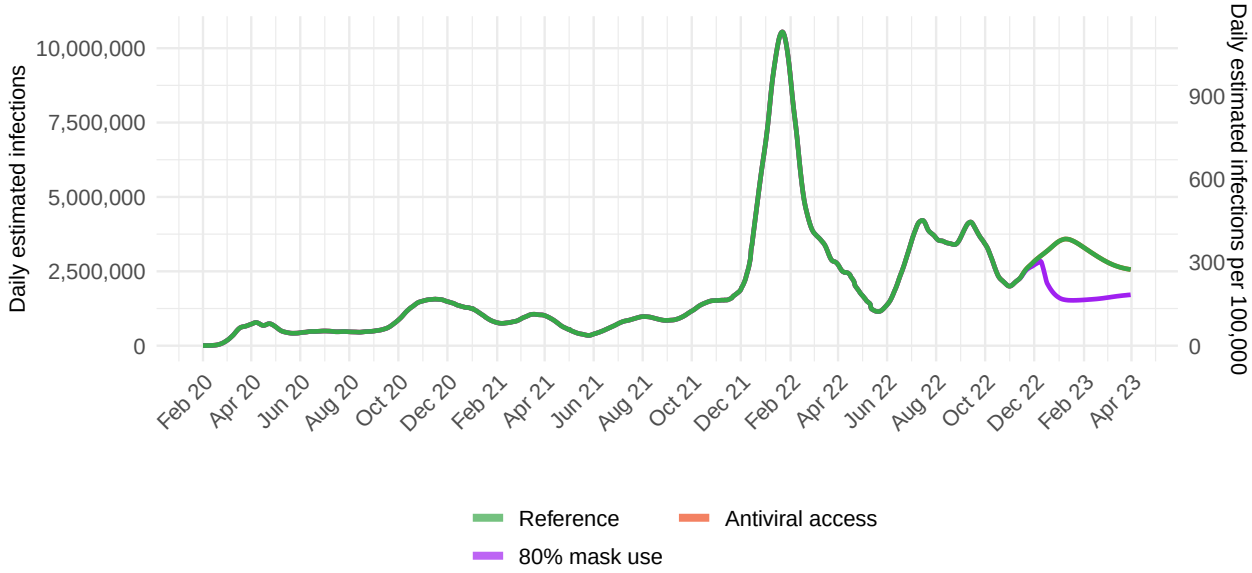


Figure 16.2: Daily COVID-19 reported cases until April 01, 2023 for three scenarios

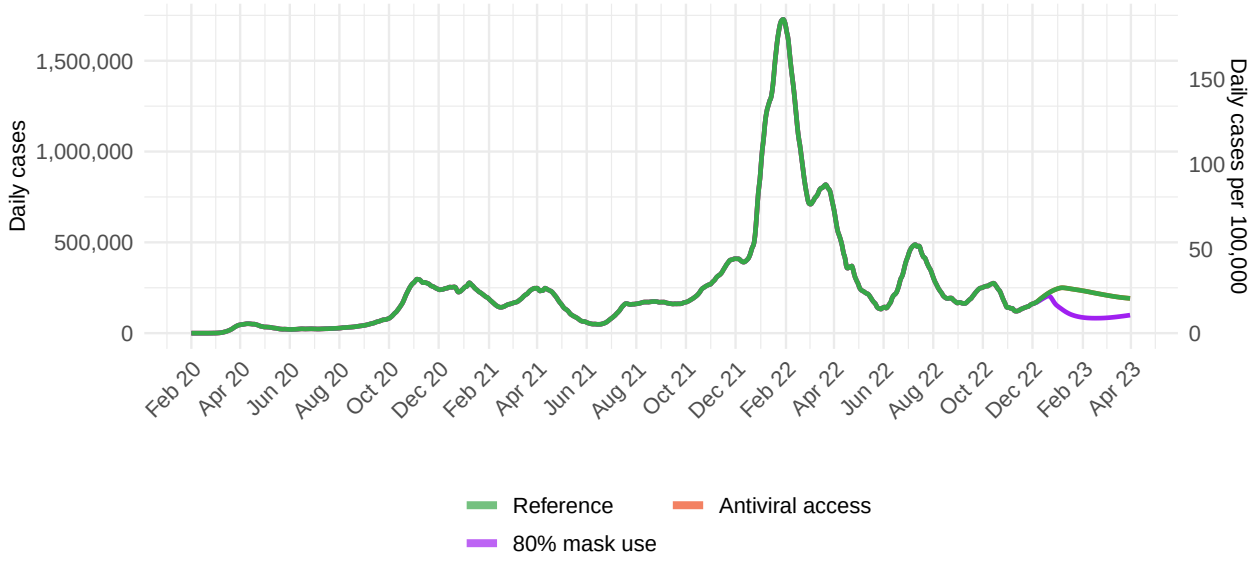


Figure 16.3: Daily COVID-19 hospital census until April 01, 2023 for three scenarios

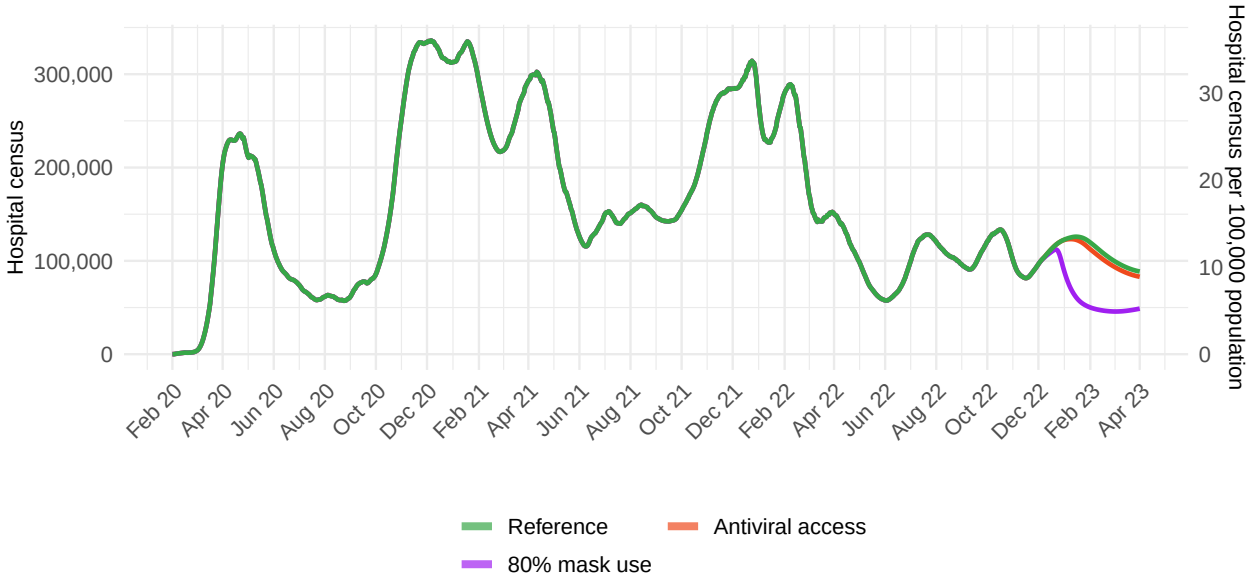


Figure 16.4: Reported daily COVID-19 deaths per 100,000

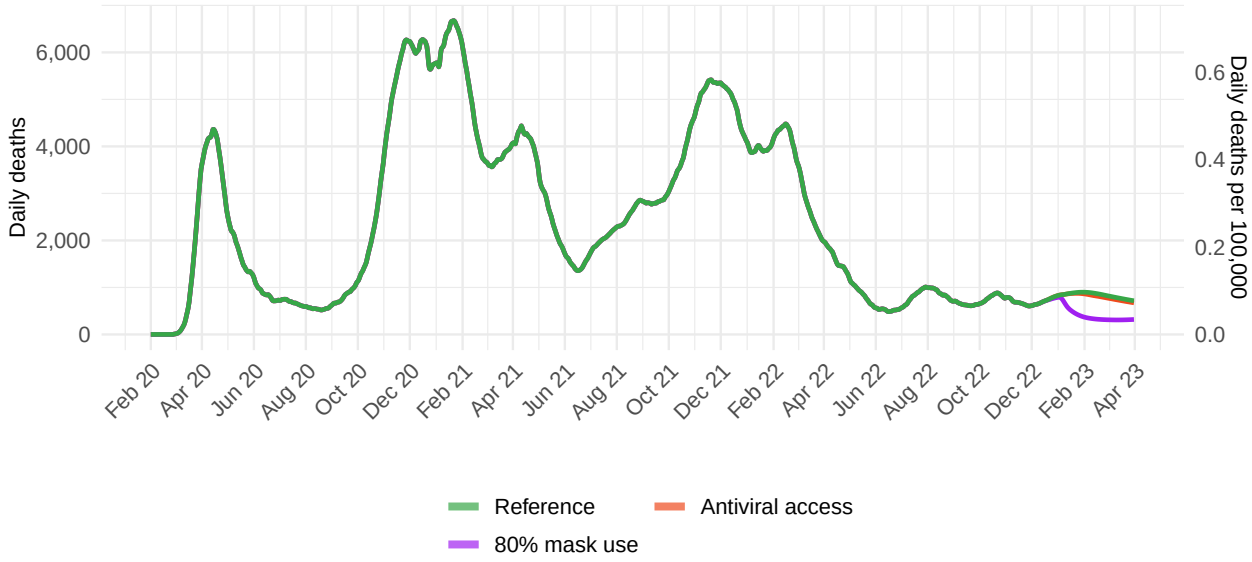


Figure 16.5: Total daily COVID-19 deaths per 100,000

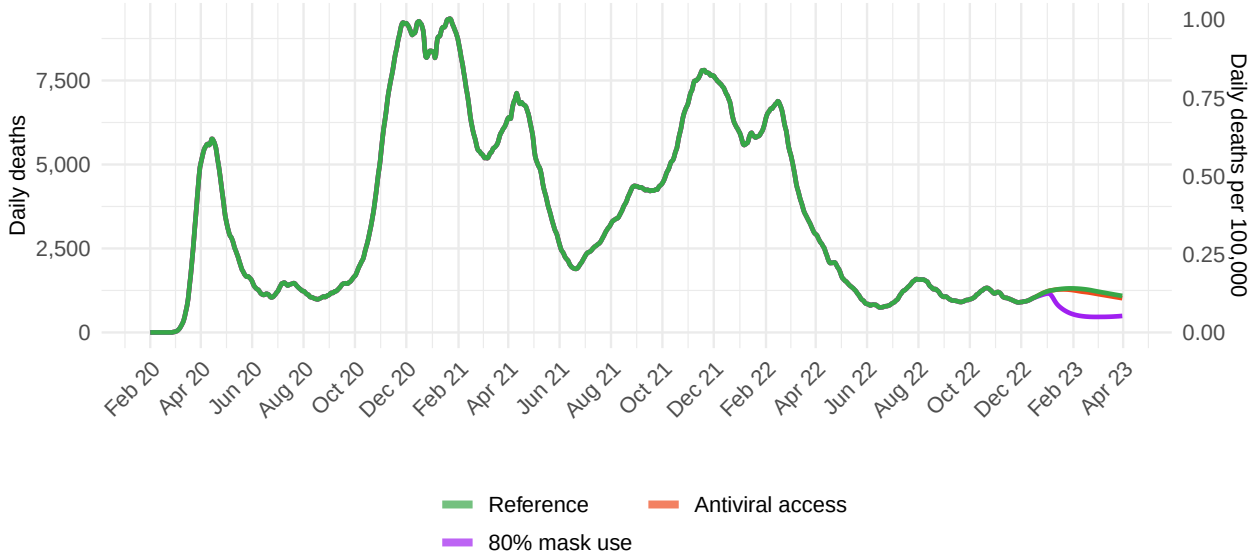


Figure 17.1: Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available, last model update in brackets: the SI-KJalpha model from the University of Southern California (SIKJalpha) [December 5, 2022]. Regional values are aggregates from available locations in that region.

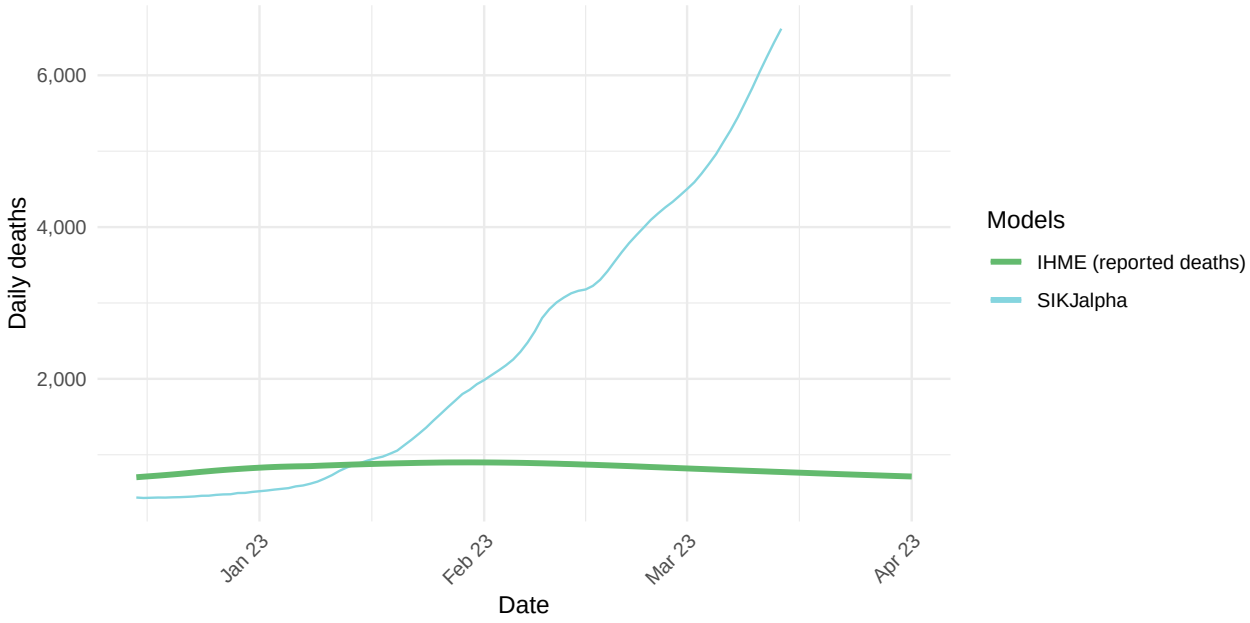


Figure 18.1: The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and 20% or greater is considered *extreme stress*.

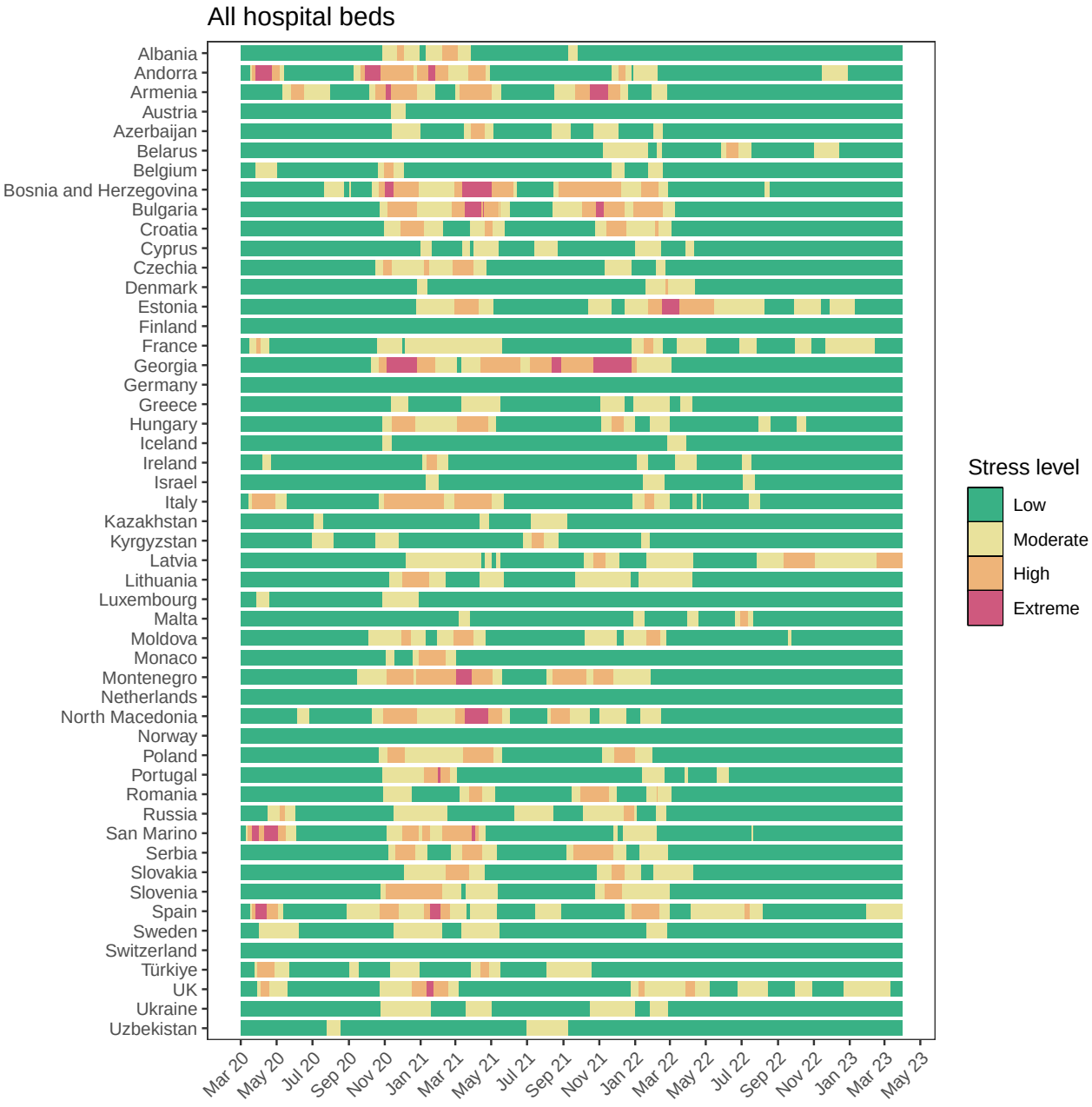


Figure 19.1: The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *moderate stress*, 30-59% is considered *high stress*, and 60% or greater is considered *extreme stress*.

More information

Data sources:

Mask use and vaccine confidence data are from the The Delphi Group at Carnegie Mellon University and University of Maryland COVID-19 Trends and Impact Surveys, in partnership with Facebook. Mask use data are also from Premise, the Kaiser Family Foundation, and the YouGov COVID-19 Behaviour Tracker survey.

Genetic sequence and metadata are primarily from the GISAID Initiative. Further details available on the COVID-19 model FAQ page.

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.

To download our most recent results, visit our Data downloads page.

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