

COVID-19 Results Briefing

Ukraine

March 19, 2022

This document contains summary information on the latest projections from the IHME model on COVID-19 in Ukraine. The model was run on March 19, 2022, with data through February 24, 2022.

The situation in Ukraine is very difficult. The war has caused large numbers of casualties and injuries that are overwhelming the medical systems. In addition, the large number of internally displaced people seeking shelter in common places could result in a rise of infections from COVID-19 and other respiratory diseases. Prior to the war, the COVID-19 vaccination levels were very low, but the combination of vaccines and infections resulted in a high number of immune individuals. However, with limited access to food and medications, increased stress and trauma, lack of clean water, electricity, and hygiene, the health situation will worsen in the coming days.

There is little reporting of the COVID situation as the country's resources are rightfully diverted to taking care of the population during the war. Although our projections do not expect a rise in COVID cases, the current conditions are of concern for many diseases and infections in addition to COVID.

The international community should provide immediate assistance to save lives and protect people from infections and diseases. There is also a need to assist refugees in proper settling and provide resources to host countries to adequately support the large number of people crossing the borders.

Current situation

- Daily infections in the last week decreased to 98,000 per day on average compared to 164,000 the week before (Figure 1.1). Daily hospital census in the last week (through February 24) decreased to 8,800 per day on average compared to 14,000 the week before.
- Daily reported cases in the last week decreased to 27,000 per day on average compared to 32,000 the week before (Figure 2.1).
- Reported deaths due to COVID-19 in the last week decreased to 110 per day on average compared to 160 the week before (Figure 3.1).
- Total deaths due to COVID-19 in the last week decreased to 160 per day on average compared to 250 the week before (Figure 3.1). This makes COVID-19 the number three cause of death in Ukraine this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 1.5 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 13 countries (Figure 4.1).

- The daily rate of total deaths due to COVID-19 is greater than 4 per million in 22 countries (Figure 4.2).
- We estimate that 95% of people in Ukraine have been infected at least once as of March 14 (Figure 6.1). Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 17 countries. Effective R in Ukraine was 0.7 on March 3 (Figure 7.1).
- The infection-detection rate in Ukraine was close to 4% on March 14 (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 9.1–9.5). We estimate that the Alpha variant is circulating in 47 countries, that the Beta variant is circulating in 26 countries, that the Delta variant is circulating in 47 countries, that the Gamma variant is circulating in 23 countries, and that the Omicron variant is circulating in 47 countries.

Trends in drivers of transmission

- Mobility last week was 9% lower than the pre-COVID-19 baseline (Figure 11.1). Mobility was lower than 30% of baseline in no countries.
- As of March 14, in the COVID-19 Trends and Impact Survey, 40% of people self-report that they always wore a mask when leaving their home compared to 44% last week (Figure 13.1).
- There were 166 diagnostic tests per 100,000 people on March 14 (Figure 15.1).
- As of March 14, 25 countries have reached 70% or more of the population who have received at least one vaccine dose, and 19 countries have reached 70% or more of the population who are fully vaccinated (Figure 17.1). 37% of people in Ukraine have received at least one vaccine dose, and 35% are fully vaccinated.
- In Ukraine, 57.6% of the population that is 12 years and older say they would accept, or would probably accept, a vaccine for COVID-19. Note that vaccine acceptance is calculated using survey data from the 18+ population. This is down by 0.1 percentage points from last week. The proportion of the population who are open to receiving a COVID-19 vaccine ranges from 29% in Tajikistan to 99% in Iceland (Figure 19.1).
- In our current reference scenario, we expect that 18.7 million people will be vaccinated with at least one dose by July 1 (Figure 20.1). We expect that 40% of the population will be fully vaccinated by July 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 is the mean of mask use over the last seven days.
- Mobility increases as vaccine coverage increases.
- Omicron variant spreads according to our flight and local spread model.
- 80% of those who have had two doses of vaccine (or one dose for Johnson & Johnson) receive a third dose at six months after their second dose.

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 **third dose scenario** is the same as the reference scenario but assumes that 100% of those who have received two doses of vaccine will get a third dose at six months.

Projections

Infections

- Daily estimated infections in the **reference scenario** will decline to 660 by July 1, 2022 (Figure 22.1).
- Daily estimated infections in the **80% mask use scenario** will decline to 130 by July 1, 2022 (Figure 22.1).
- Daily estimated infections in the **reduced vaccine hesitancy scenario** will decline to 650 by July 1, 2022 (Figure 22.1).
- Daily estimated infections in the **third dose scenario** will decline to 420 by July 1, 2022 (Figure 22.1).

Cases

- Daily estimated cases in the **reference scenario** will decline to 50 by July 1, 2022 (Figure 22.2).
- Daily estimated cases in the **80% mask use scenario** will decline to 10 by July 1, 2022 (Figure 22.2).
- Daily estimated cases in the **third dose scenario** will decline to 30 by July 1, 2022 (Figure 22.2).

Hospitalizations

- Daily hospital census in the **reference scenario** will decline to 40 by July 1, 2022 (Figure 22.3).
- Daily hospital census in the **80% mask use scenario** will decline to 10 by July 1, 2022 (Figure 22.3).
- Daily hospital census in the **third dose scenario** will decline to 30 by July 1, 2022 (Figure 22.3).

Deaths

- In our **reference scenario**, our model projects 116,000 cumulative reported deaths due to COVID-19 on July 1. This represents 910 additional deaths from March 14 to July 1. Daily reported COVID-19 deaths in the **reference scenario** will decline to zero by July 1, 2022 (Figure 22.4).
- Under our **reference scenario**, our model projects 177,000 cumulative total deaths due to COVID-19 on July 1. This represents 1,400 additional deaths from March 14 to July 1 (Figure 22.5).
- In our **80% mask use scenario**, our model projects 116,000 cumulative reported deaths due to COVID-19 on July 1. This represents 860 additional deaths from March 14 to July 1. Daily reported COVID-19 deaths in the **80% mask use scenario** will decline to zero by July 1, 2022 (Figure 22.4).
- In our **third dose scenario**, our model projects 116,000 cumulative reported deaths due to COVID-19 on July 1. This represents 860 additional deaths from March 14 to July 1. Daily reported COVID-19 deaths in the **third dose scenario** will decline to zero by July 1, 2022 (Figure 22.4).
- Figure 23.1 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.
- At some point from March through July 1, two countries will have high or extreme stress on hospital beds (Figure 24.1). At some point from March through July 1, 19 countries will have high or extreme stress on intensive care unit (ICU) capacity (Figure 25.1).

Model updates

We had previously developed a model in which deaths and the infection-fatality ratio, hospital admissions and the infection-hospitalization ratio, and cases and the infection-detection ratio were all passed into a single run of our ODE system to simultaneously fit past transmission intensity for a given location over time. We have seen improved stability when instead we first derive transmission intensity based on each of the three abovementioned pairs of daily reported epi statistics and estimated ratios in separate SEIR models and then average them.

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

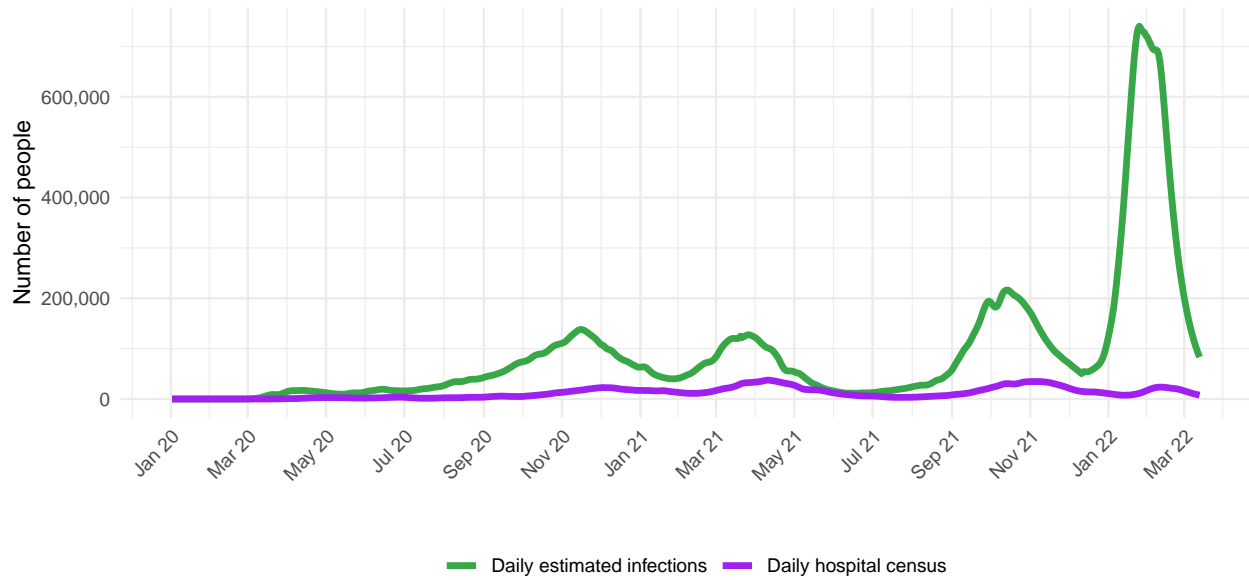


Figure 2.1: Reported daily COVID-19 cases, moving average

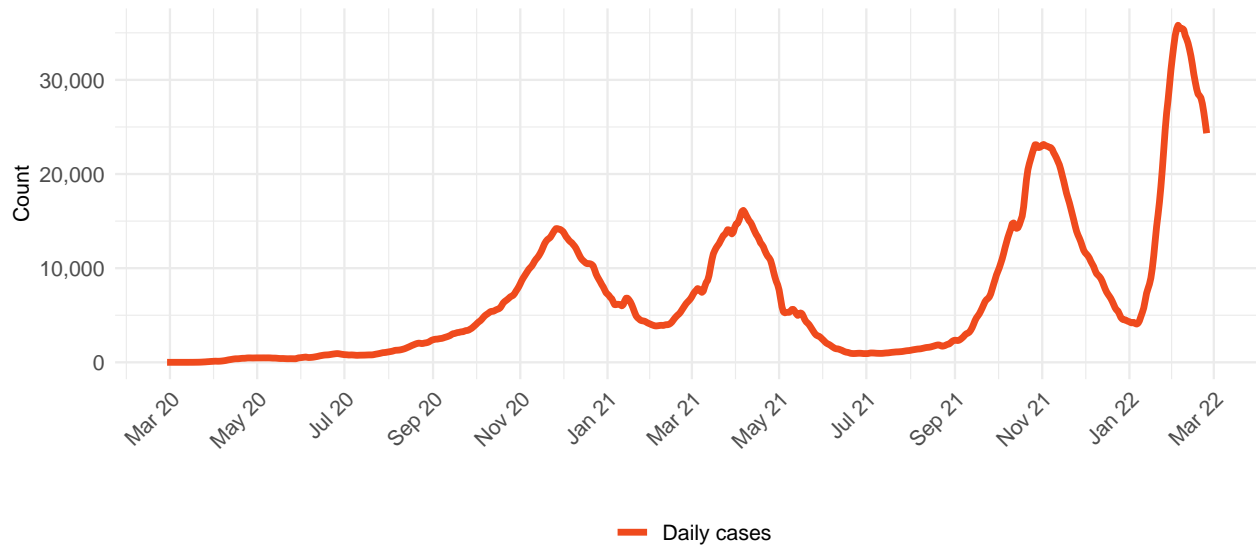
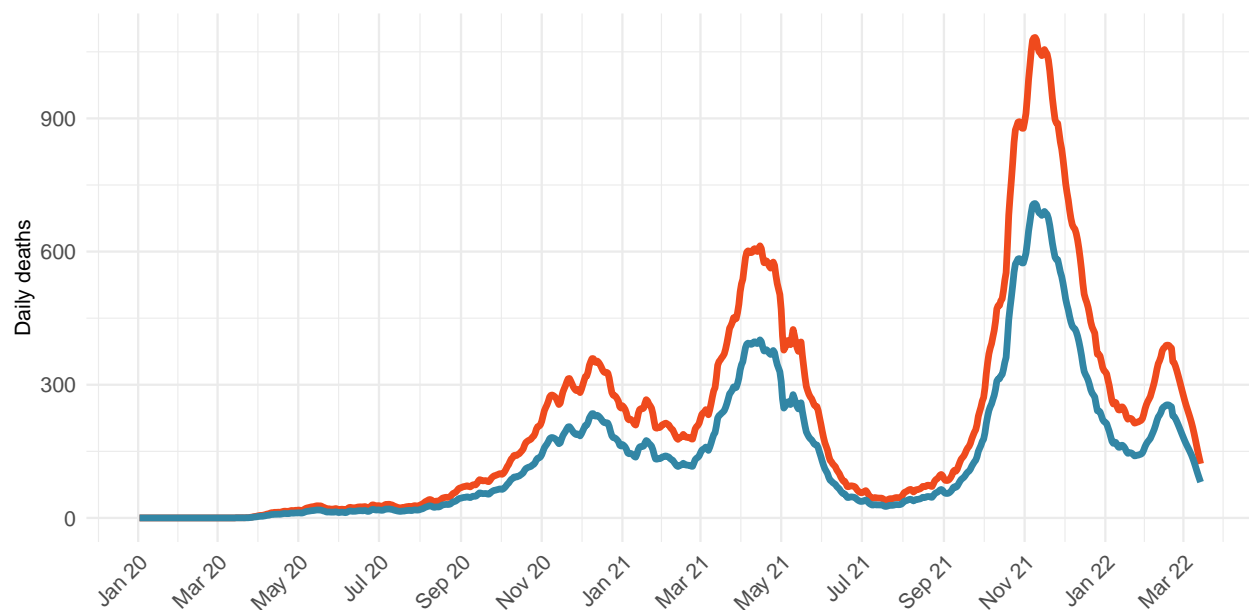


Table 1: Ranking of total deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	6,267	1
Stroke	1,805	2
COVID-19	1,140	3
Cirrhosis and other chronic liver diseases	387	4
Tracheal, bronchus, and lung cancer	327	5
Alzheimer's disease and other dementias	315	6
Cardiomyopathy and myocarditis	295	7
Colon and rectum cancer	280	8
Self-harm	263	9
Chronic obstructive pulmonary disease	218	10

Figure 3.1: Smoothed trend estimate of reported daily COVID-19 deaths (blue) and total daily deaths due to COVID-19 (orange)



Daily COVID-19 death rate per 1 million on March 14, 2022

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

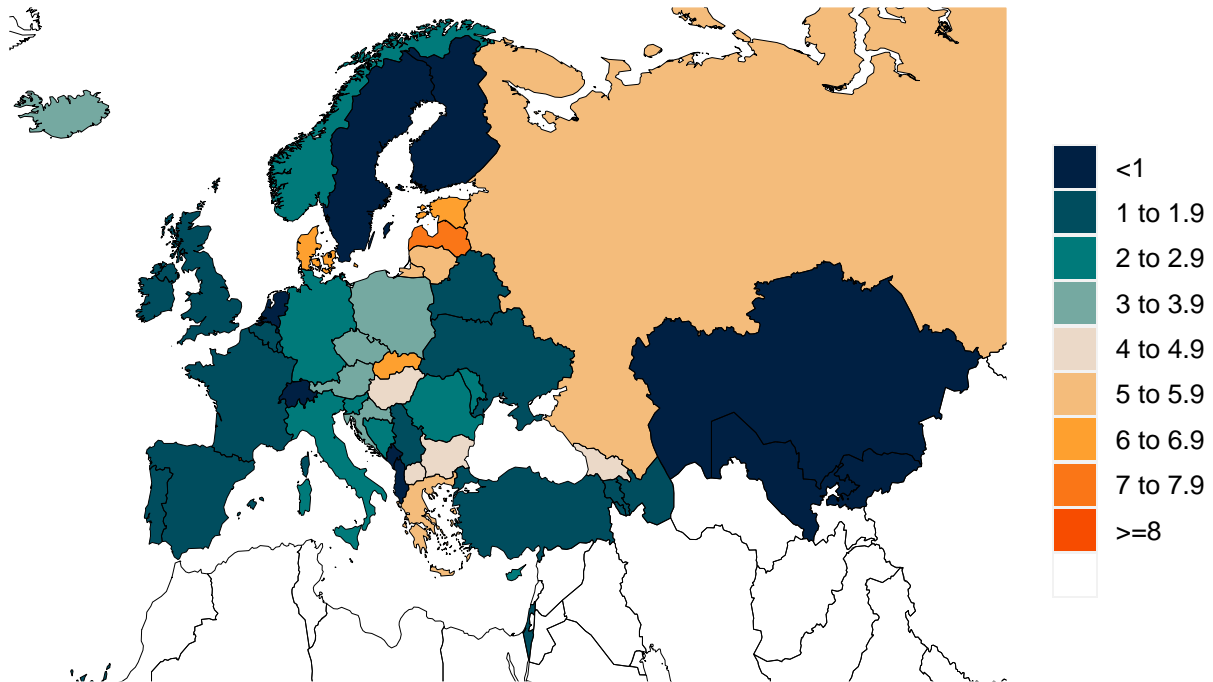
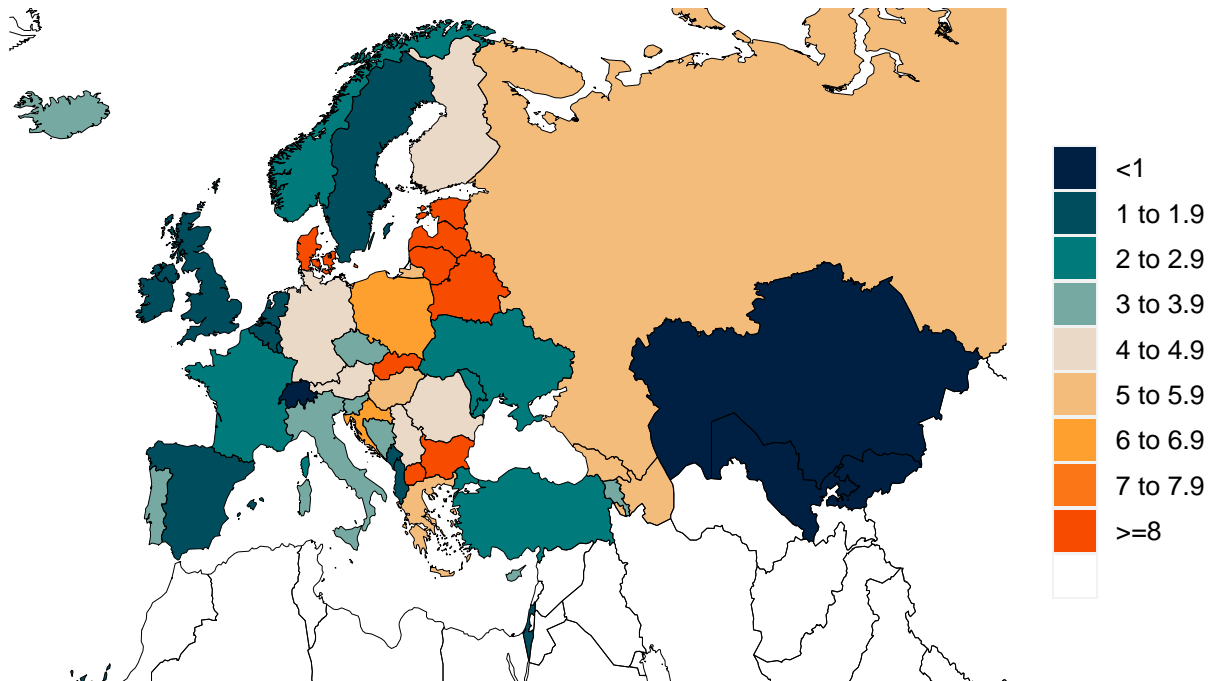


Figure 4.2: Daily total COVID-19 death rate per 1 million



Cumulative COVID-19 deaths per 100,000 on March 14, 2022

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

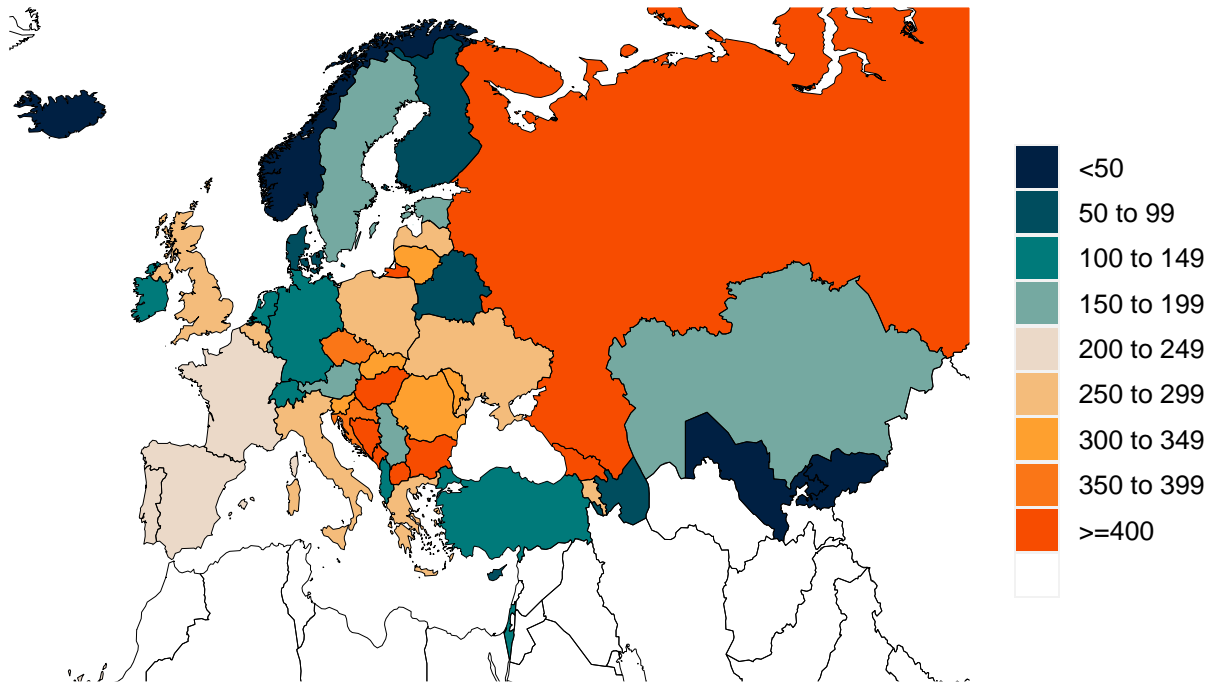


Figure 5.2: Total cumulative COVID-19 deaths per 100,000

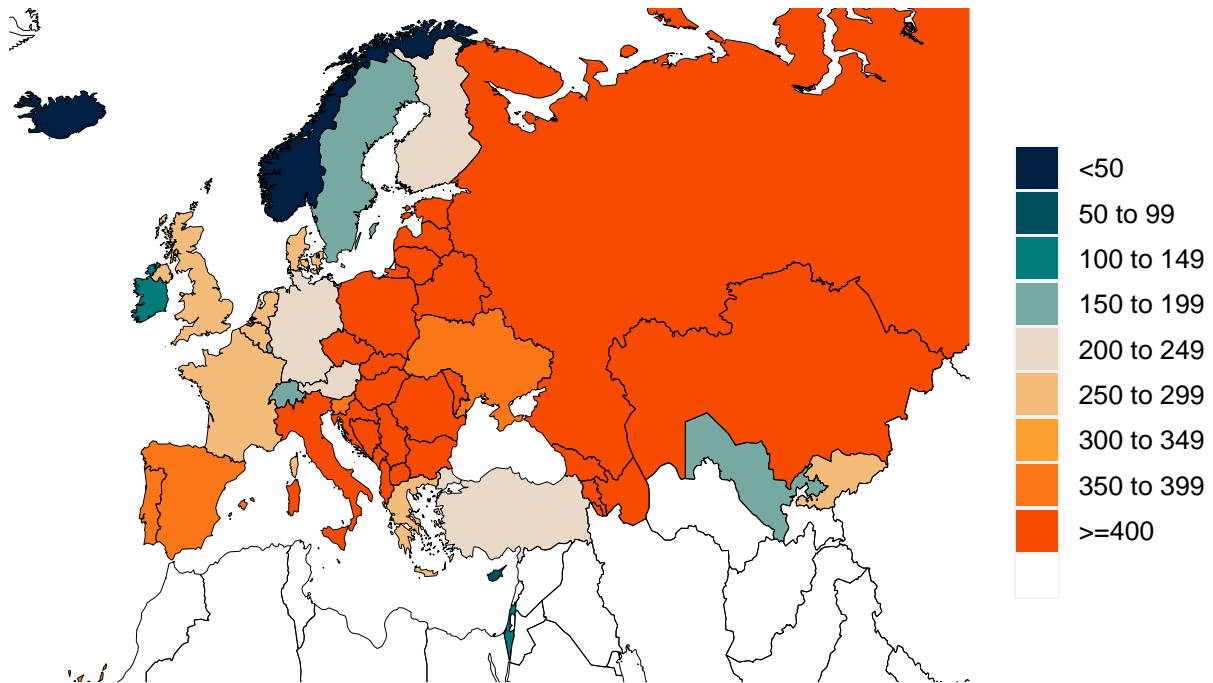


Figure 6.1: Estimated percent of the population infected with COVID-19 on March 14, 2022

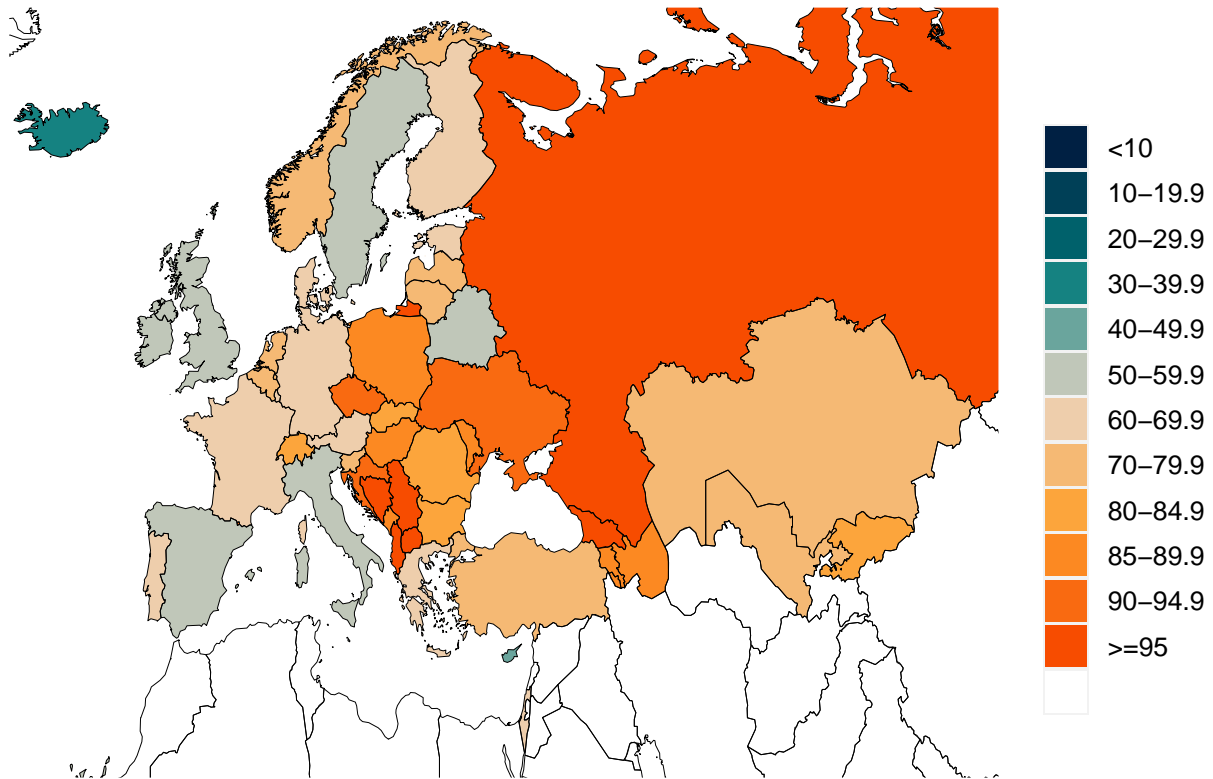


Figure 7.1: Mean effective R on March 3, 2022. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.

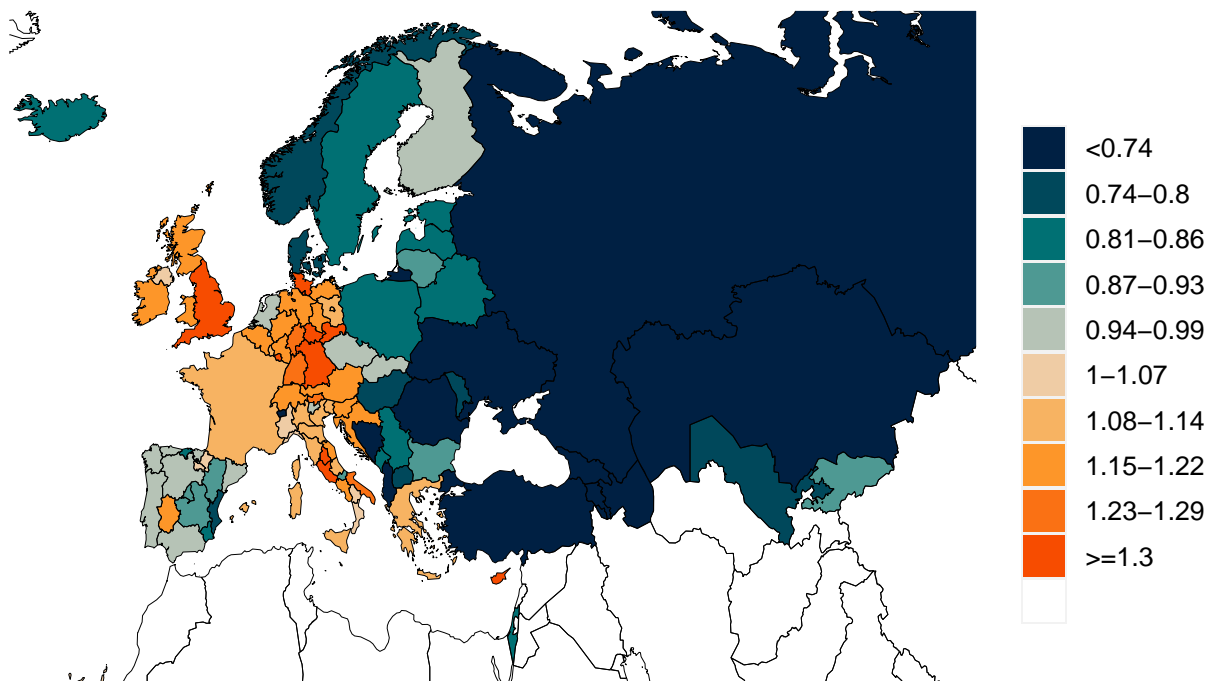
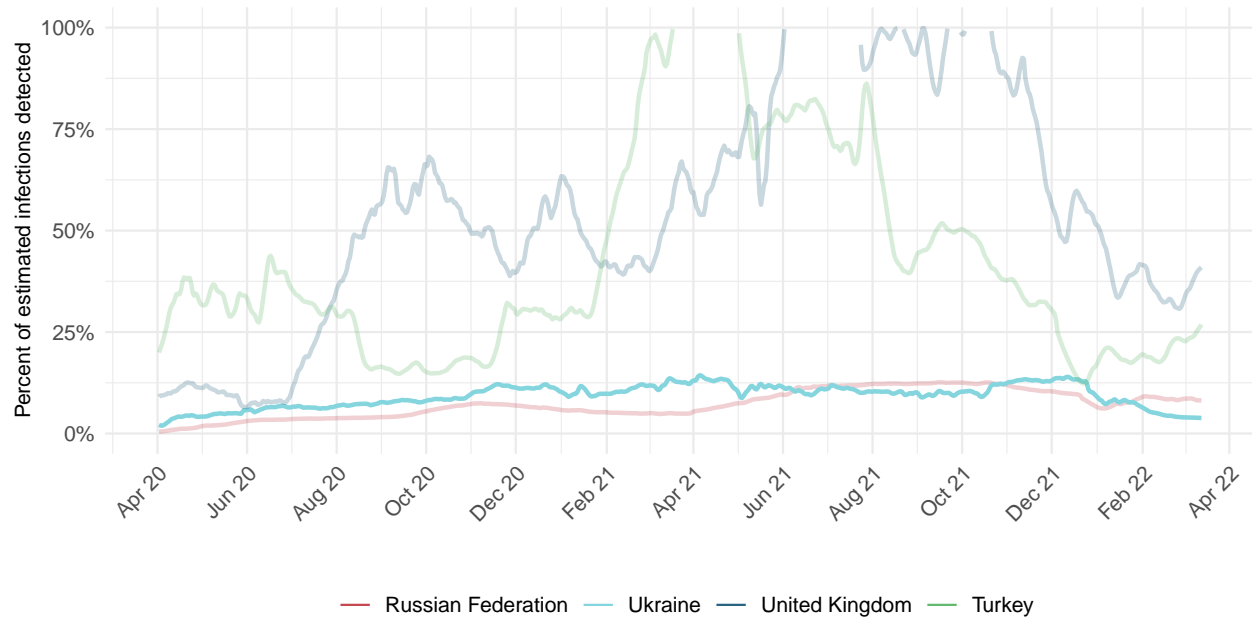


Figure 8.1: Percent of estimated COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed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



Estimated percent of circulating SARS-CoV-2 for primary variant families on March 14, 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

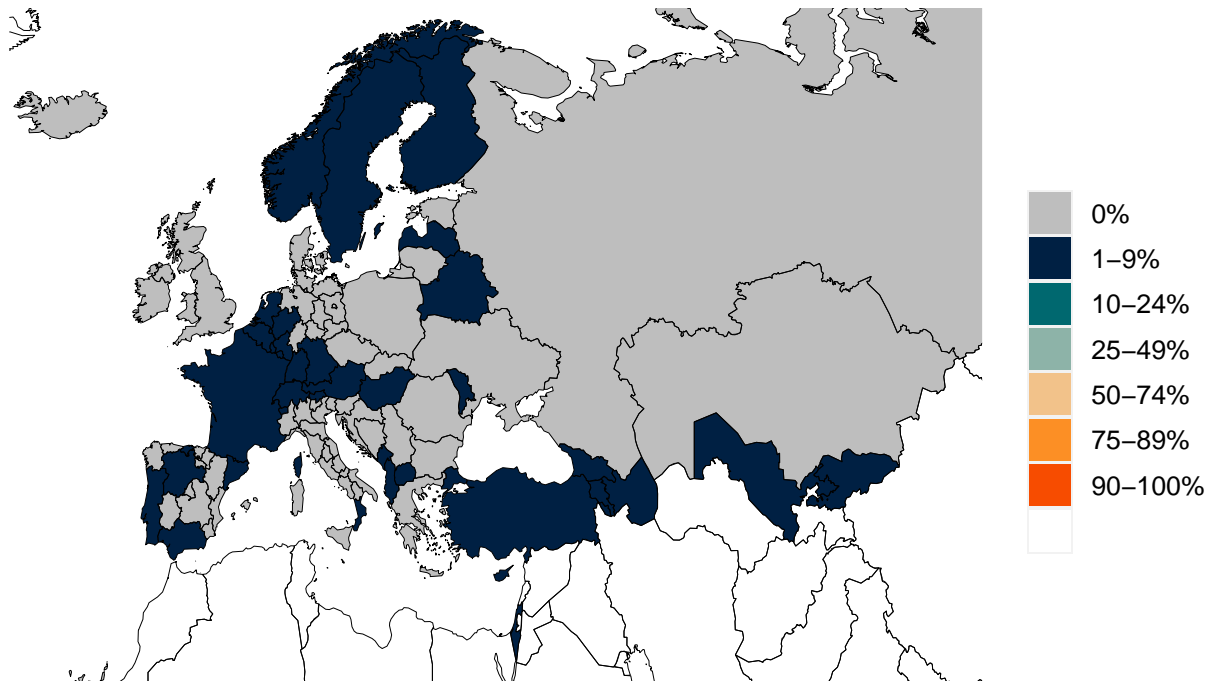


Figure 9.3: Estimated percent of new infections that are Delta variant

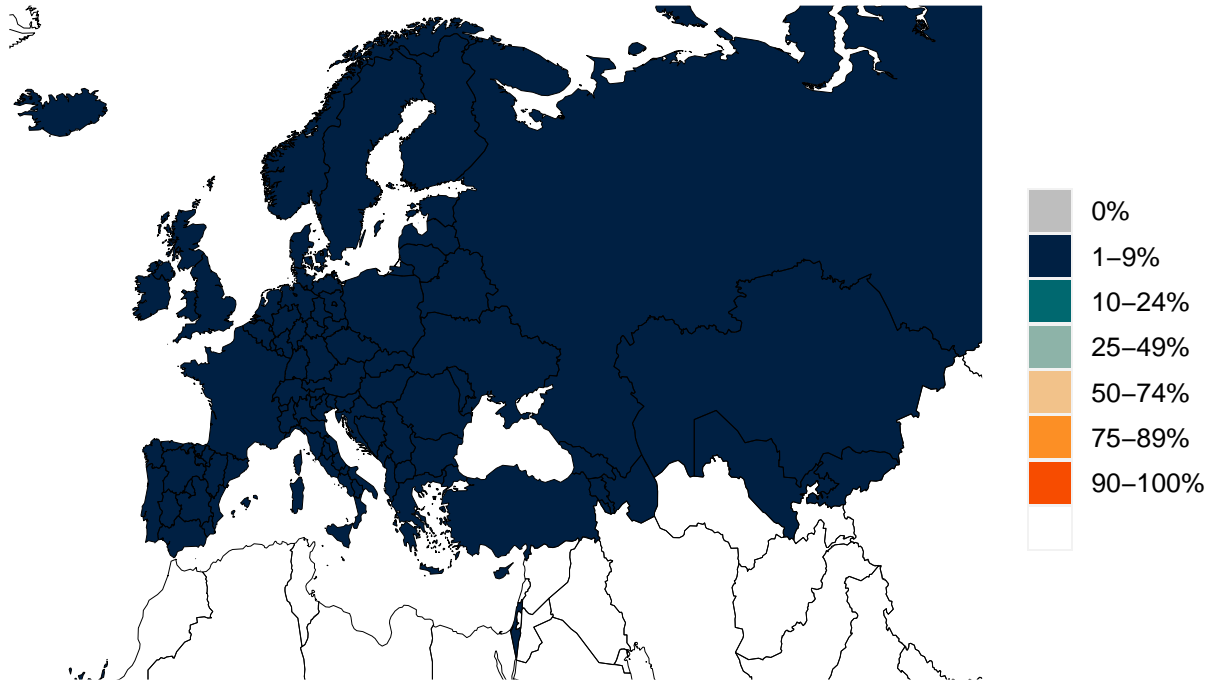


Figure 9.4: Estimated percent of new infections that are Gamma variant

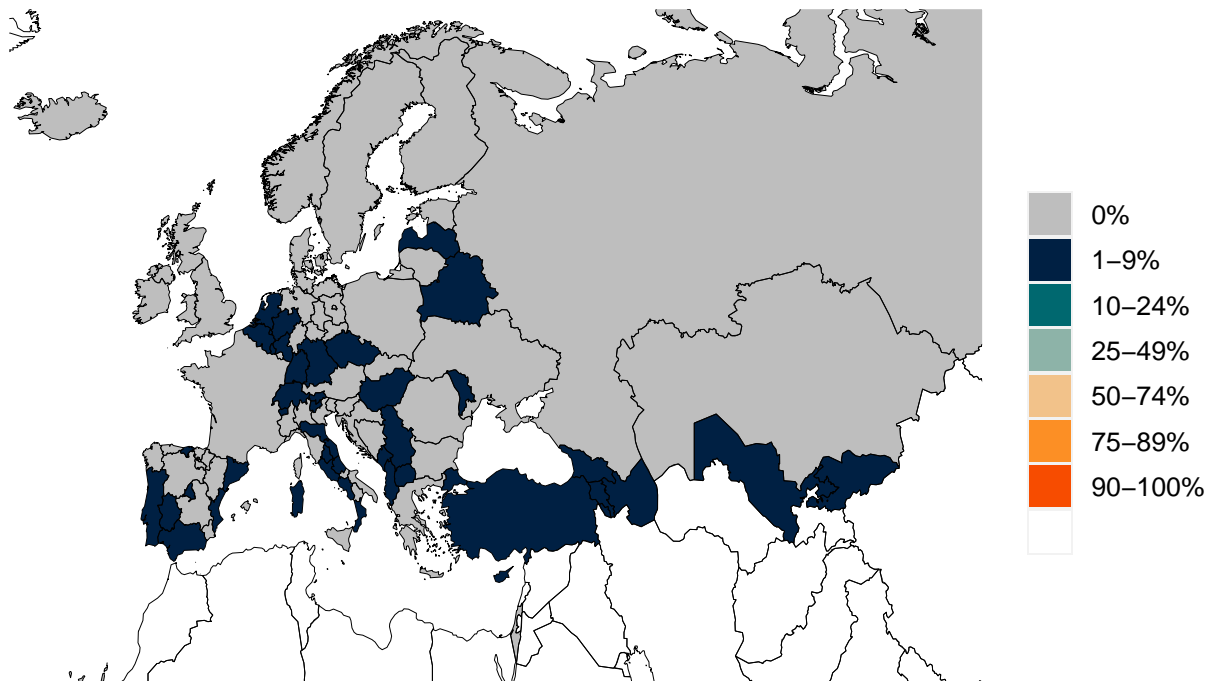


Figure 9.5: Estimated percent of new infections that are Omicron variant

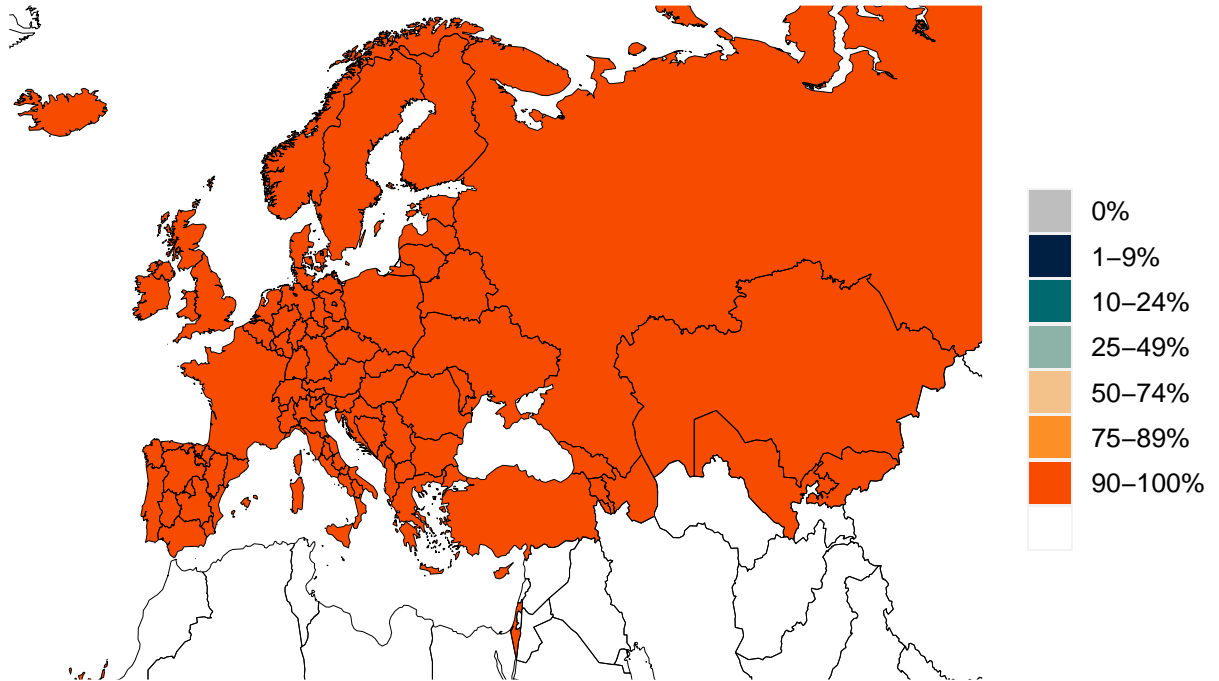
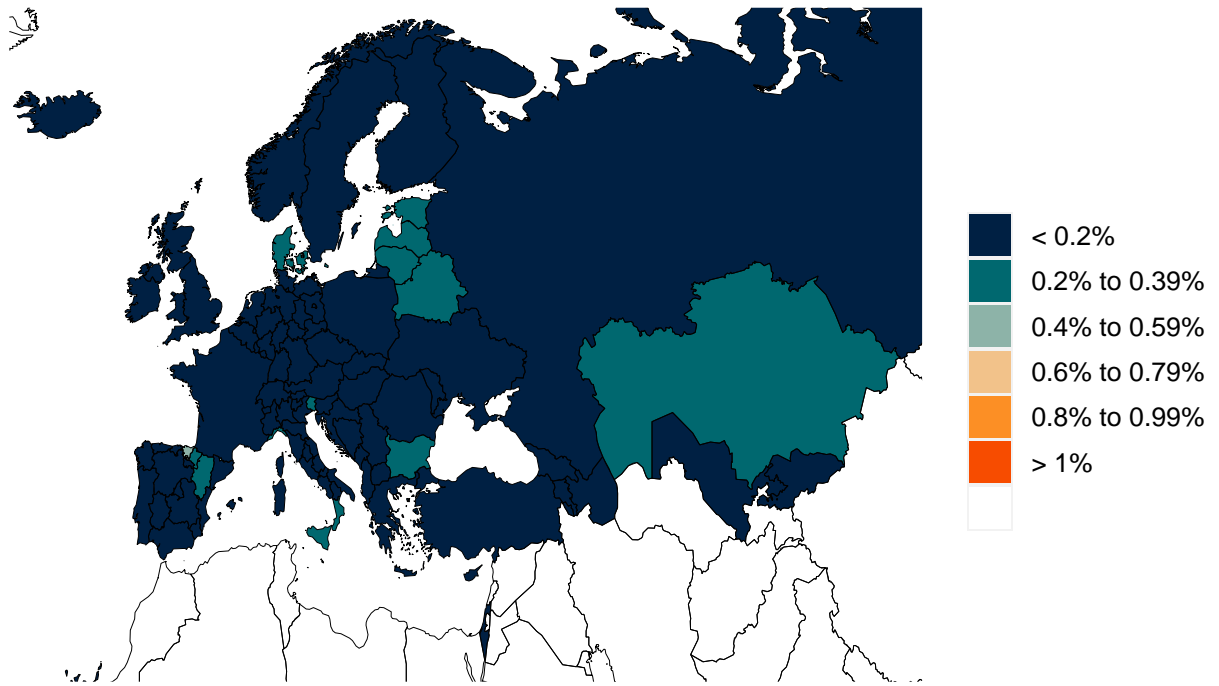
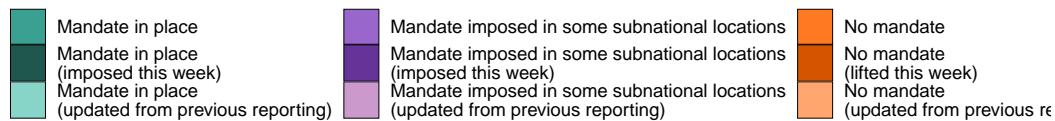
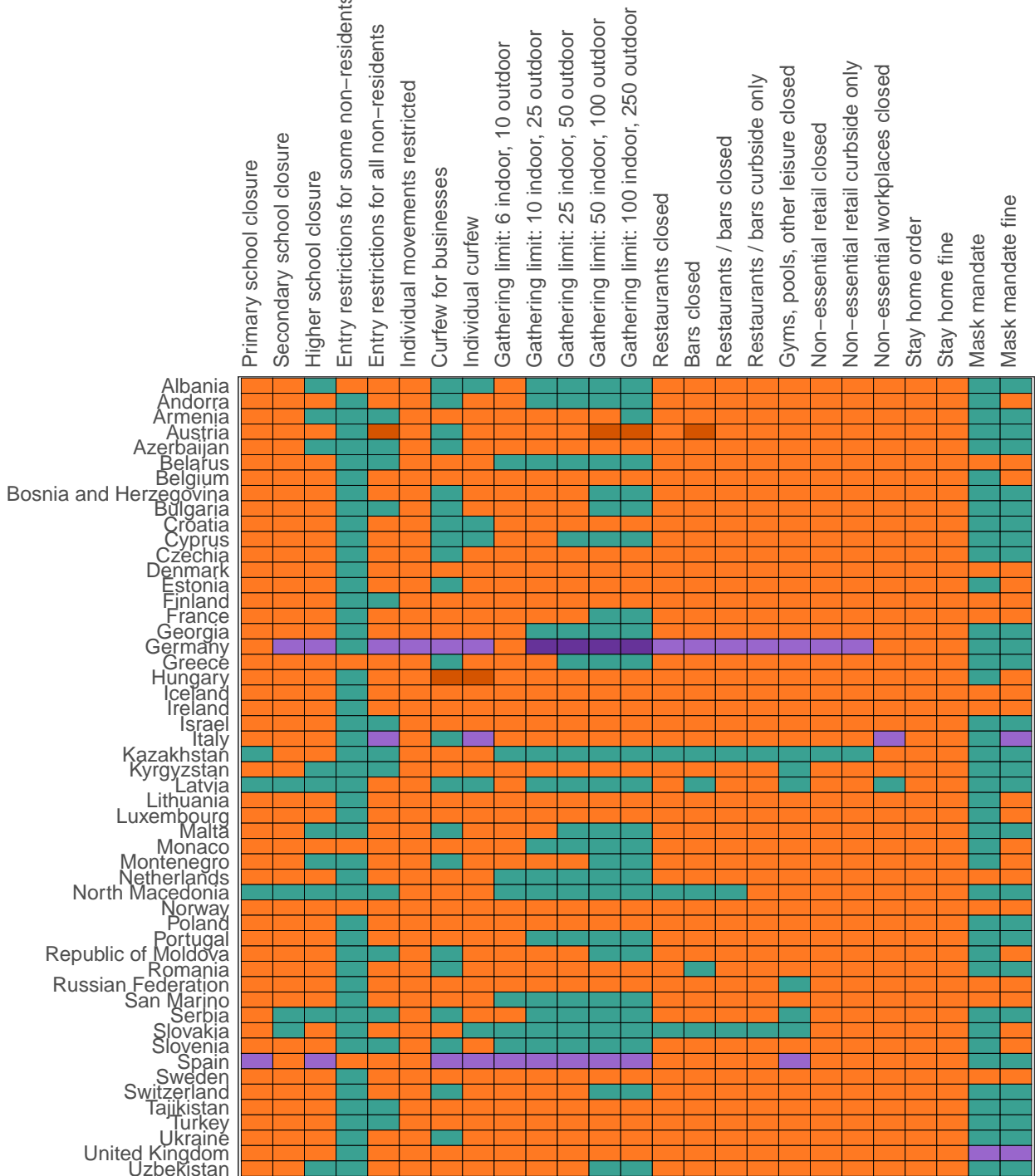


Figure 10.1: Infection-fatality rate on March 14, 2022. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.



Critical drivers

Table 2: Current mandate implementation



*Not all locations are measured at the subnational level.

Figure 11.1: Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

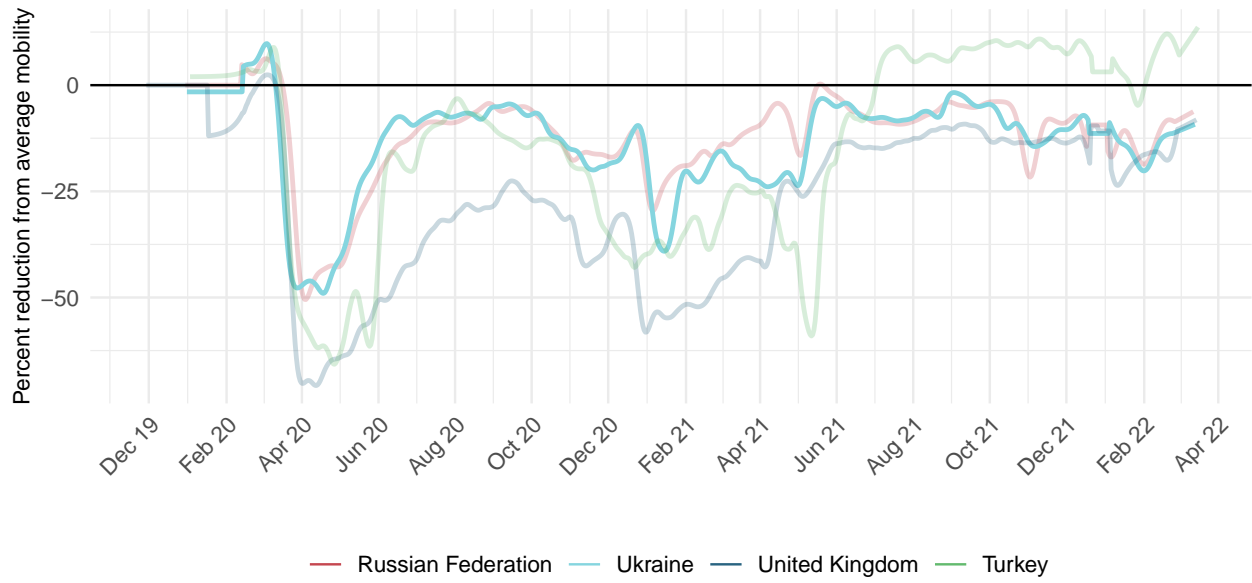


Figure 12.1: Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on March 14, 2022

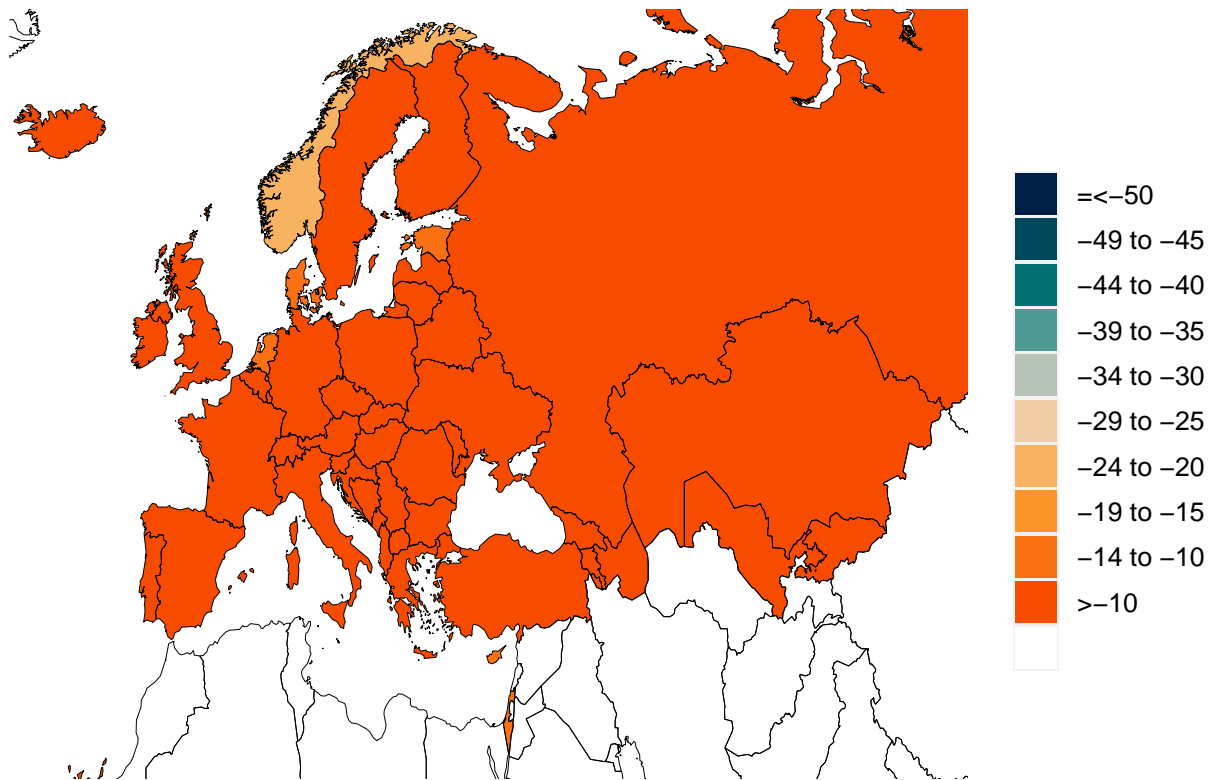


Figure 13.1: Trend in the proportion of the population reporting always wearing a mask when leaving home

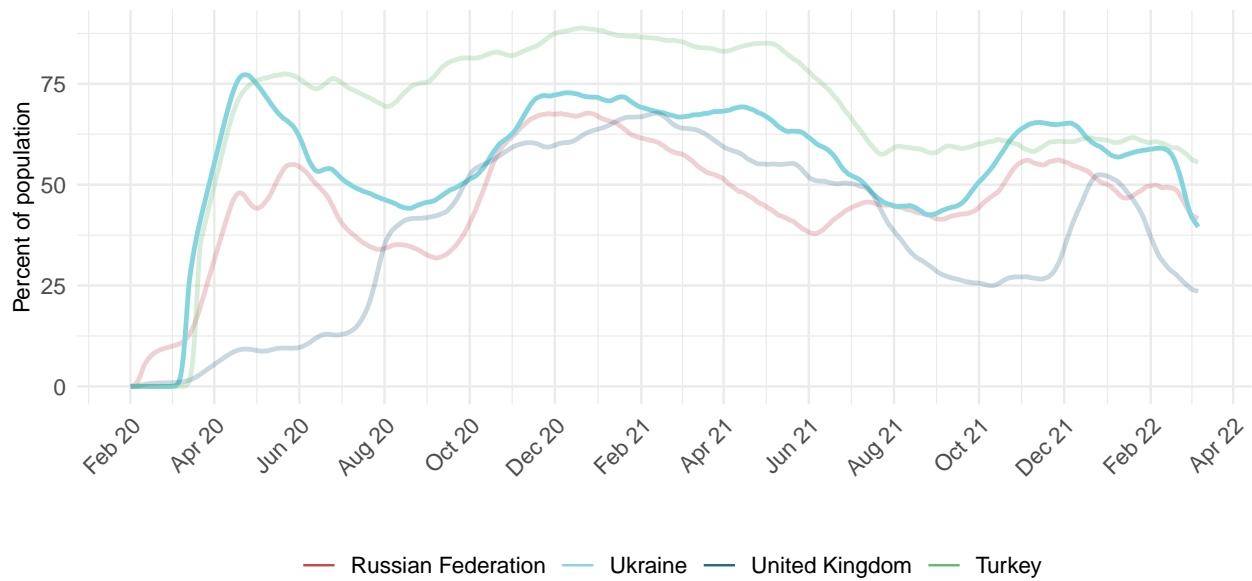


Figure 14.1: Proportion of the population reporting always wearing a mask when leaving home on March 14, 2022

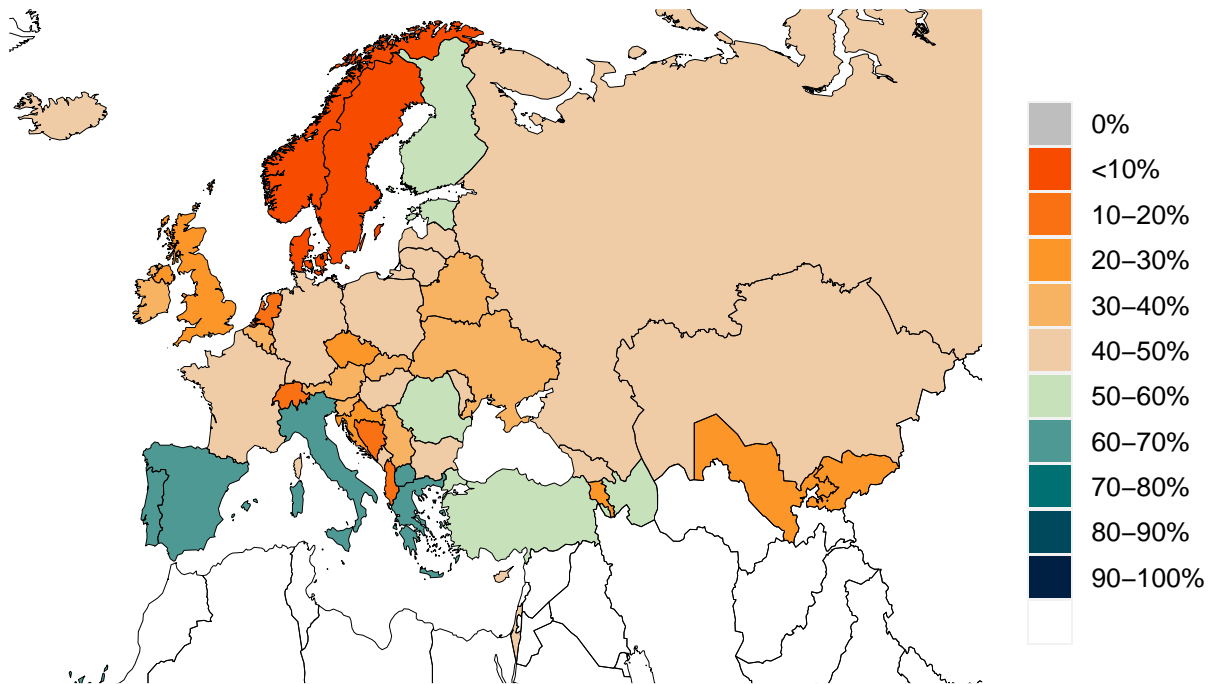


Figure 15.1: Trend in COVID-19 diagnostic tests per 100,000 people

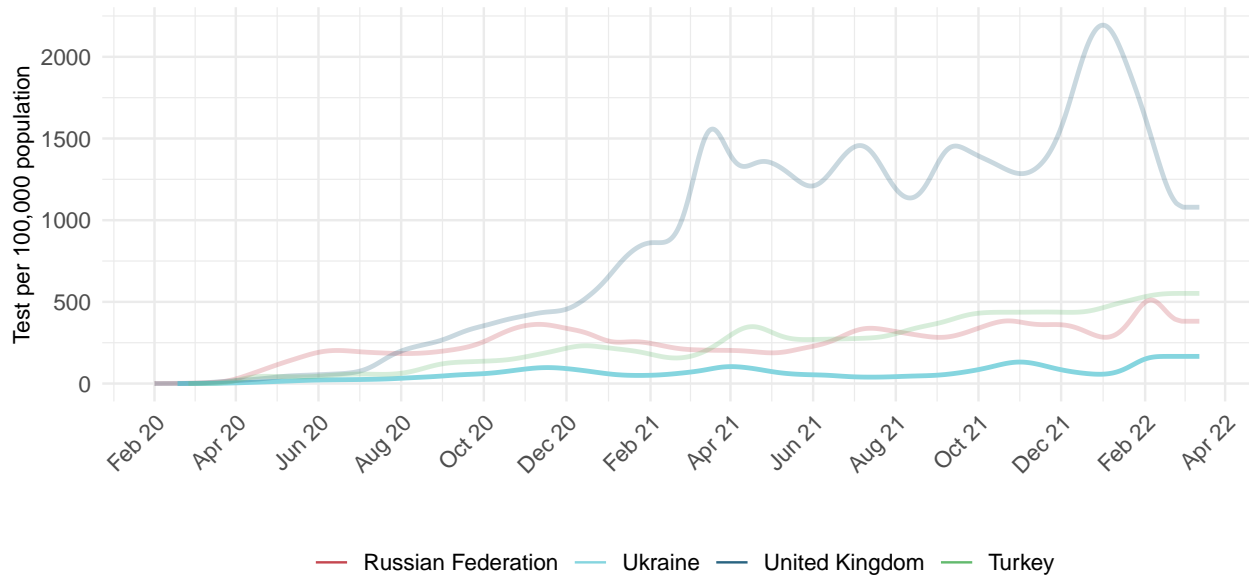


Figure 16.1: COVID-19 diagnostic tests per 100,000 people on March 14, 2022

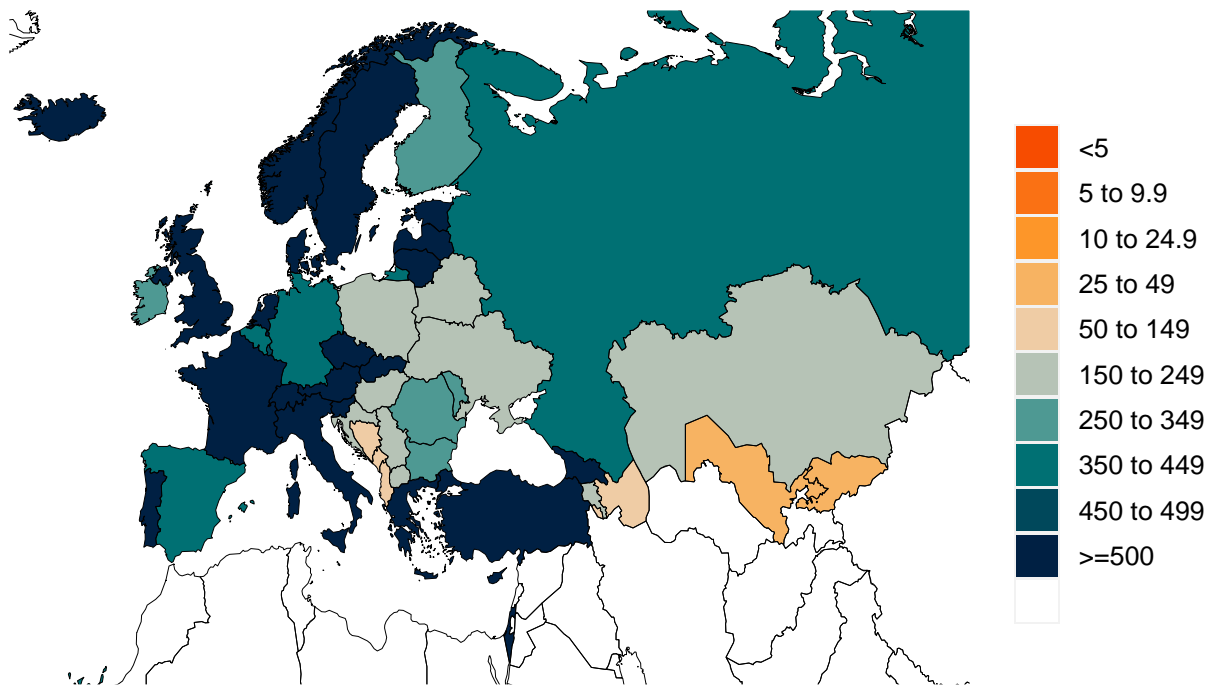


Table 3: Estimates of vaccine effectiveness for specific vaccines used in the model at preventing severe disease and infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our [website](#).

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

Percent of the population having received at least one dose (17.1) and fully vaccinated against SARS-CoV-2 (17.2) by March 14, 2022

Figure 17.1: Percent of the population having received one dose of a COVID-19 vaccine

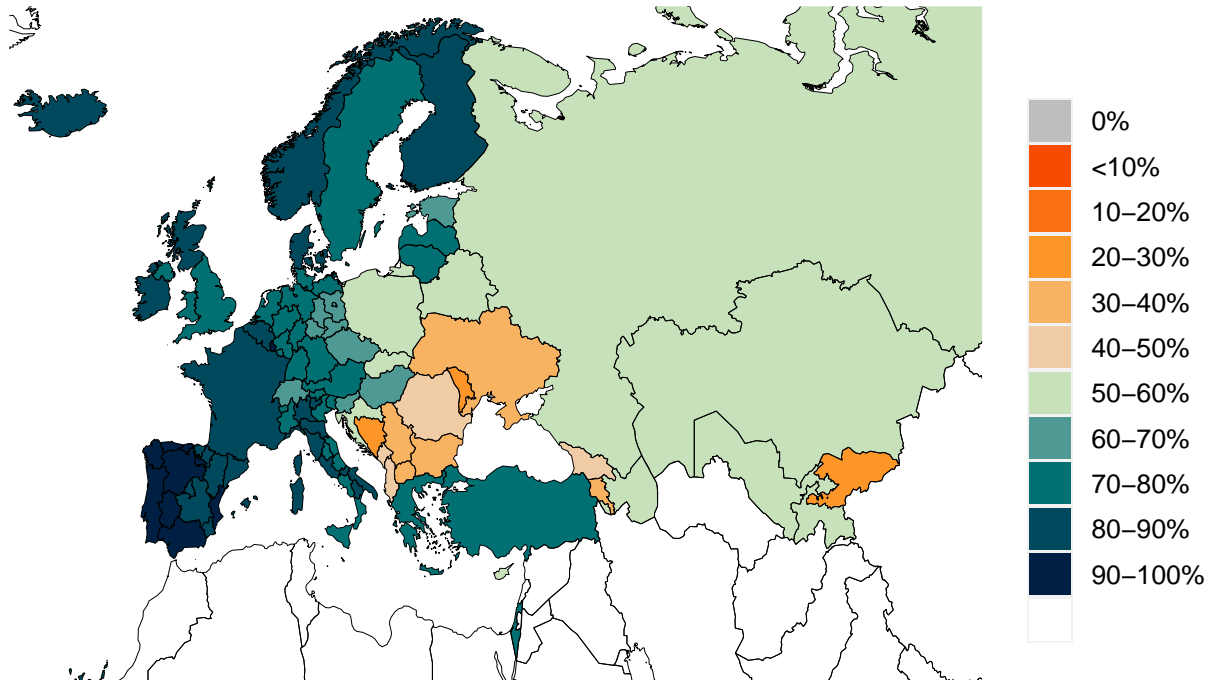


Figure 17.2: Percent of the population fully vaccinated against SARS-CoV-2

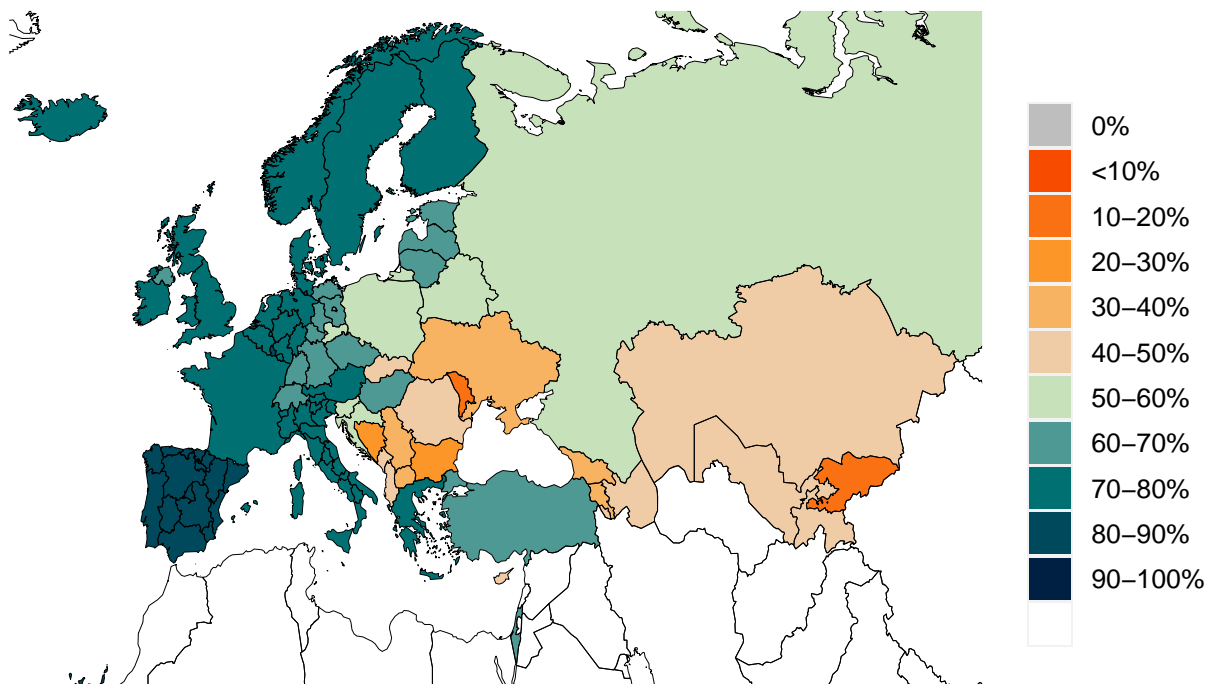


Figure 18.1: Trend in the estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

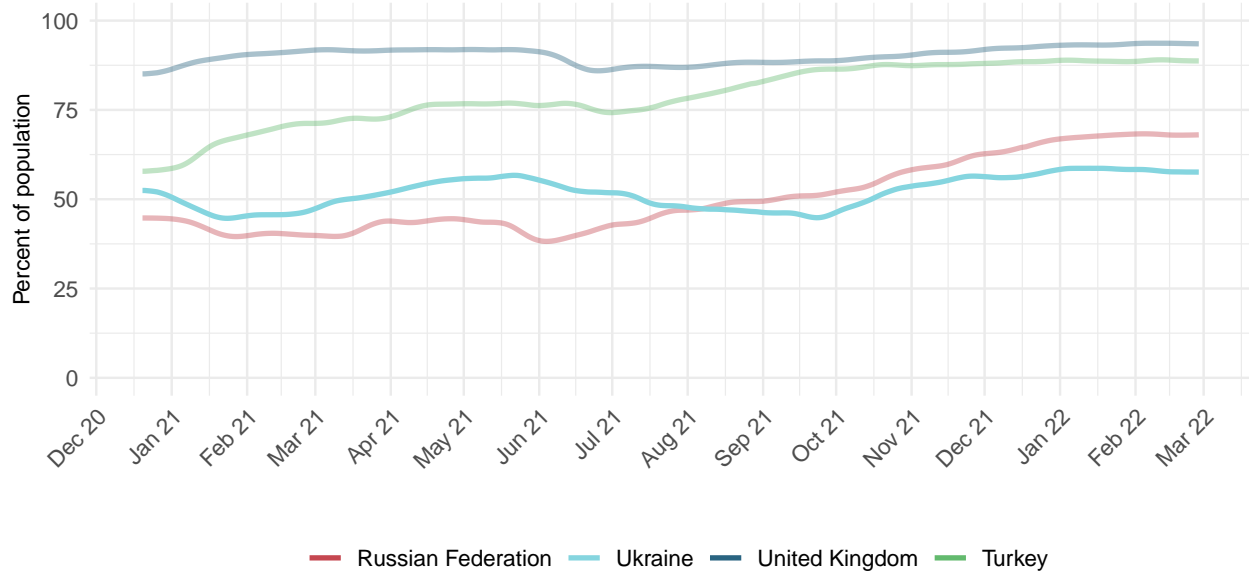


Figure 19.1: Estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

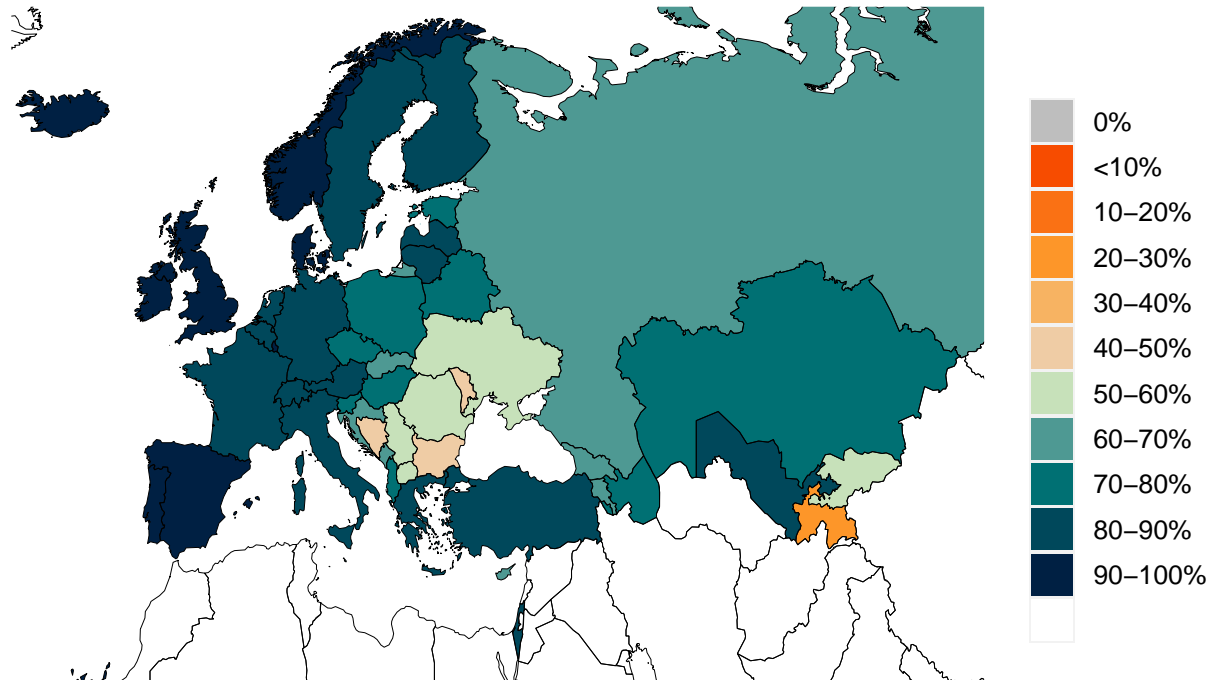


Figure 20.1: Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated

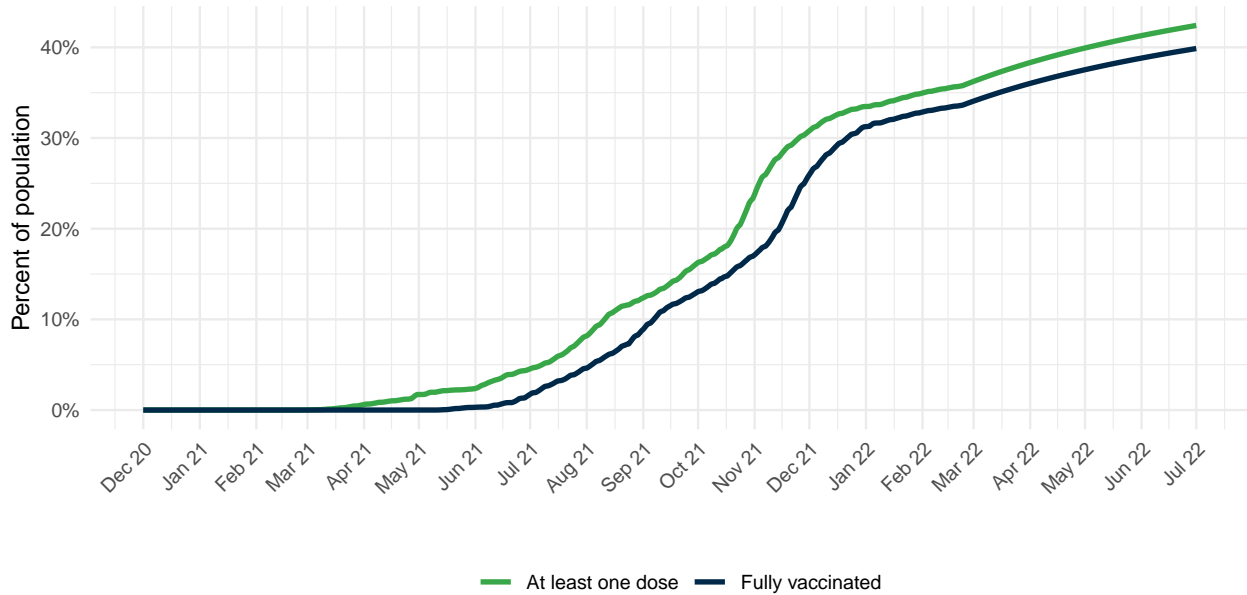
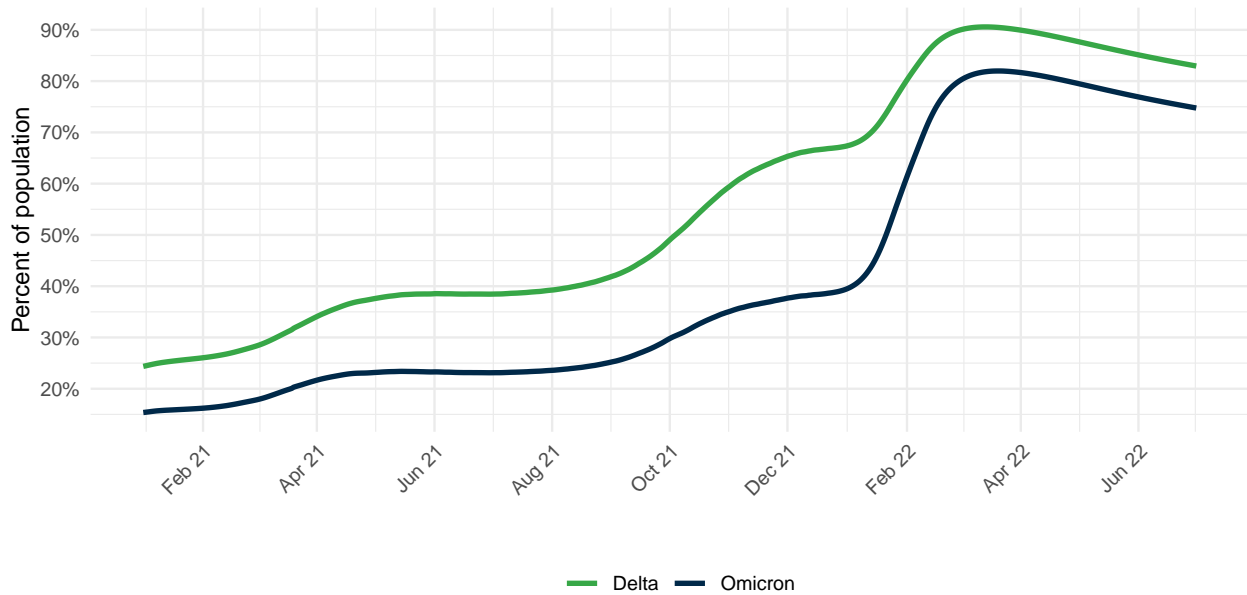


Figure 21.1: Percent of people who are immune to Delta or Omicron. Immunity is based on protection due to prior vaccination and infection(s). Moreover, variant-specific immunity is also based on variant-variant specific protection.



Projections and scenarios

Figure 22.1: Daily COVID-19 infections until July 01, 2022 for three scenarios

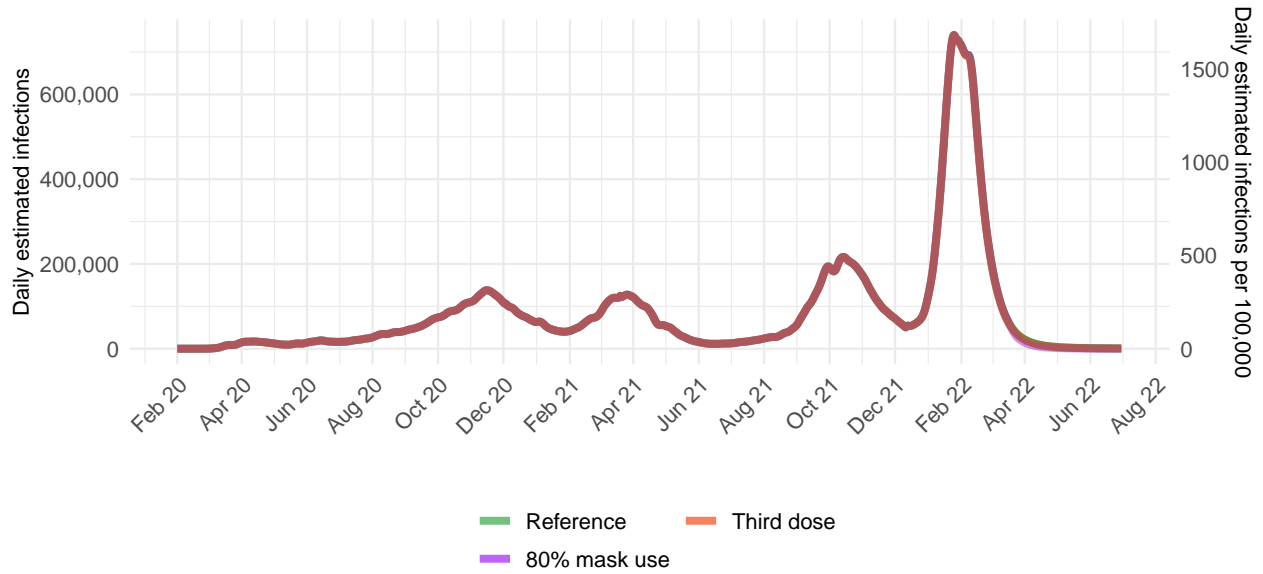


Figure 22.2: Daily COVID-19 reported cases until July 01, 2022 for three scenarios

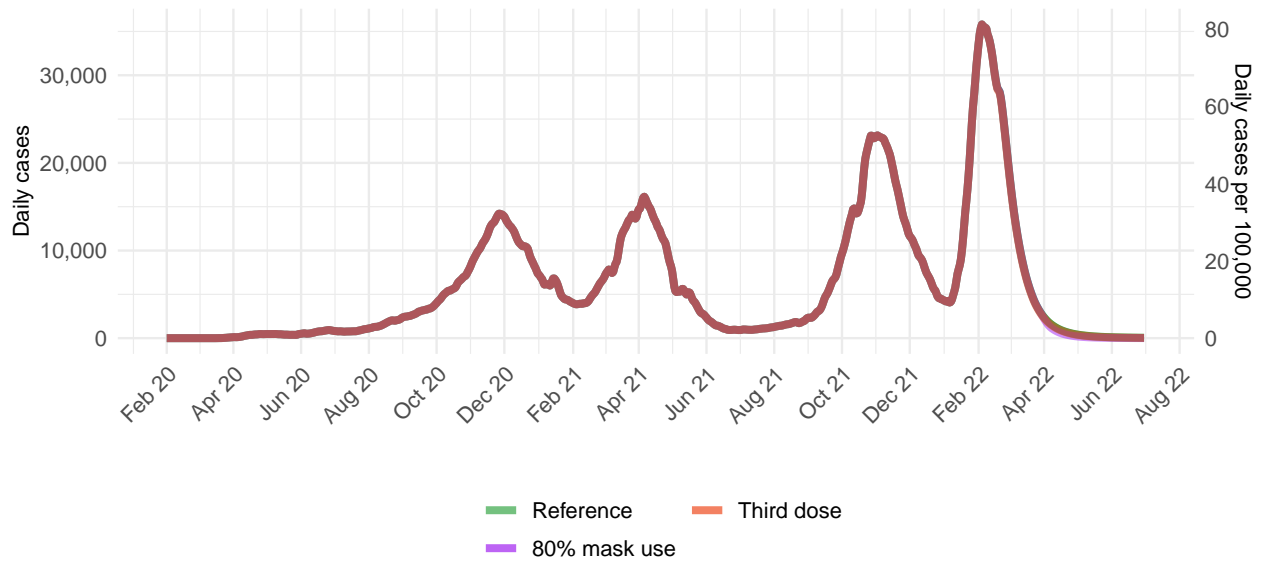


Figure 22.3: Daily COVID-19 hospital census until July 01, 2022 for three scenarios

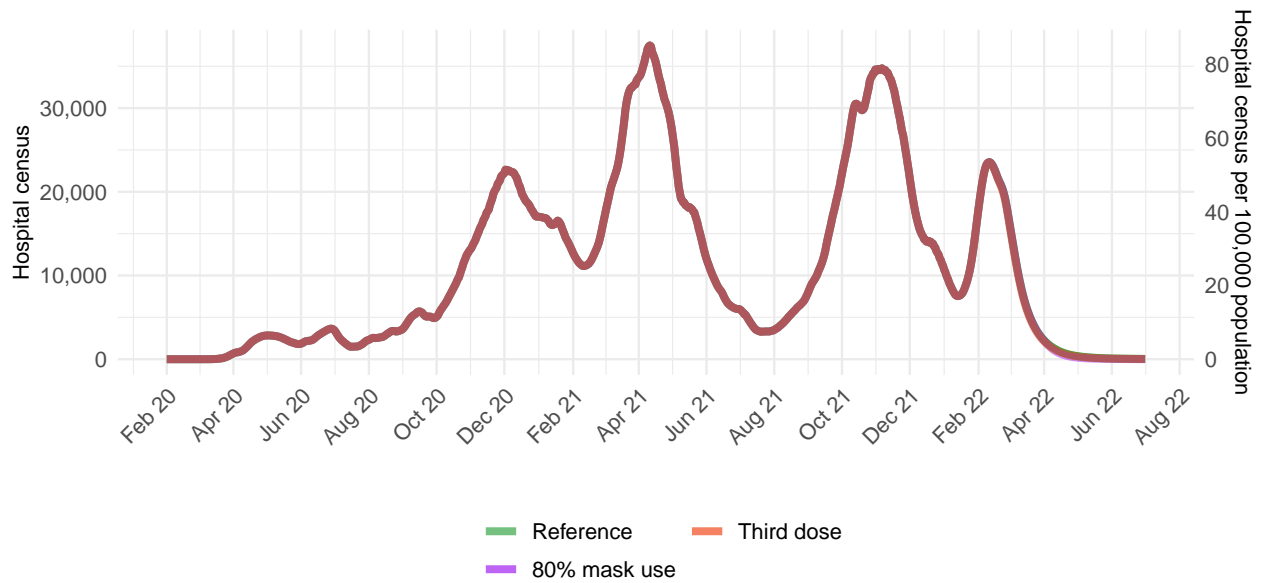


Figure 22.4: Reported daily COVID-19 deaths per 100,000

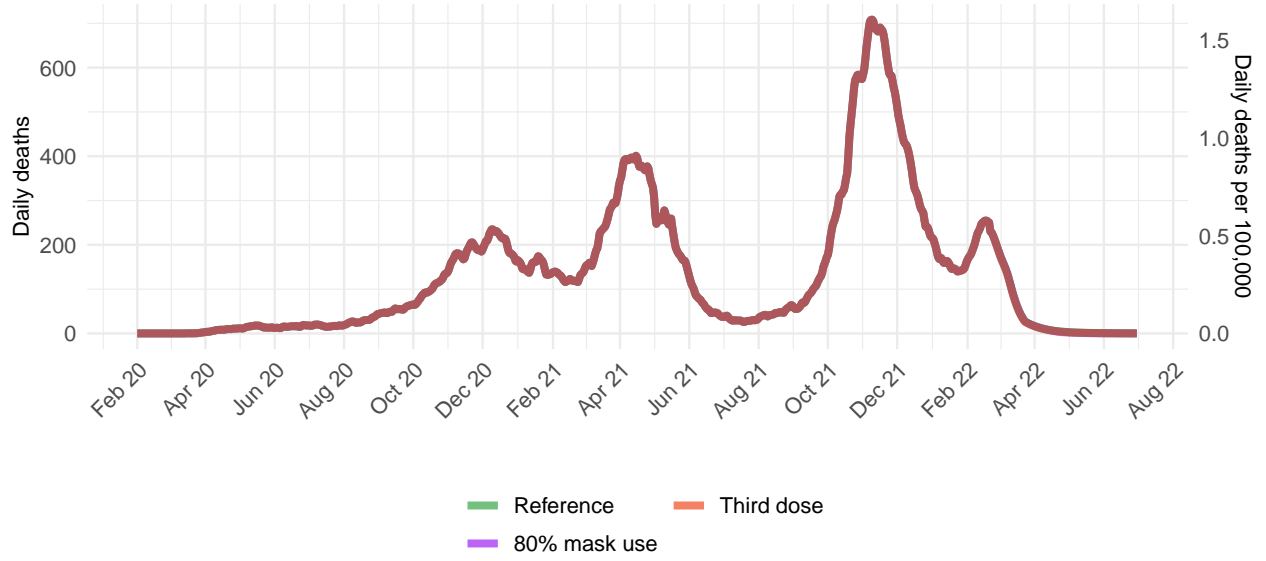


Figure 22.5: Total daily COVID-19 deaths per 100,000

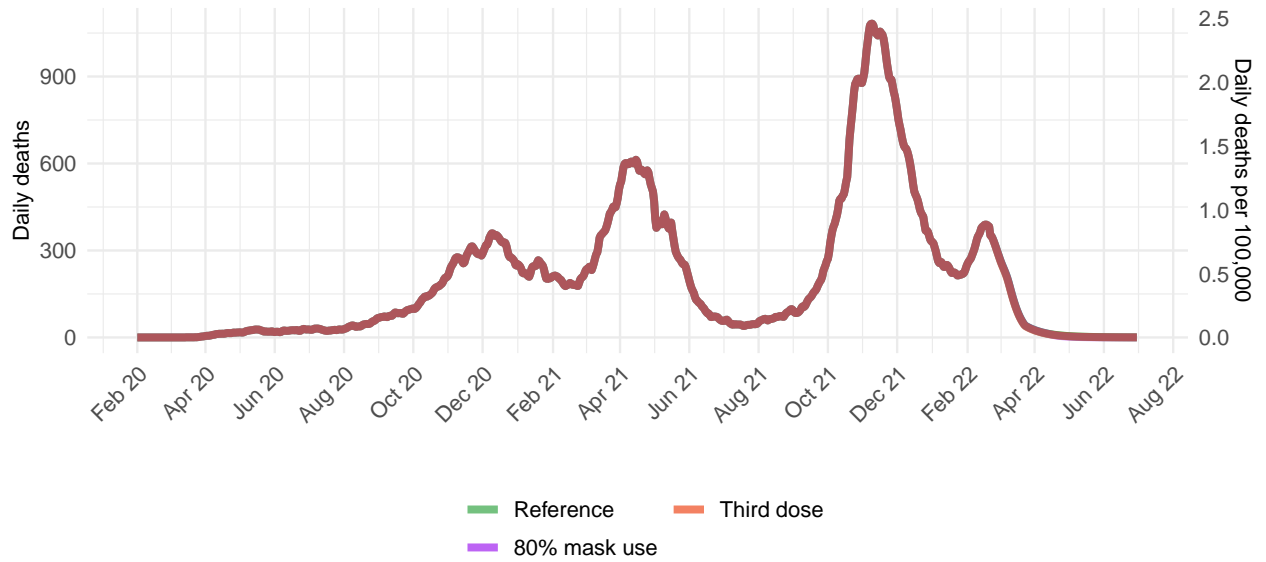


Figure 23.1: Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available, last model update in brackets: Delphi from the Massachusetts Institute of Technology ([Delphi](#)) [March 20, 2022], Imperial College London ([Imperial](#)) [January 20, 2022], the SI-KJalpha model from the University of Southern California ([SIKJalpha](#)) [March 20, 2022]. Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from available locations in that region.

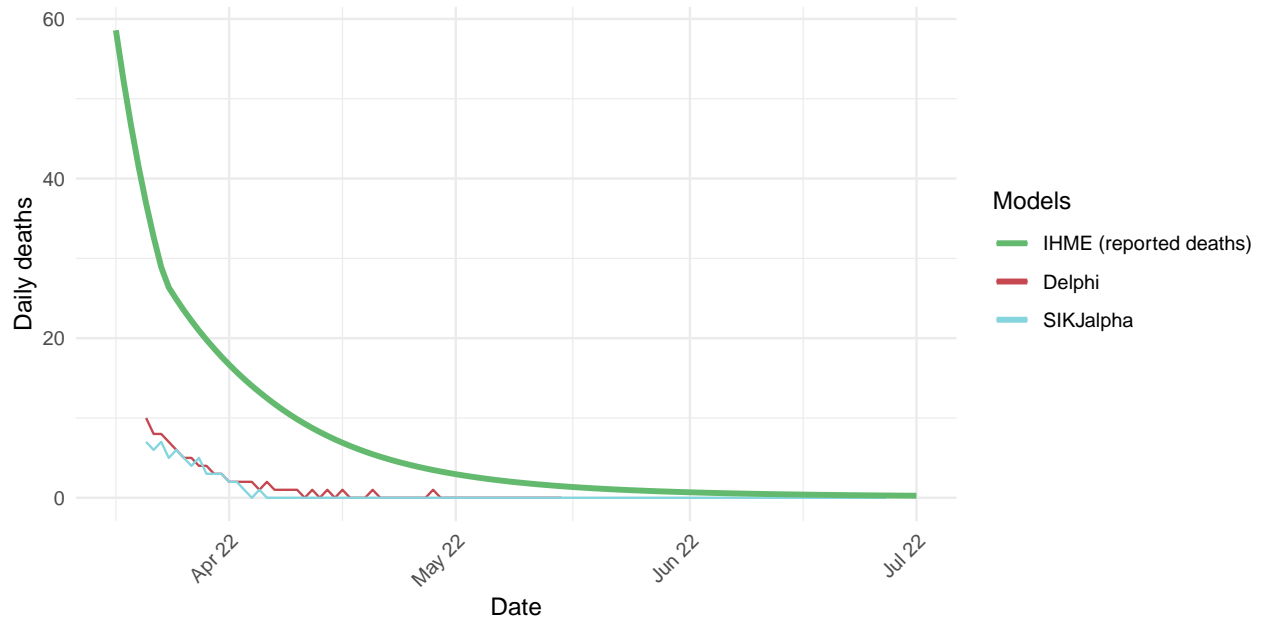


Figure 24.1: The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and 20% or greater is considered *extreme stress*.



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>.