COVID-19 Results Briefing

The European Union

September 22, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in the European Union. The model was run on September 21, 2021, with data through September 20, 2021.

Delta surges have peaked and are declining in many countries in the western parts of the EU. A block of countries from Germany to the Baltics and south to Bulgaria have increasing transmission. Levels of immunity against the Delta variant are a function of vaccination and past levels of infection; the gradients in these are opposite, with higher vaccination in the western parts of the EU and higher past infection rates in the eastern parts. In our reference forecast, we expect that daily infections will begin increasing in mid-October and rise steadily toward the end of the year due to seasonality combined with sufficient susceptible individuals remaining in most countries to sustain transmission. Given levels of likely immunity, we expect increases in the western parts of the EU in the winter to be larger than in the member states in the eastern part. Given the higher infection-detection rate in the west of the EU, this suggests that daily reported cases may increase proportionately more than infections during the fall and winter. Given that levels of immunity keep increasing due to both vaccination and the ongoing Delta infections, the effect of reducing transmission through increased mask use in the region can be very substantial. We estimate that increased mask use above the current level of 43% could save 82,000 lives by the end of the year. The major factors that can influence the trajectory of the epidemic this fall and winter include the extent of waning of vaccine-derived and natural immunity both for infection and for hospitalization and death, the emergence of new variants with substantial immune escape, and the extent to which behavioral mitigation continues through mask use and avoiding gatherings, particularly for the unvaccinated. We continue to expect the combined impact of COVID-19 and flu on hospitals this winter.

Current situation

- Daily infections in the last week increased to 190,700 per day on average compared to 159,000 the week before (Figure 1).

- Daily hospital census in the last week (through September 20) increased to 51,300 per day on average compared to 49,600 the week before.

- Daily reported cases in the last week increased to 55,000 per day on average compared to 53,800 the week before (Figure 2).

- Reported deaths due to COVID-19 in the last week increased slightly to 520 per day on average compared to 490 the week before (Figure 3).

- Excess deaths due to COVID-19 in the last week increased to 1,100 per day on average compared to 960 the week before (Figure 3). **This makes COVID-19 the number 3 cause of death in the European Union this week** (Table 1). Estimated excess daily deaths due to COVID-19 in the past week were 2.1 times larger than the reported number of deaths.

- The daily reported COVID-19 death rate is greater than 4 per million in Bulgaria, Lithuania, and Romania (Figure 4).

- The daily rate of excess deaths due to COVID-19 is greater than 4 per million in Bulgaria, Croatia, Estonia, Greece, Latvia, Lithuania, and Romania (Figure 4).

- We estimate that 26% of people in the European Union have been infected as of September 20 (Figure 6).

- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 14 countries as well as several regions in Italy (Figure 7).

- The infection-detection rate in the European Union was close to 37% on September 20 (Figure 8).

- Based on the GISAID and various national databases, combined with our variant spread model, we estimate the current prevalence of variants of concern (Figure 9). Delta is the dominant variant throughout the EU.

Trends in drivers of transmission

- Mobility last week was at the pre-COVID-19 baseline (Figure 11). Mobility was lower than 10% below the pre-COVID-19 baseline in Ireland, Sweden, Portugal, and some regions in Spain. Mobility was near baseline (within 10%) in 23 member states.

- As of September 20, in the COVID-19 Trends and Impact Survey, 43% of people self-report that they always wore a mask when leaving their home (Figure 13).

- There were 390 diagnostic tests per 100,000 people on September 20 (Figure 15).

- As of September 20, 11 member states have reached 70% or more of the population who have received at least one vaccine dose, and 6 countries have reached 70% or more of the population who are fully vaccinated (Figure 17). Member states where one-dose coverage is less than 50% include Latvia, Slovakia, Croatia, Romania, Bulgaria, and Cyprus.

- In the European Union, 73% of adults say they would accept or would probably accept a vaccine for COVID-19. The proportion of the adult population who are open to receiving a COVID-19 vaccine ranges from 36% in Bulgaria to 87% in Portugal (Figure 19).

- **In our current reference scenario, we expect that 303 million people in the EU will be vaccinated with at least one dose by January 1** (Figure 20). We expect that 65% of the population will be fully vaccinated by January 1.

- Based on the estimate of the population that have been infected with COVID-19 and vaccinated to date, combined with assumptions on protection against infection with the Delta variant provided by either natural infection, vaccination, or both, we estimate that 48% of the region is immune to the Delta variant. In our current reference scenario, we expect that by January 1, 59% of people will be immune to the Delta variant (Figure 21). These two calculations do not take into account the waning of natural or vaccine-derived immunity.

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 906,000 cumulative reported deaths due to COVID-19 on January 1. This represents 133,000 additional deaths from September 20 to January 1. Daily reported deaths will rise to 2,130 on January 1, 2022 (Figure 22).

- Under our **reference scenario**, our model projects 1,625,000 cumulative excess deaths due to COVID-19 on January 1. This represents 280,000 additional deaths from September 20 to January 1 (Figure 22).

- If **universal mask coverage (95%)** were attained in the next week, our model projects 82,000 fewer cumulative reported deaths compared to the reference scenario on January 1.

- Under our **worse scenario**, our model projects 1,070,000 cumulative reported deaths on January 1, an additional 164,000 deaths compared to our reference scenario. Daily reported deaths in the **worse scenario** will rise to 5,700 by mid-December (Figure 22).

- Daily infections in the **reference scenario** will rise to 550,000 by late December (Figure 23). Daily infections in the **worse scenario** will rise to 1.5 million by late November (Figure 23).

- Daily cases in the **reference scenario** will rise to nearly 300,000 by year-end (Figure 24). Daily cases in the **worse scenario** will rise to 850,000 by early December (Figure 24).

- Daily hospital census in the **reference scenario** will rise to 195,000 on January 1, 2022 (Figure 25). Daily hospital census in the **worse scenario** will rise to 580,000 by mid-December (Figure 25).

- Figure 26 compares our reference scenario forecasts to other publicly archived models. Most models suggest slow increases in daily deaths until late November. After November, the models diverge markedly.

- At some point from September through January 1, 10 member states will have high or extreme stress on hospital beds (Figure 27). At some point from September through January 1, 23 member states will have high or extreme stress on intensive care unit (ICU) capacity (Figure 28).

Model updates

Previously, our global total for vaccinations was based only on the locations that we produce COVID estimates for. Starting this week, we are including vaccination in all locations in the world that report data on vaccinations. This will ensure vaccination numbers reflect what is happening around the world and are not impacted by the selection of locations that we publish COVID-19 estimates for. We currently only report COVID-19 estimates for locations that have reported greater than 500 cumulative COVID-19 deaths.

Figure 1. Daily COVID-19 hospital census and infections
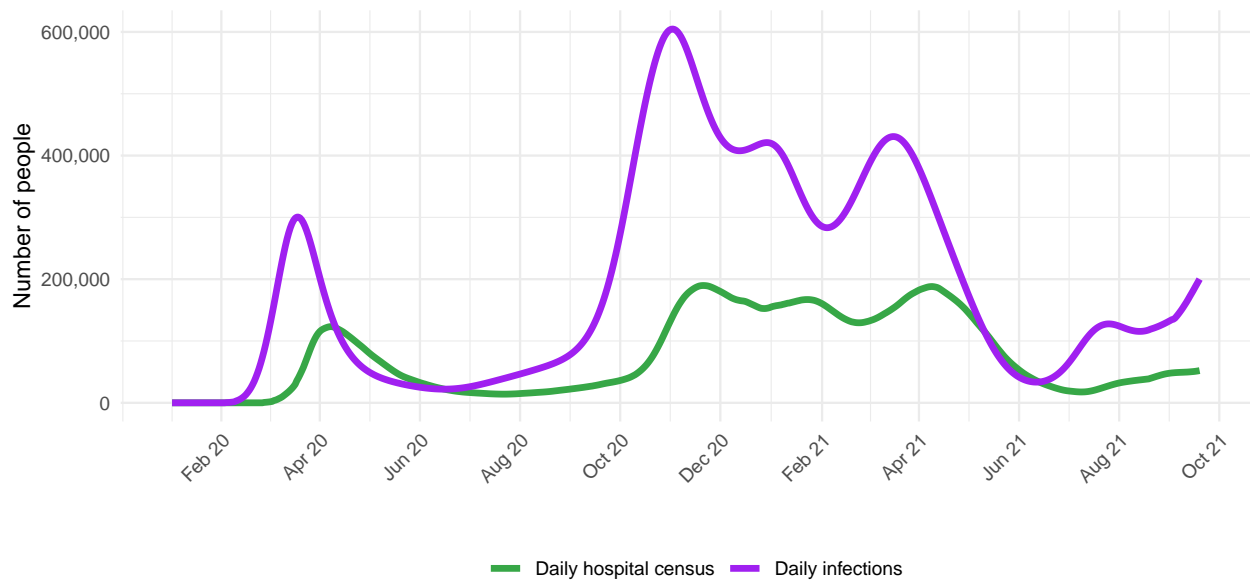
Figure 2. Reported daily COVID-19 cases, moving average
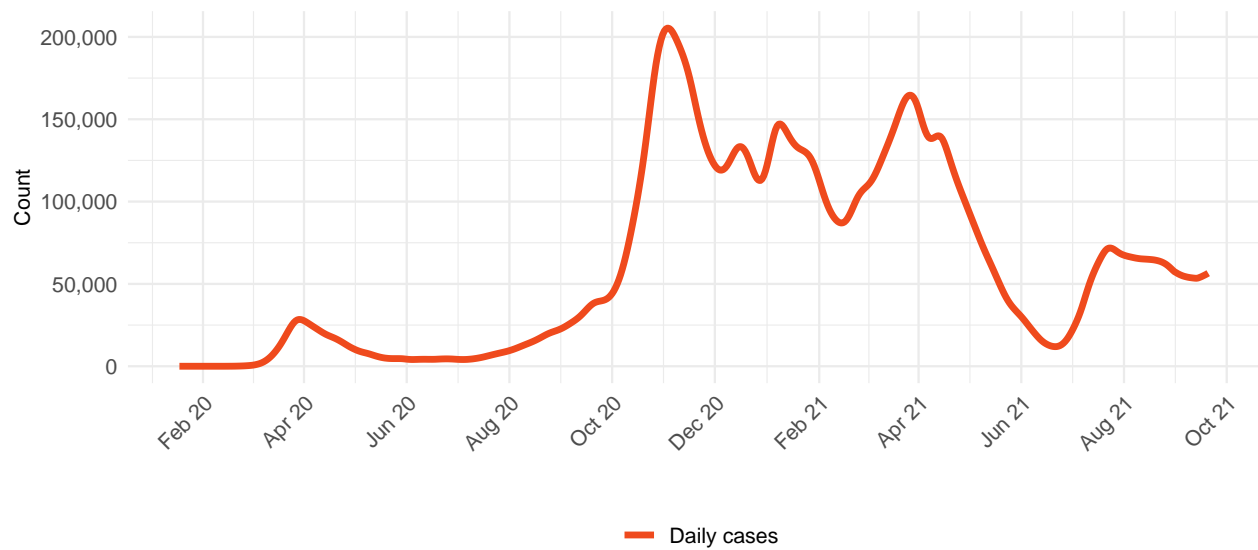
Table 1. Ranking of excess deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	18,714	1
Stroke	10,303	2
COVID-19	7,522	3
Tracheal, bronchus, and lung cancer	6,216	4
Alzheimer's disease and other dementias	5,827	5
Chronic obstructive pulmonary disease	4,608	6
Colon and rectum cancer	4,100	7
Lower respiratory infections	3,503	8
Hypertensive heart disease	2,797	9
Chronic kidney disease	2,430	10

Figure 3. Smoothed trend estimate of reported daily COVID-19 deaths (blue) and excess daily deaths due to COVID-19 (orange)
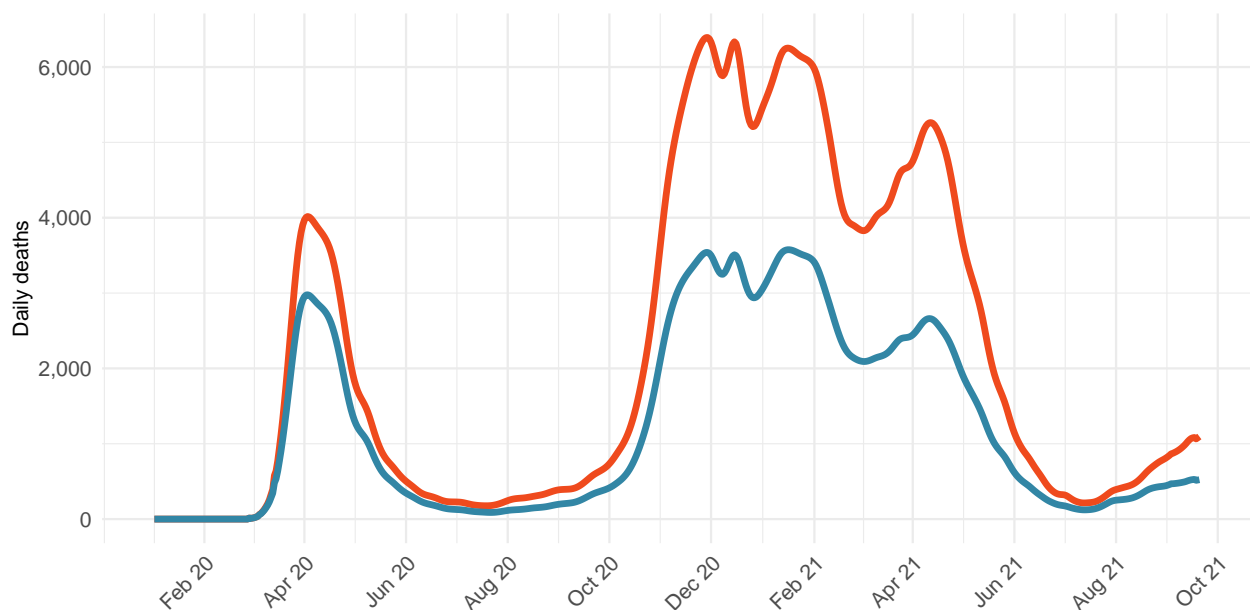
Figure 4. Daily COVID-19 death rate per 1 million on September 20, 2021

A. Daily reported COVID-19 death rate per 1 million
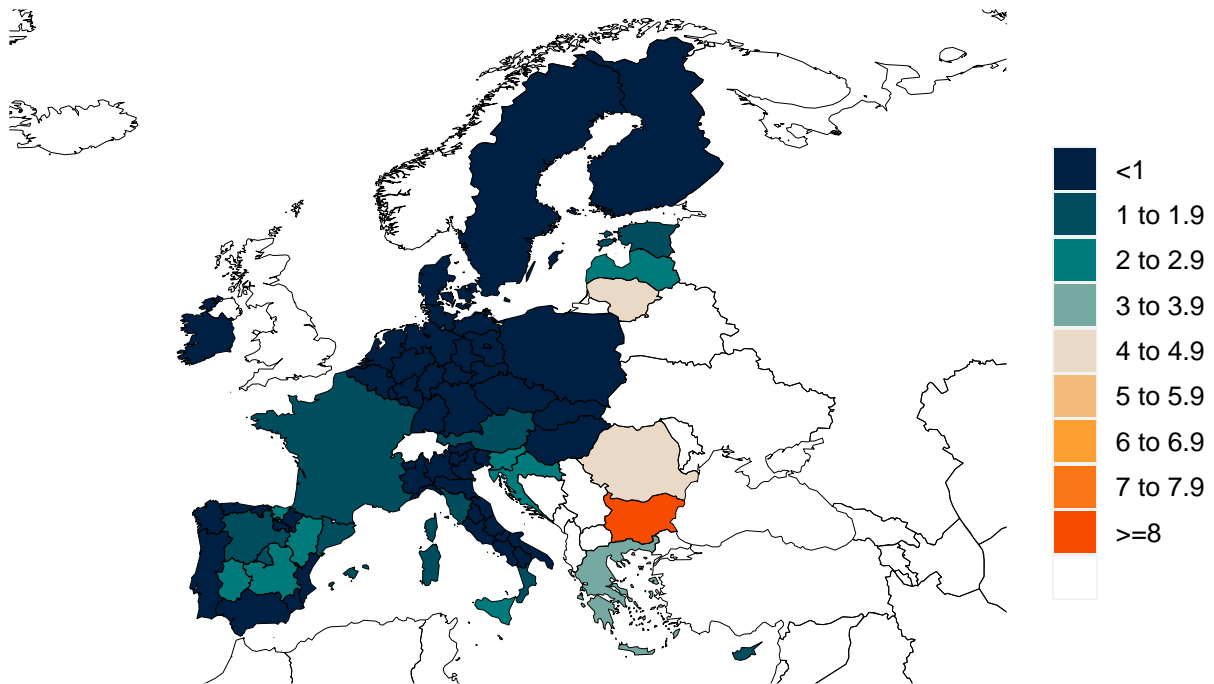
B. Daily excess COVID-19 death rate per 1 million
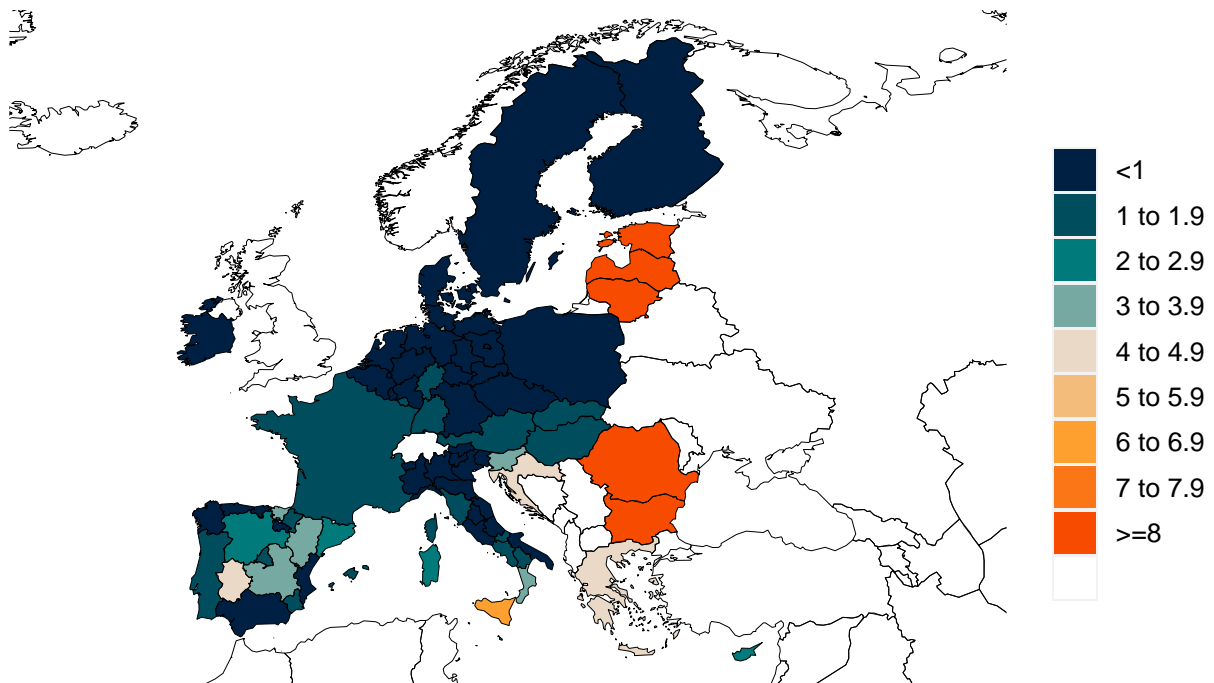
Figure 5. Cumulative COVID-19 deaths per 100,000 on September 20, 2021

A. Reported cumulative COVID-19 deaths per 100,000
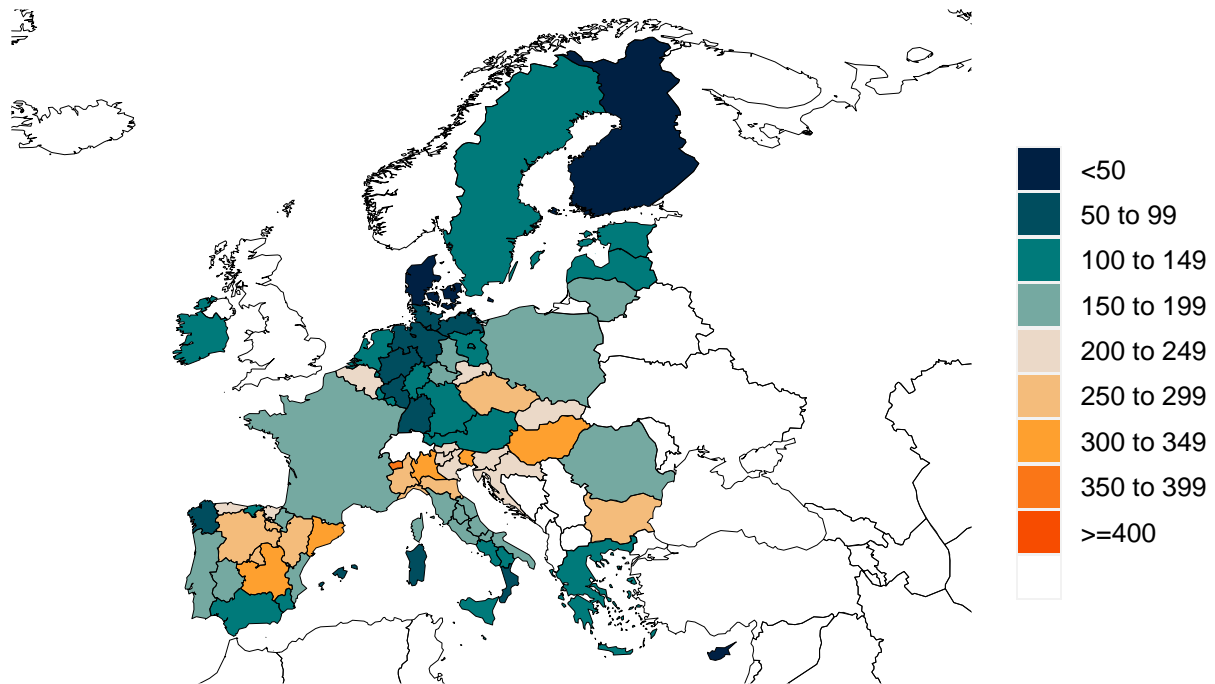
**B. Excess cumulative COVID-19 deaths per 100,000**
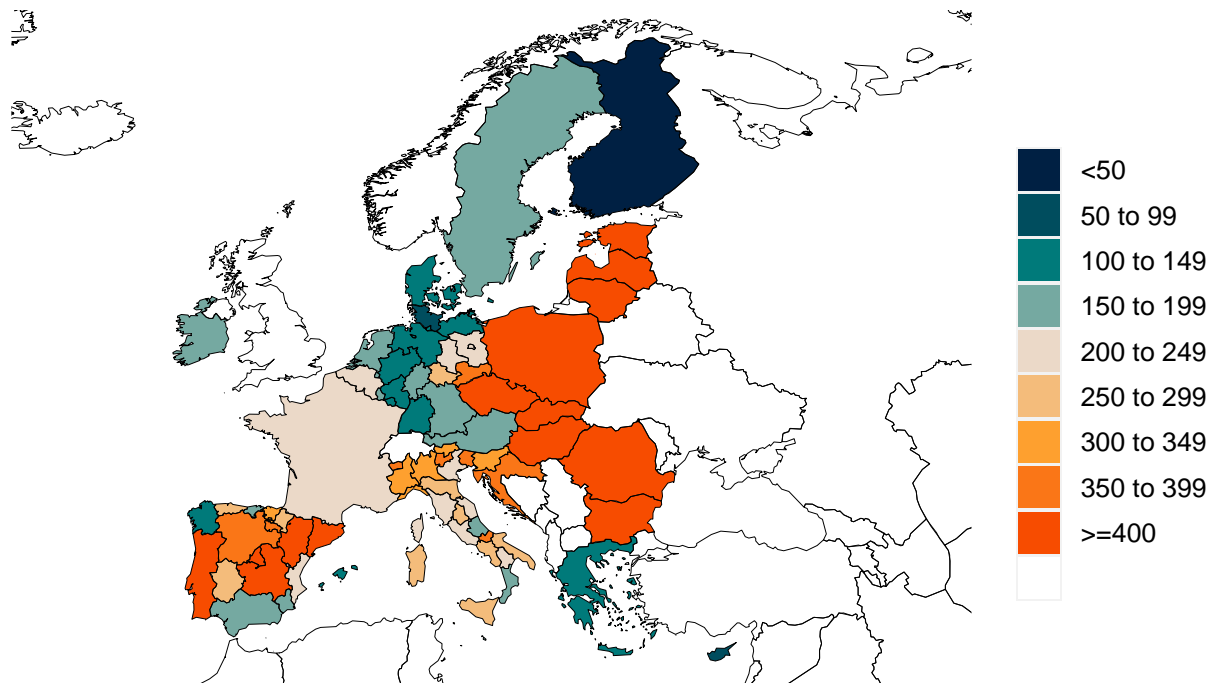
Figure 6. Estimated percent of the population infected with COVID-19 on September 20, 2021
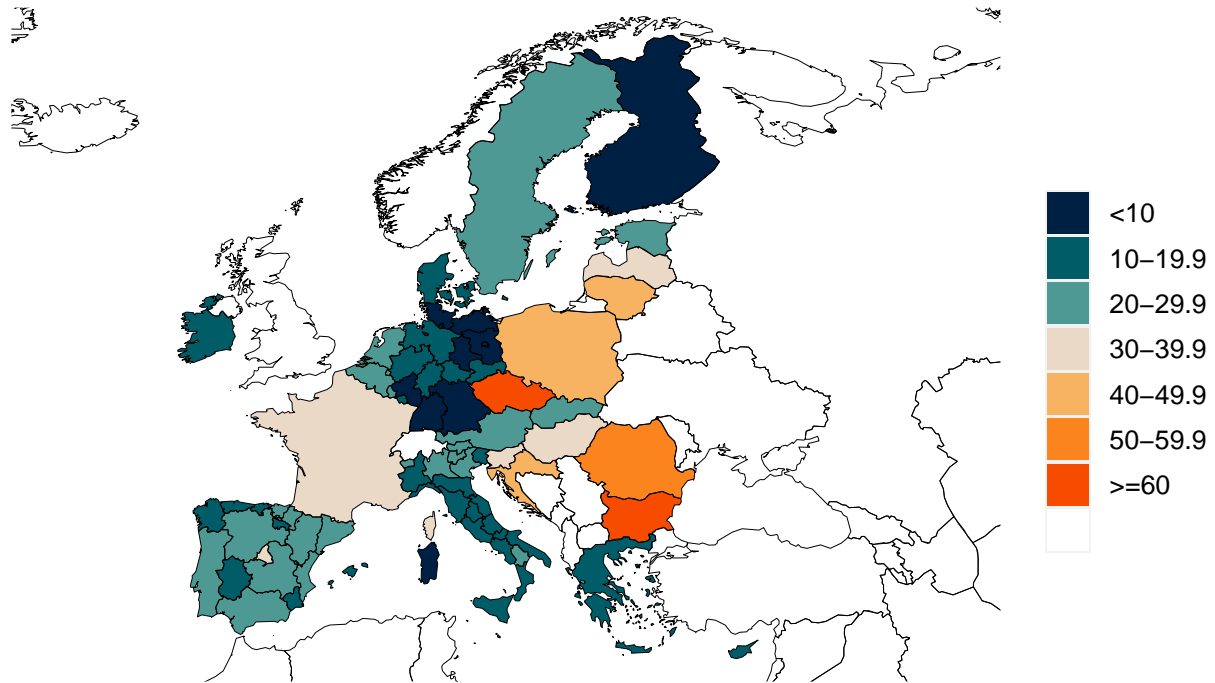
Figure 7. Mean effective R on September 9, 2021. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.
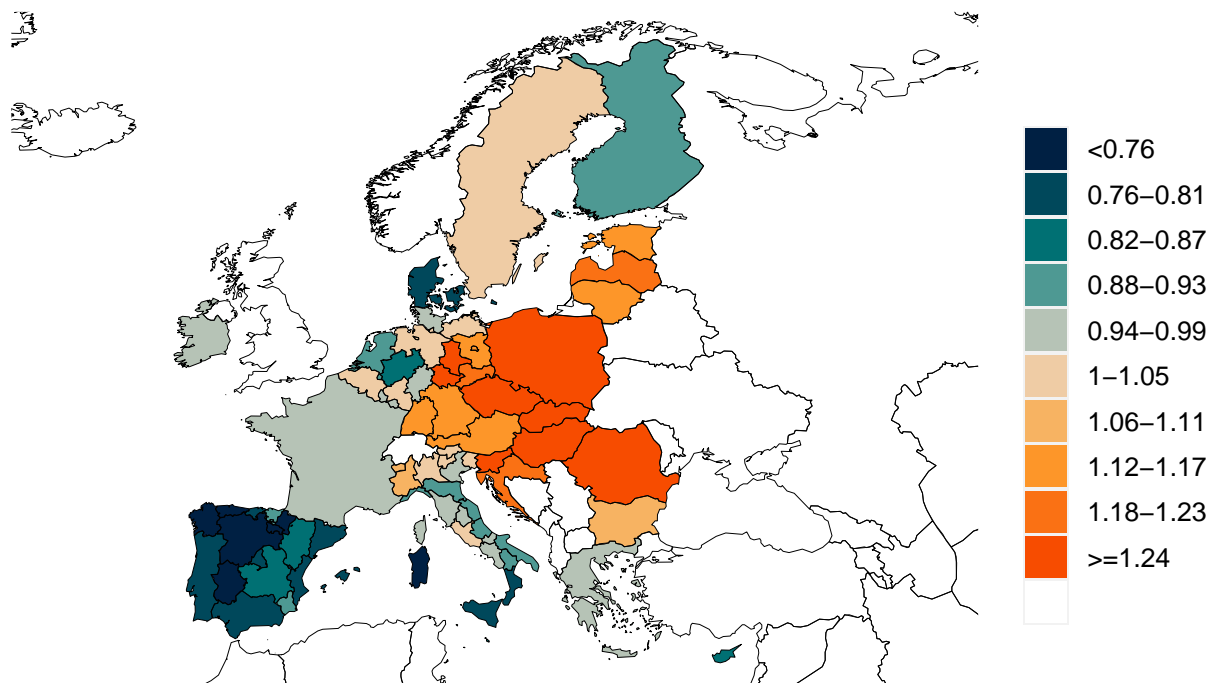
Figure 8. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100% at particular points in time.
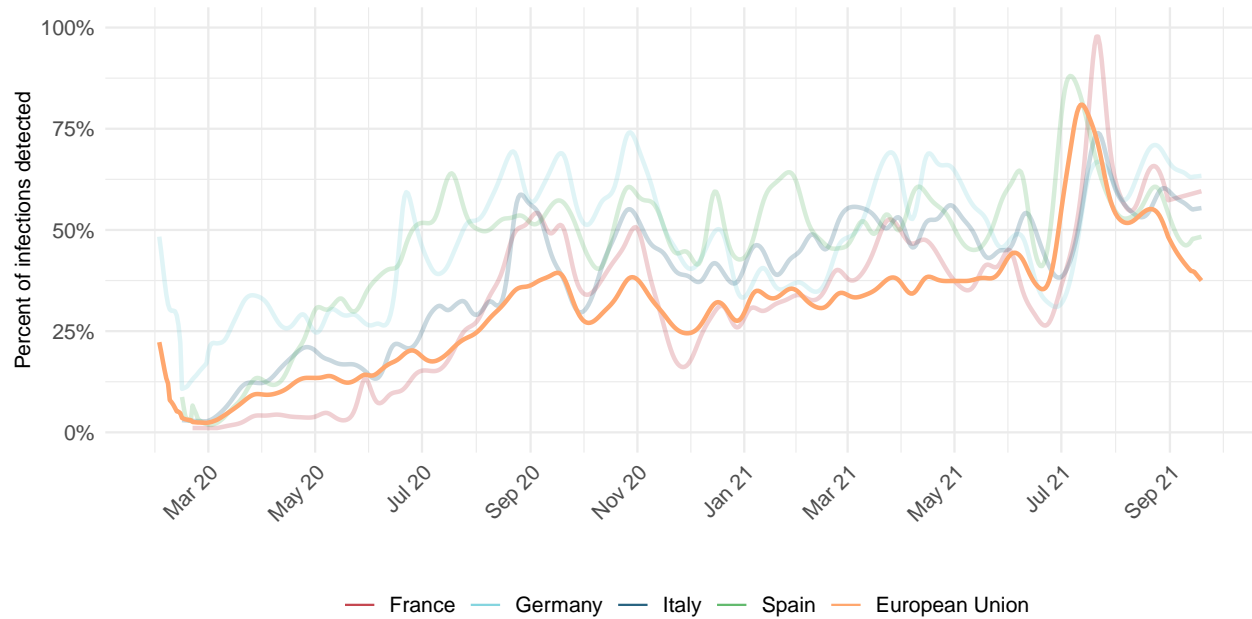
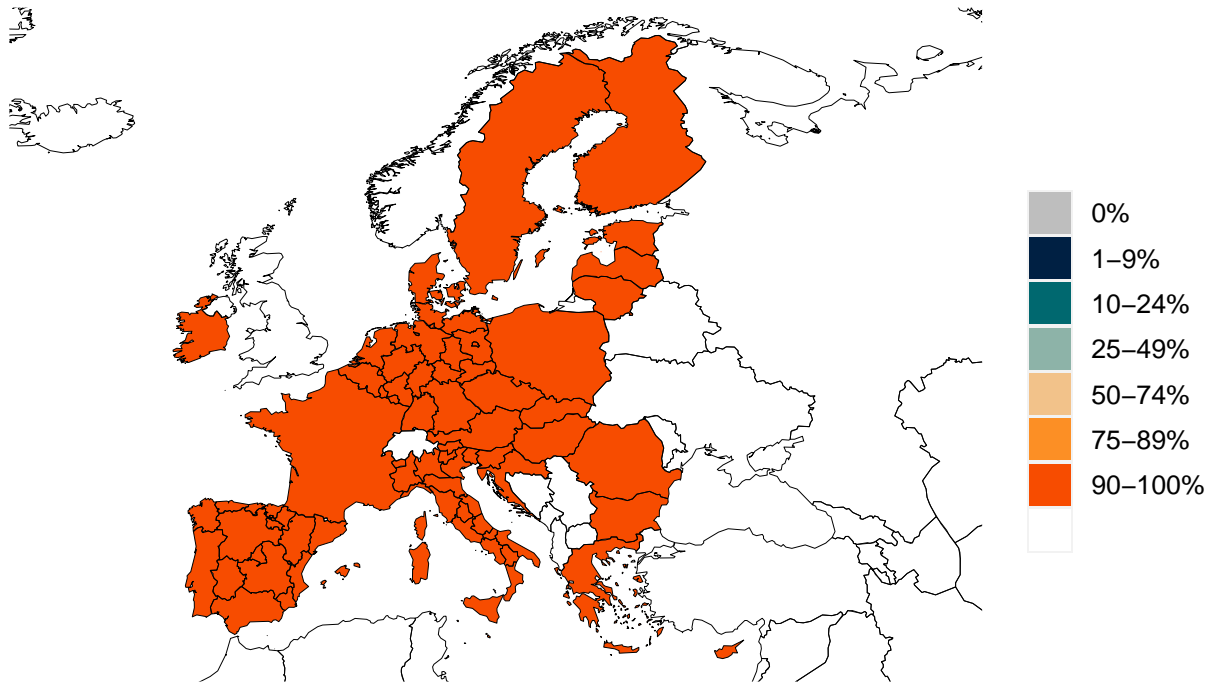**Figure 9.** Estimated percent of circulating SARS-CoV-2 for primary variant families on September 20, 2021
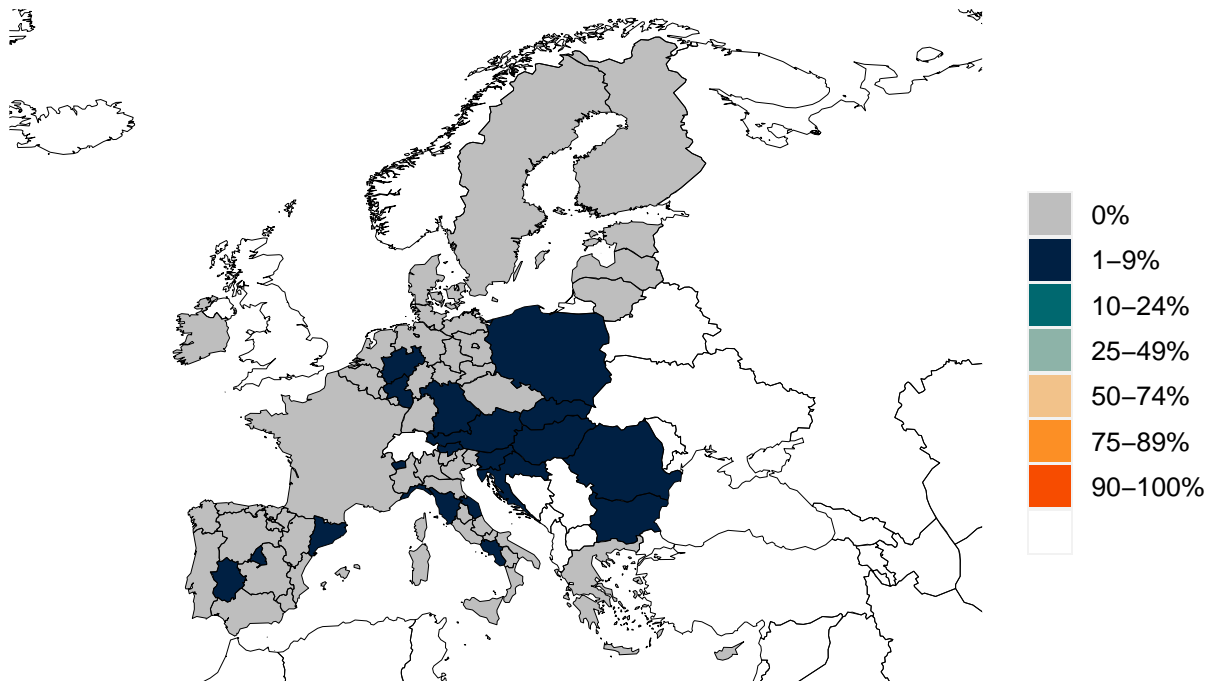
A. Estimated percent Alpha variant
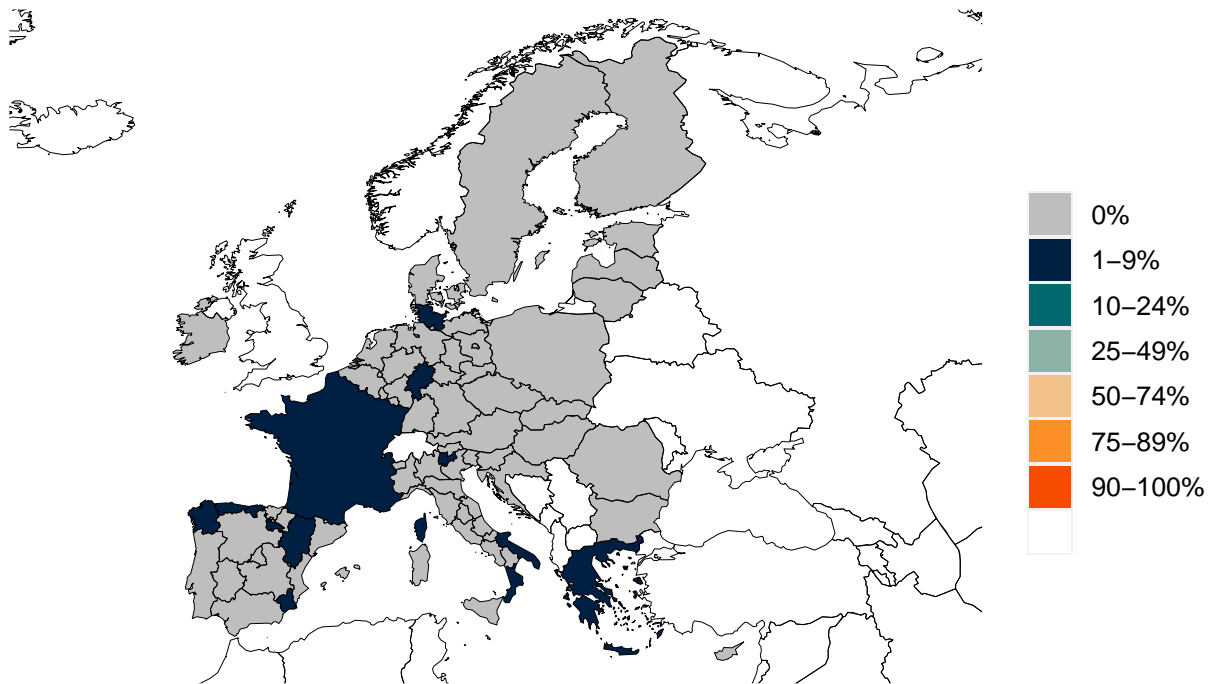
B. Estimated percent Beta variant

C. Estimated percent Delta variant

▨	0%
■	1–9%
■	10–24%
■	25–49%
■	50–74%
■	75–89%
■	90–100%
□	

D. Estimated percent Gamma variant

▨	0%
■	1–9%
■	10–24%
■	25–49%
■	50–74%
■	75–89%
■	90–100%
□	

Figure 10. Infection-fatality rate on September 20, 2021. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.
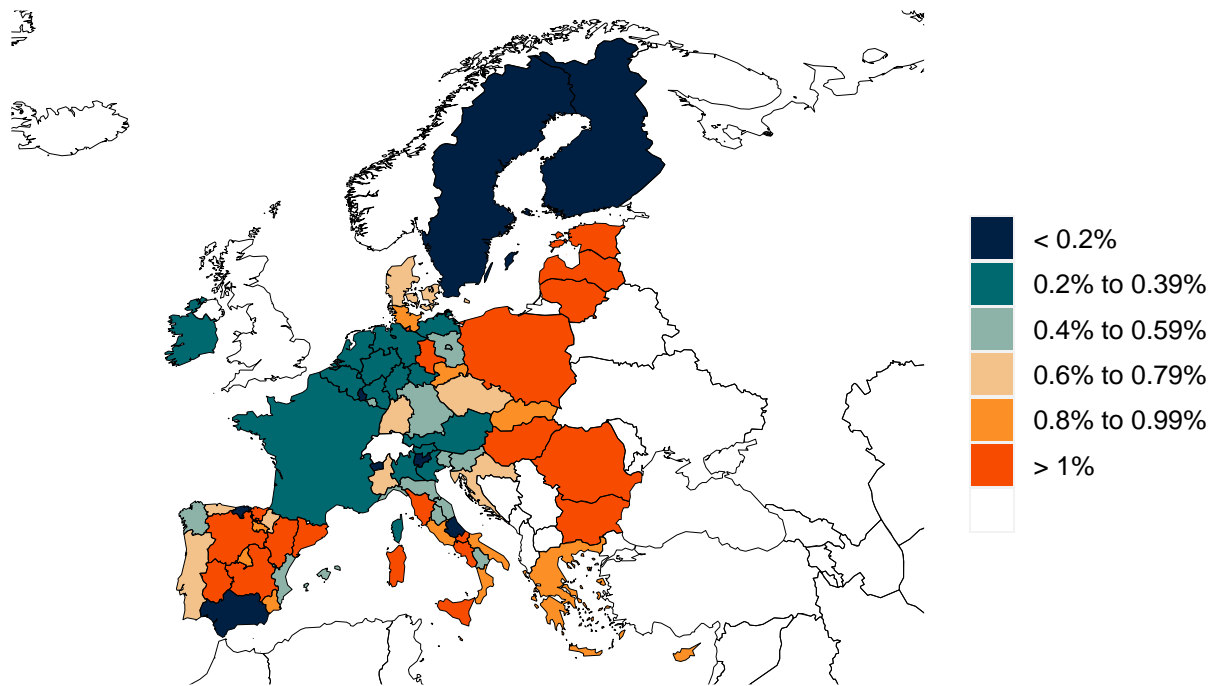
Critical drivers

Table 2. Current mandate implementation
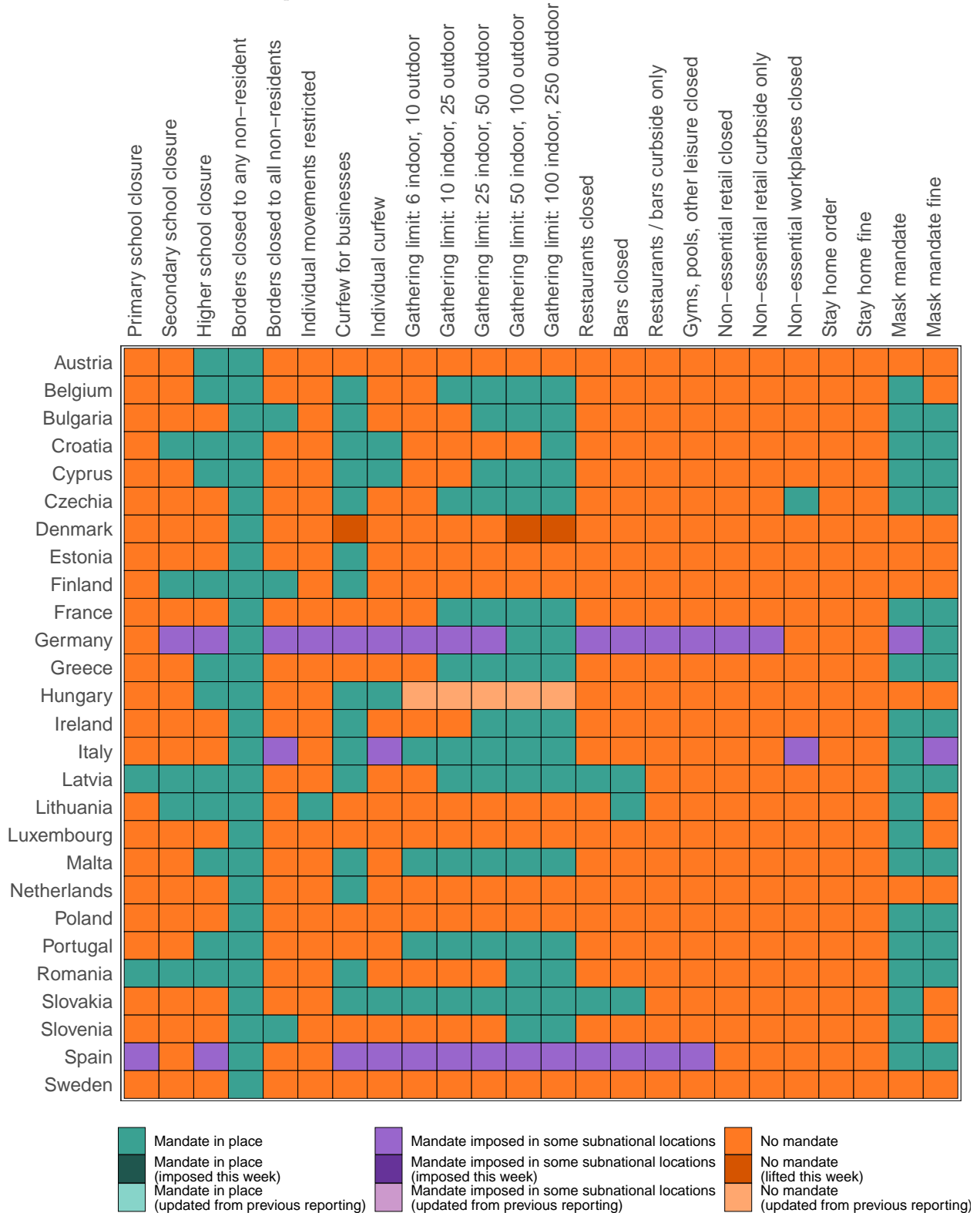
Figure 11. Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

France ── Germany ── Italy ── Spain ── European Union
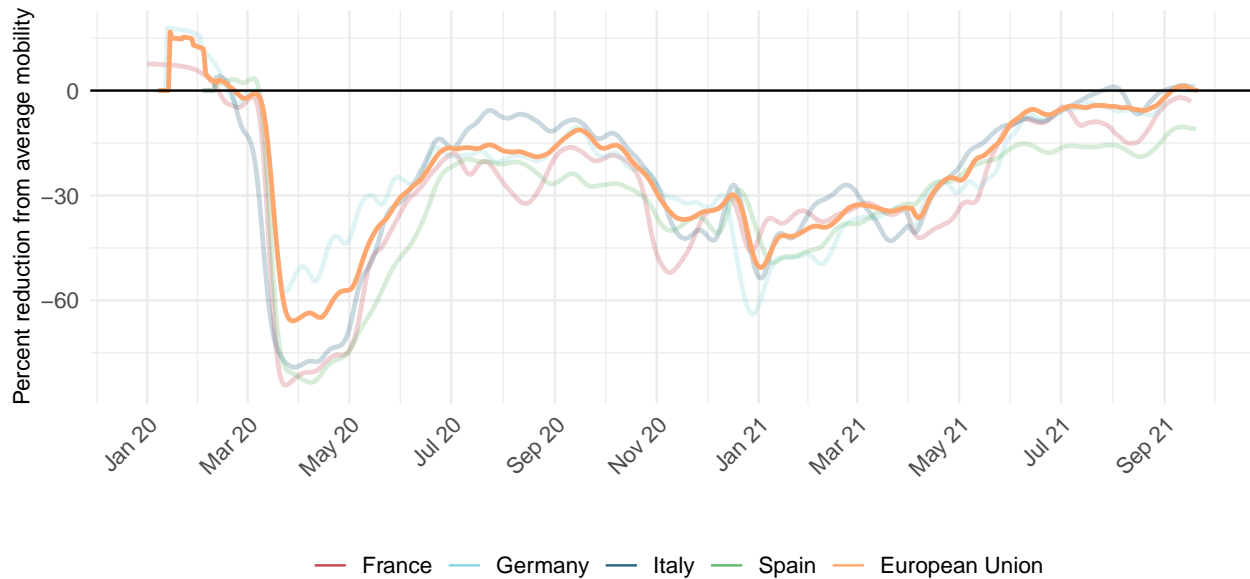
Figure 12. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on September 20, 2021

=<−50
−49 to −45
−44 to −40
−39 to −35
−34 to −30
−29 to −25
−24 to −20
−19 to −15
−14 to −10
>−10
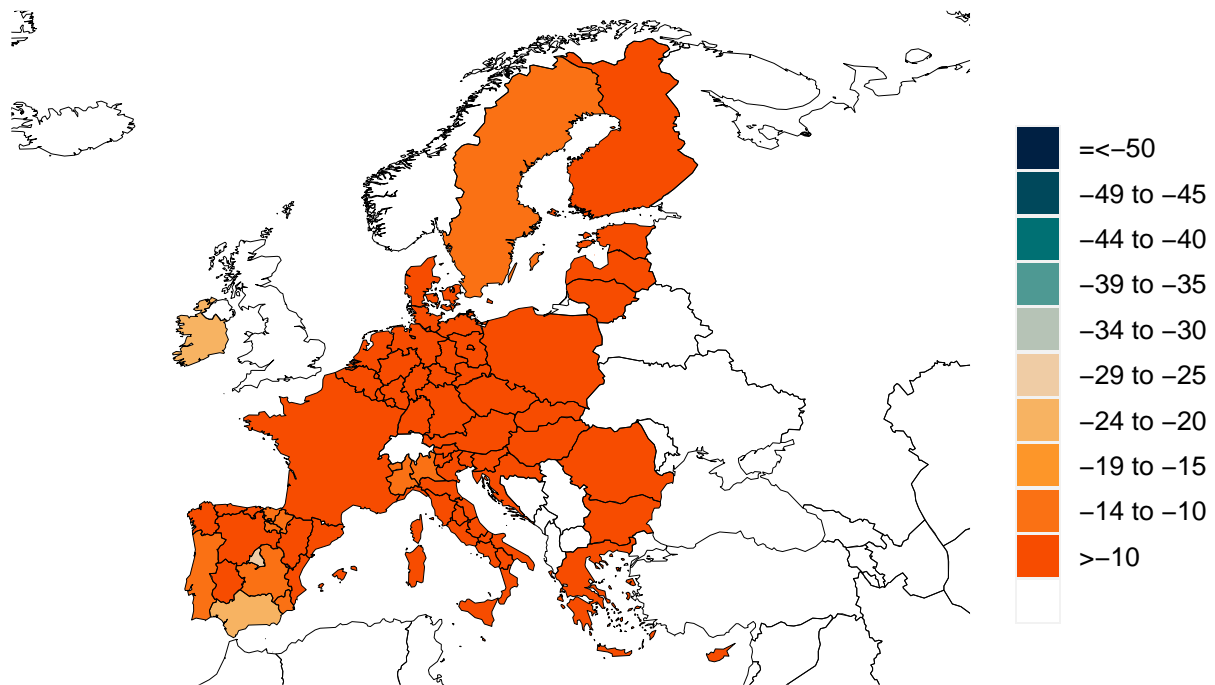
Figure 13. Trend in the proportion of the population reporting always wearing a mask when leaving home
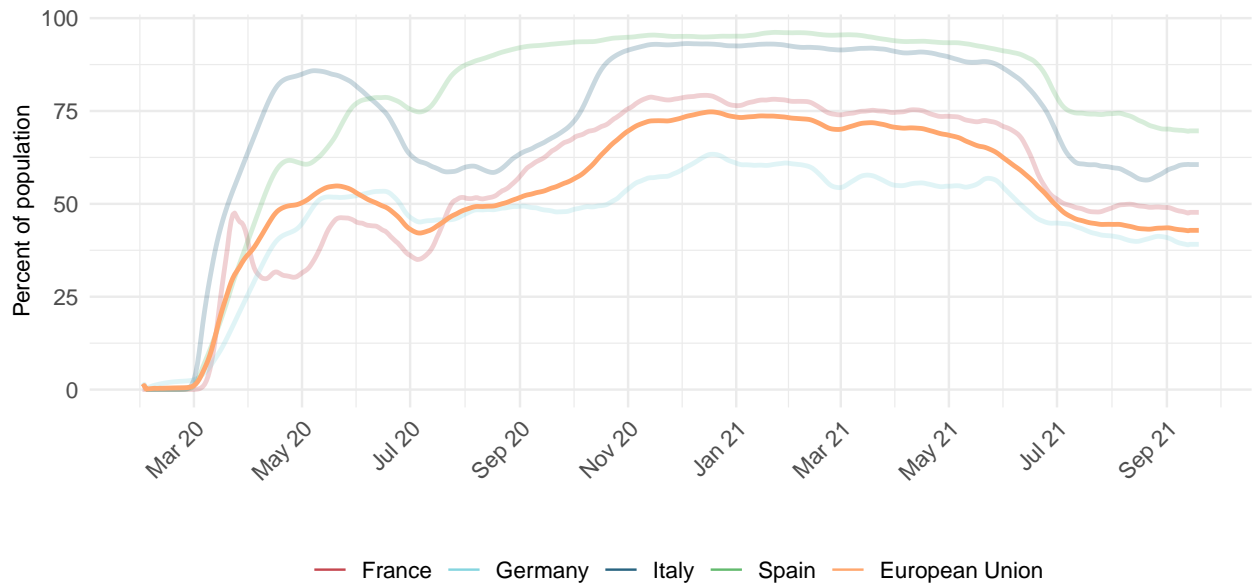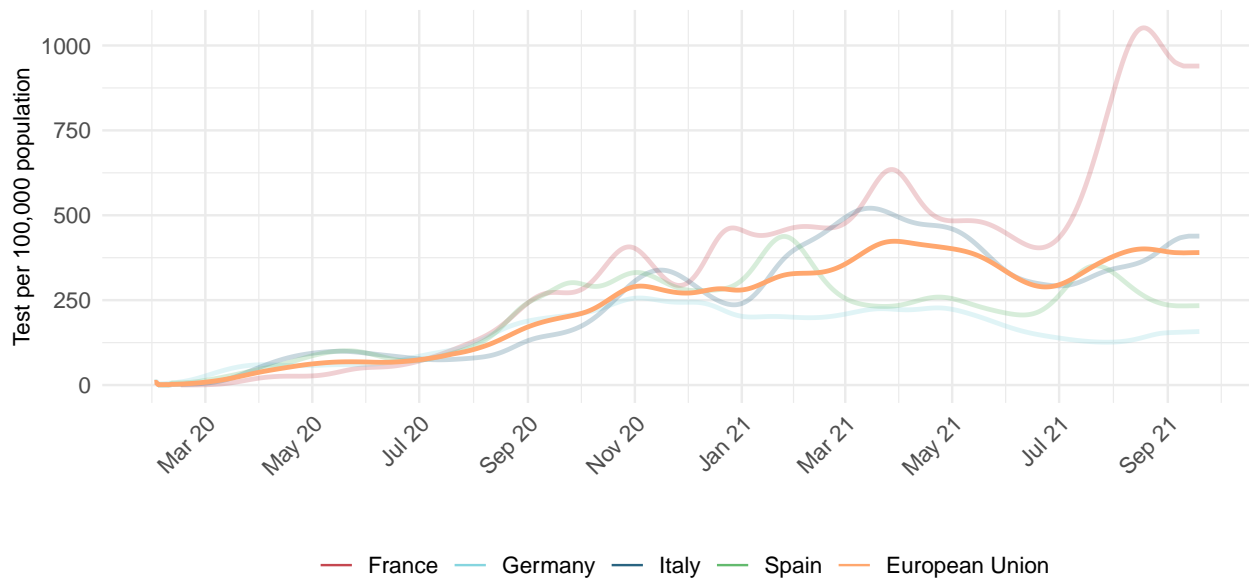

Figure 14. Proportion of the population reporting always wearing a mask when leaving home on September 20, 2021
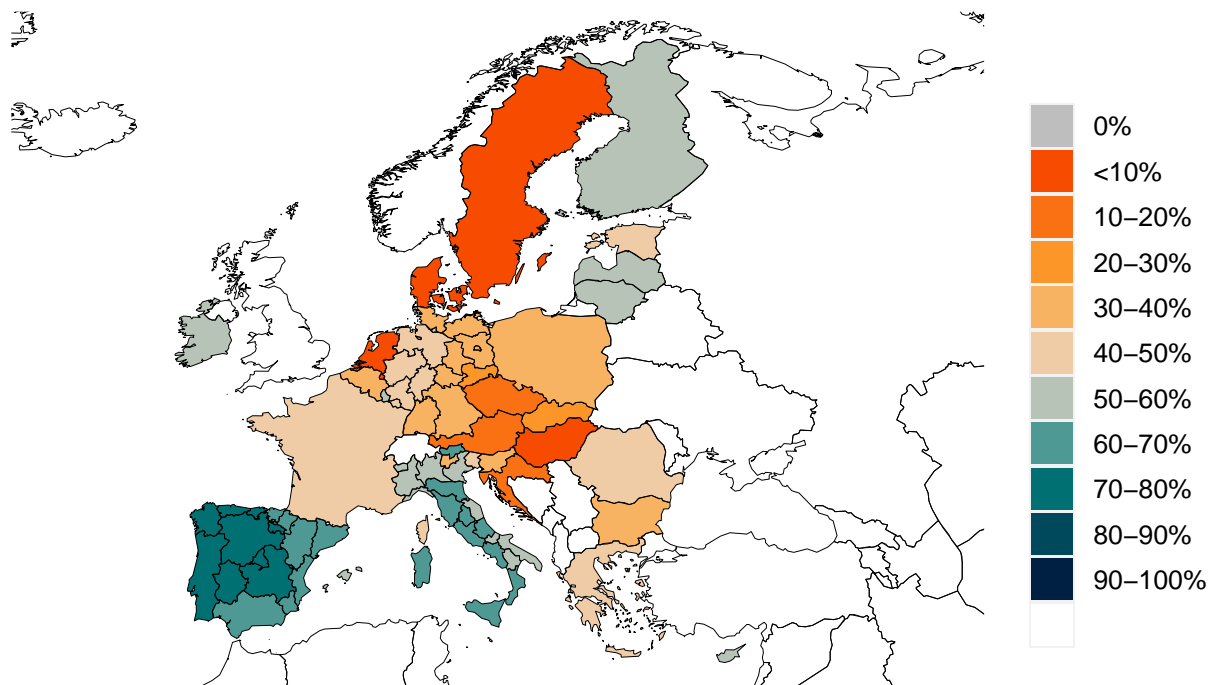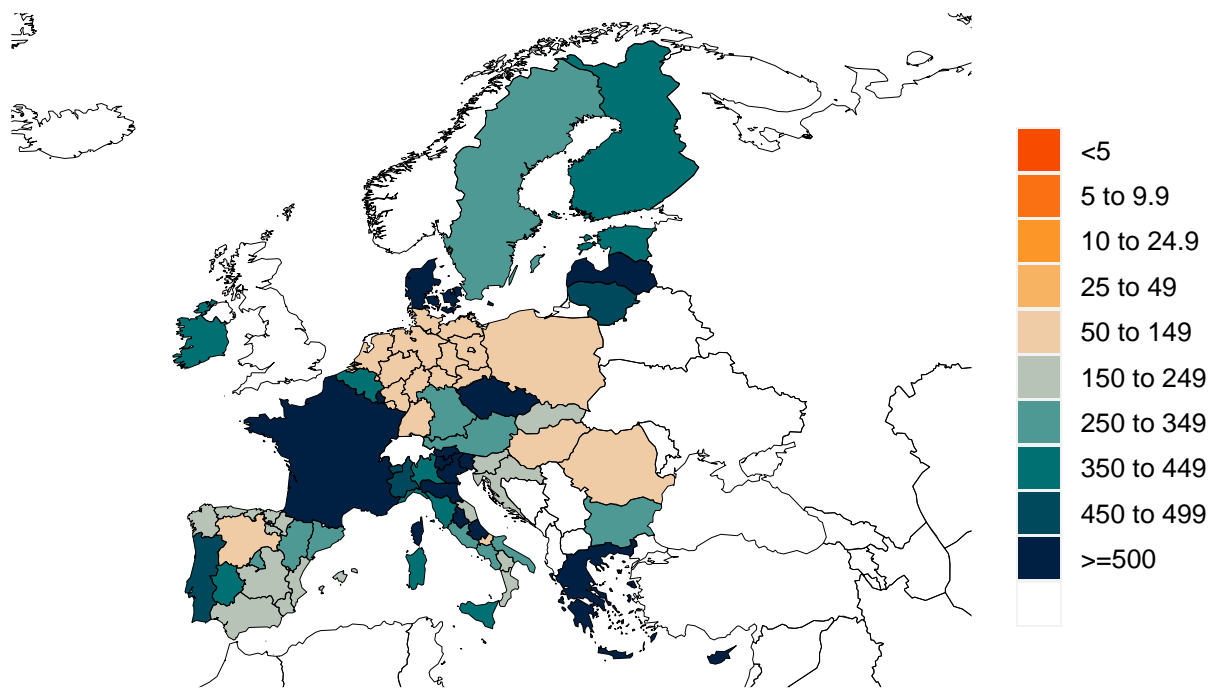
Figure 15. Trend in COVID-19 diagnostic tests per 100,000 people

**Figure 16.** COVID-19 diagnostic tests per 100,000 people on September 20, 2021

Table 3. Estimates of vaccine efficacy for specific vaccines used in the model at preventing disease and infection. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our website.

Vaccine	Efficacy at preventing disease: ancestral and Alpha	Efficacy at preventing infection: ancestral and Alpha	Efficacy at preventing disease: Beta, Delta, & Gamma	Efficacy at preventing infection: Beta, Delta, & Gamma
AstraZeneca	90%	52%	85%	49%
CoronaVac	50%	44%	43%	38%
Covaxin	78%	69%	68%	60%
Johnson & Johnson	86%	72%	60%	56%
Moderna	94%	89%	94%	80%
Novavax	89%	79%	79%	69%
Pfizer/BioNTech	94%	86%	85%	78%
Sinopharm	73%	65%	63%	56%
Sputnik-V	92%	81%	80%	70%
Tianjin CanSino	66%	58%	57%	50%
Other vaccines	75%	66%	65%	57%
Other vaccines (mRNA)	91%	86%	85%	78%

Figure 17. Percent of the population (A) having received at least one dose and (B) fully vaccinated against SARS-CoV-2 by September 20, 2021
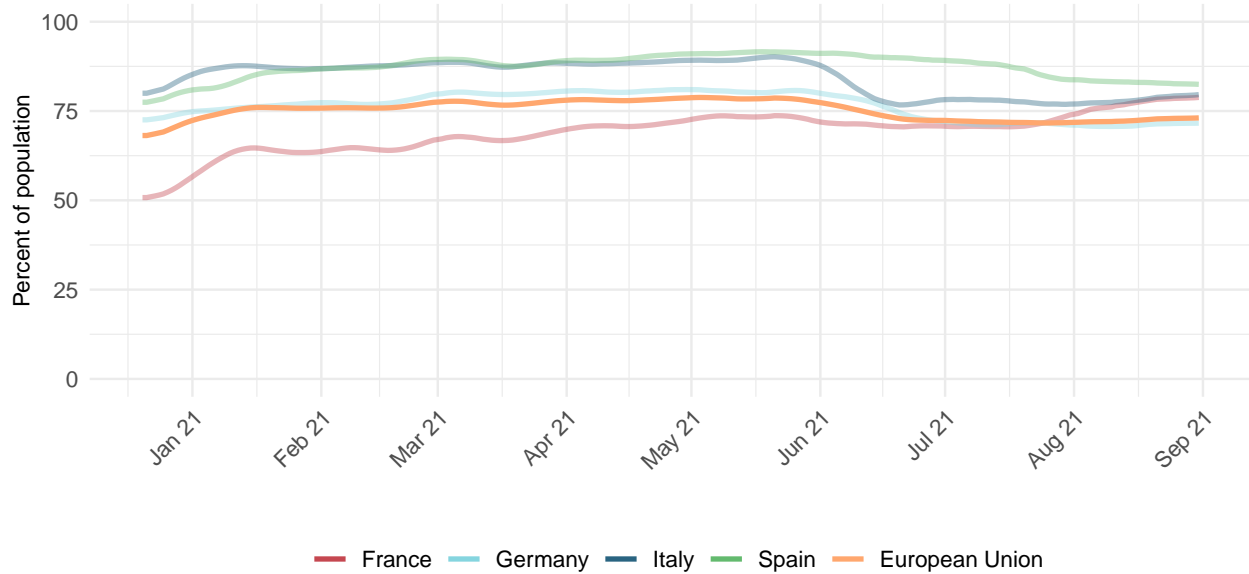
**A. Percent of the population having received one dose of a COVID-19 vaccine**
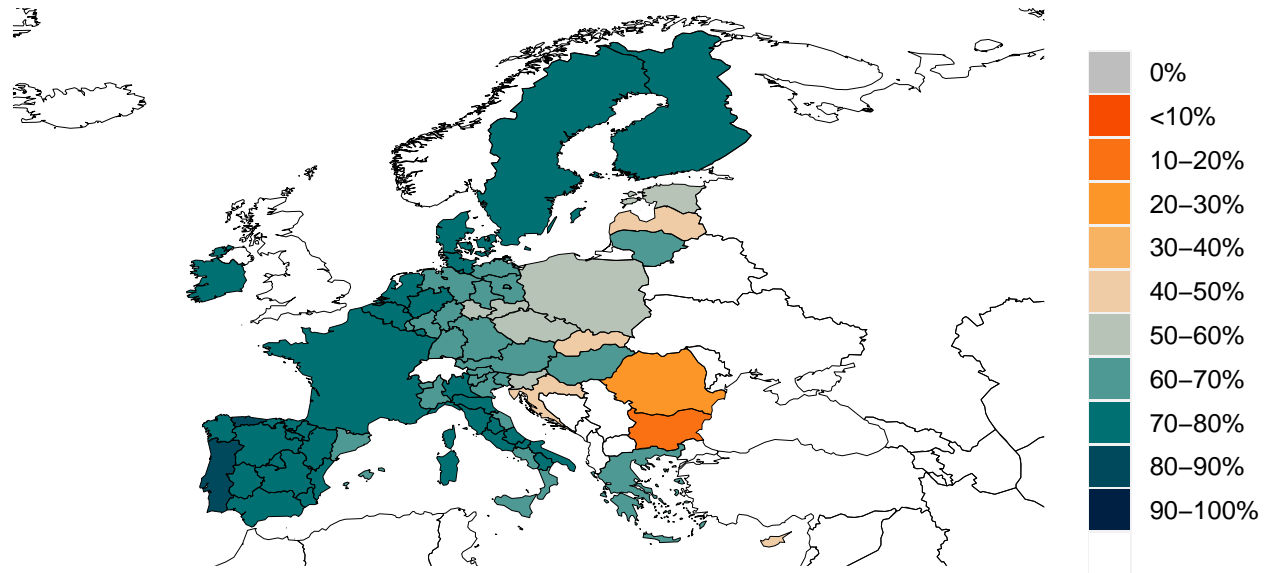
**B. Percent of the population fully vaccinated against SARS-CoV-2**
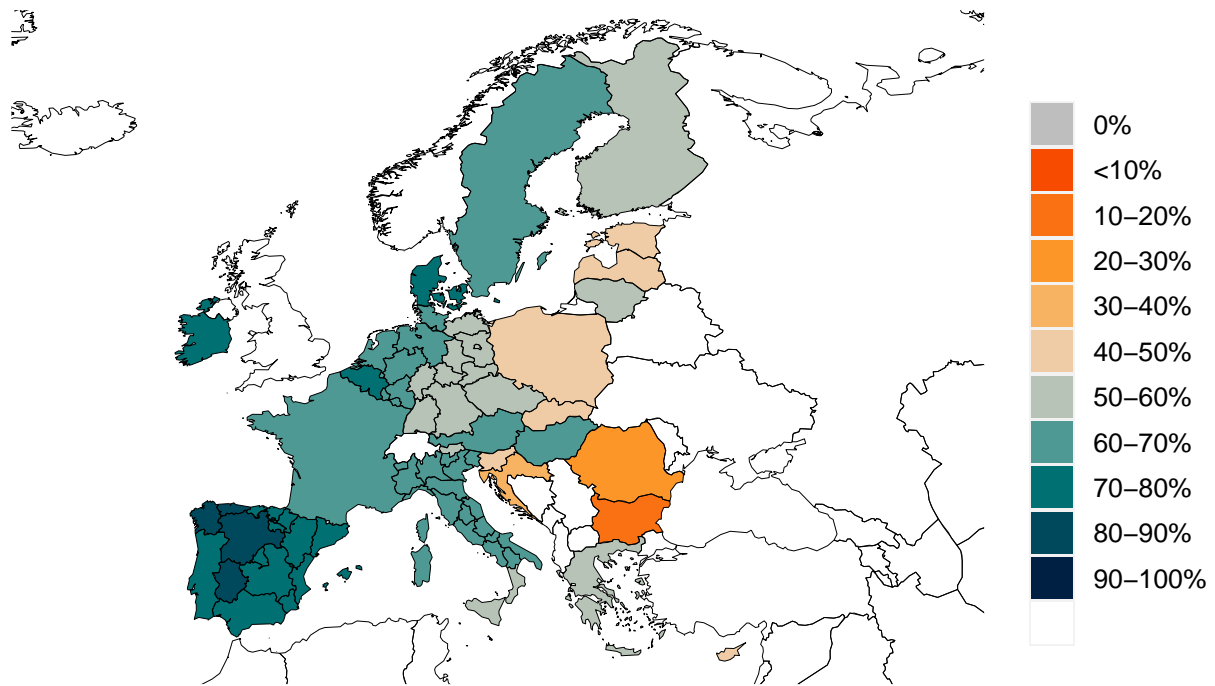
Figure 18. Trend in the estimated proportion of the adult (18+) population that have been vaccinated or would probably or definitely receive the COVID-19 vaccine if available


Figure 19. This figure shows the estimated proportion of the adult (18+) population that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available
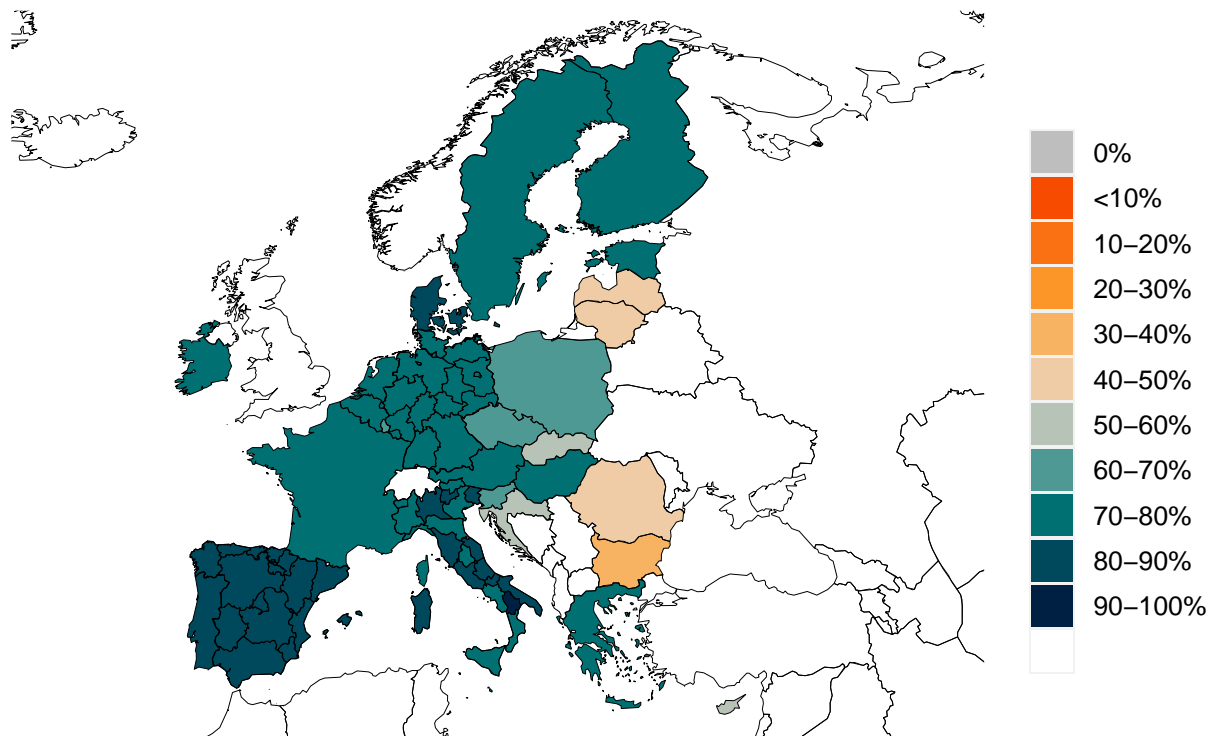
Figure 20. Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated
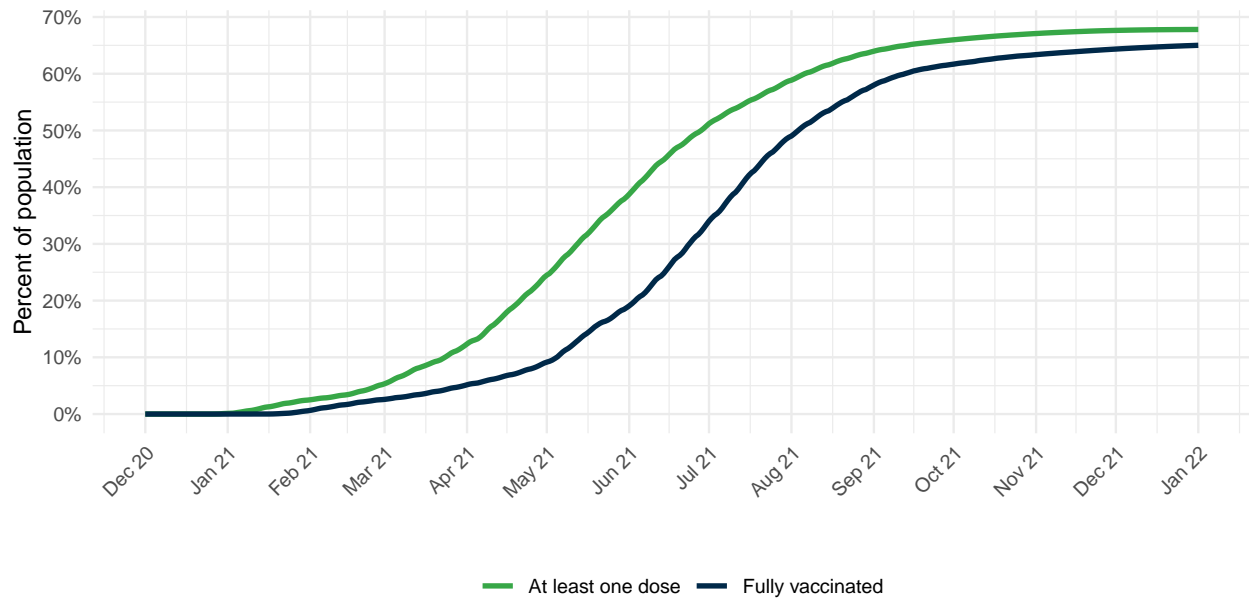
Figure 21. Percentage of people who are immune to non-escape variants and the percentage of people who are immune to escape variants
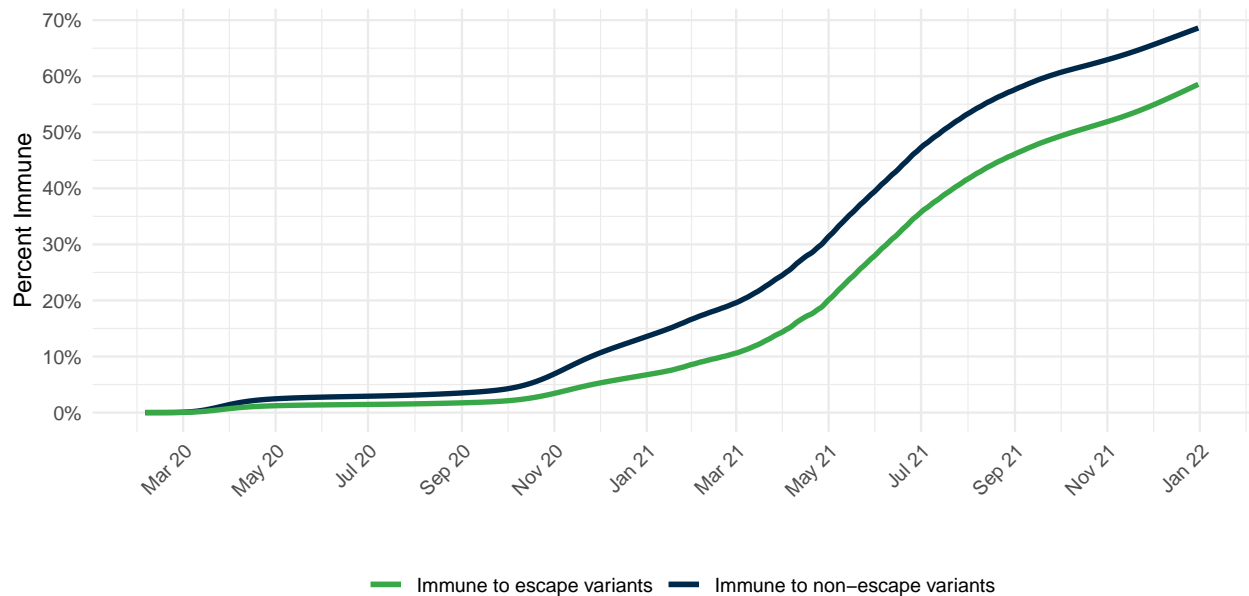
Projections and scenarios

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 7 days.
- Mobility increases as vaccine coverage increases.
- 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 reference scenario assumes that mandates are re-imposed when daily deaths reach 15 per million.
- Variants Alpha, Beta, Gamma, and Delta continue to spread regionally and globally from locations with sufficient transmission.

The **worse scenario** modifies the reference scenario assumption in four ways:

- 100% of vaccinated individuals stop using masks.
- Mobility increases in all locations to 25% above the pre-pandemic winter baseline, irrespective of vaccine coverage.
- Governments are more reluctant to re-impose social distancing mandates, waiting until the daily death rate reaches 15 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 reference scenario assumes that mandates are re-imposed when daily deaths reach 38 per million. In either case, we assume social distancing mandates remain in effect for 6 weeks.
- Variants Alpha, Beta, Gamma, and Delta spread between locations twice as fast when compared with our reference scenario.

The **universal masks scenario** makes all the same assumptions as the reference scenario but assumes all locations reach 95% mask use within 7 days.

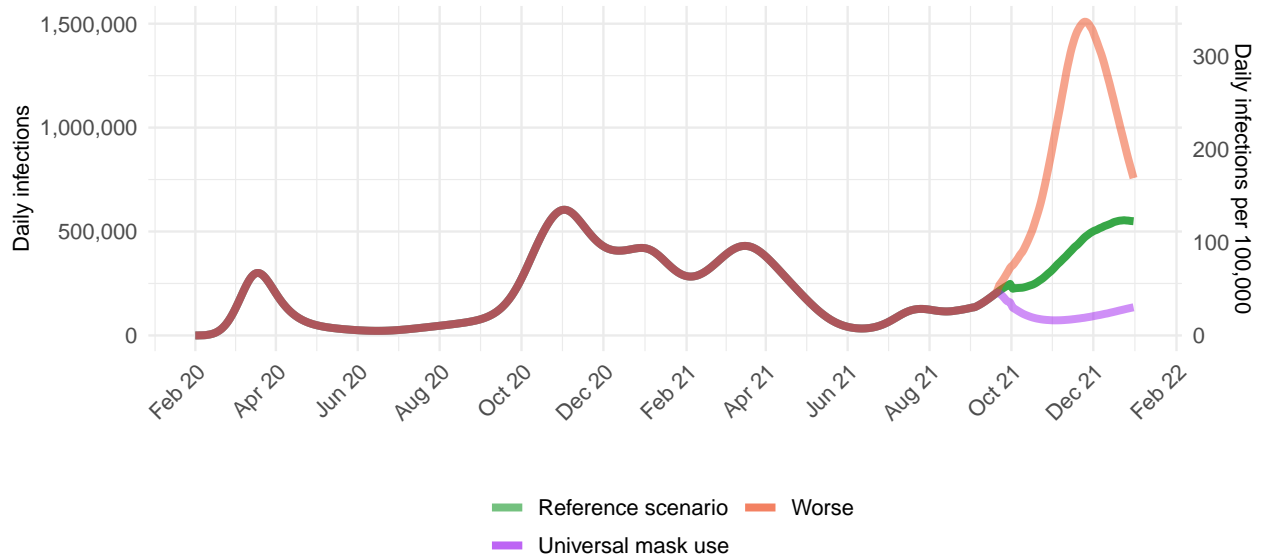**Figure 22.** Daily COVID-19 deaths until January 01, 2022 for three scenarios

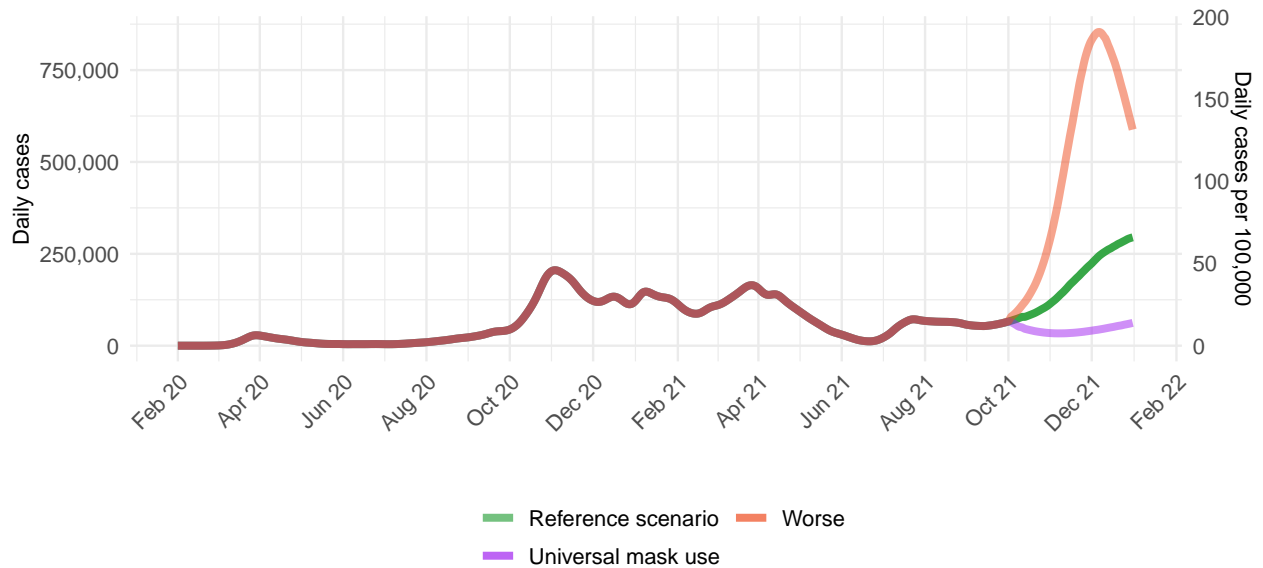**A. Reported daily COVID-19 deaths per 100,000**

Reference scenario — Worse
Universal mask use
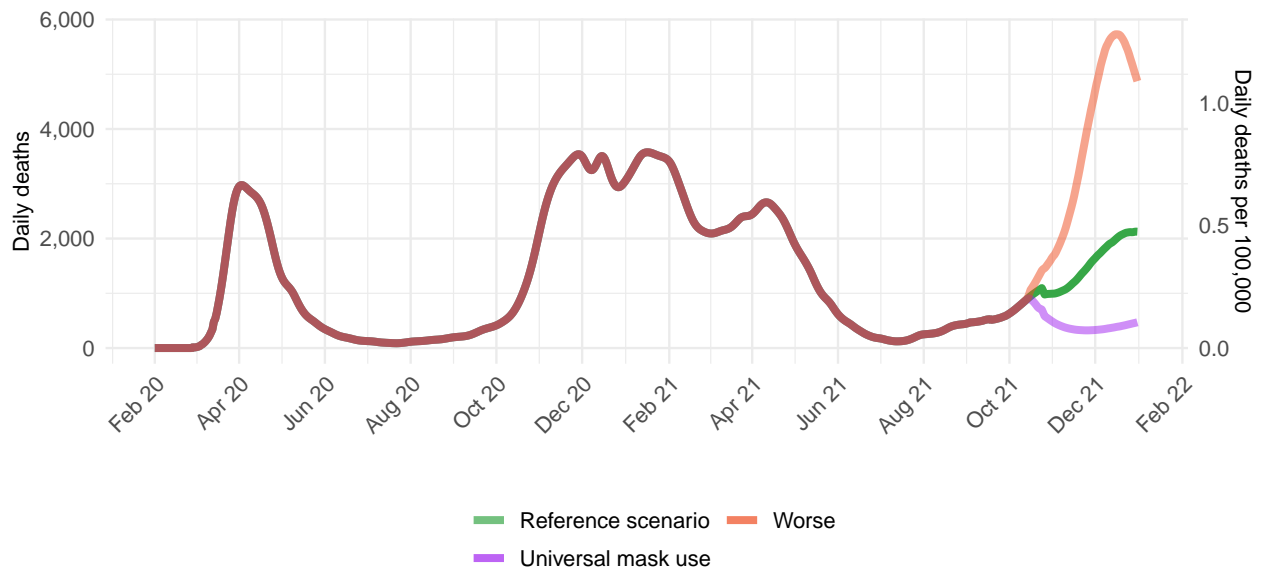
B. Excess daily COVID-19 deaths per 100,000

Reference scenario — Worse
Universal mask use
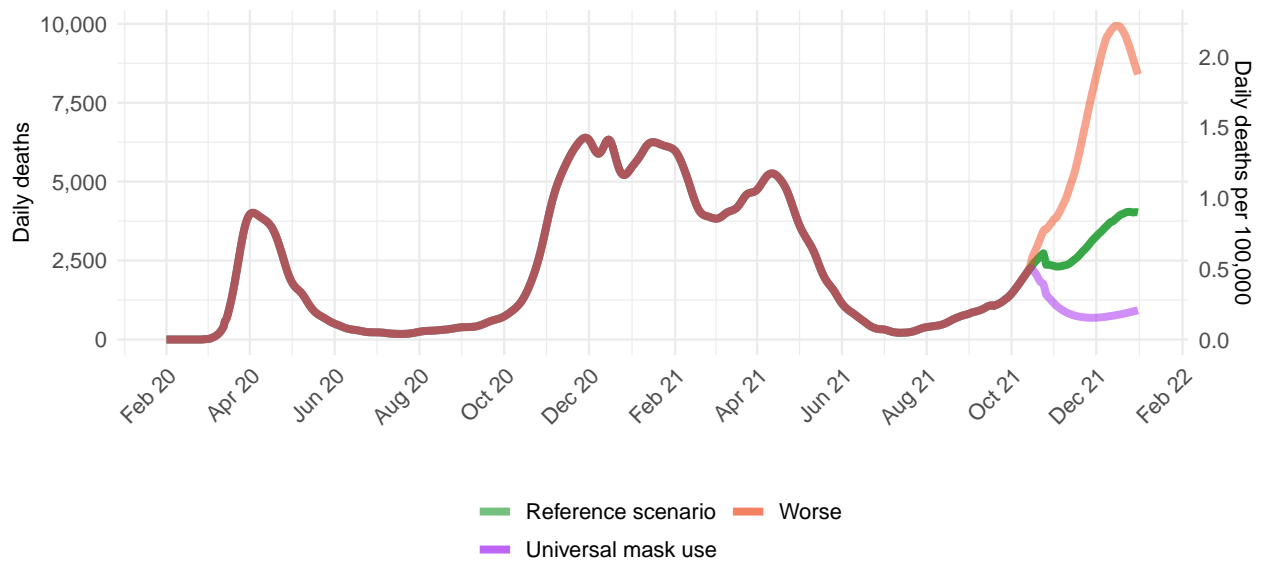
Figure 23. Daily COVID-19 infections until January 01, 2022 for three scenarios
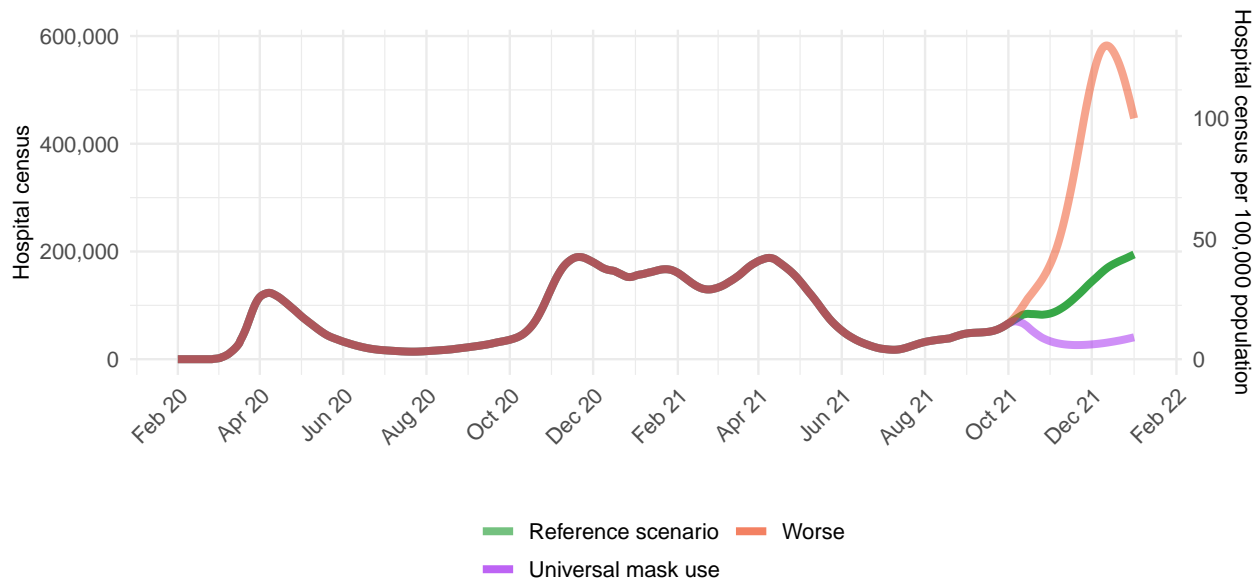

Figure 24. Daily COVID-19 reported cases until January 01, 2022 for three scenarios

Figure 25. Daily COVID-19 hospital census until January 01, 2022 for three scenarios

Figure 26. 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 Massachusetts Institute of Technology (Delphi), Imperial College London (Imperial), The Los Alamos National Laboratory (LANL), the SI-KJalpha model from the University of Southern California (SIKJalpha), and the ECDC Ensemble Model (ECDC) Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from available locations in that region.
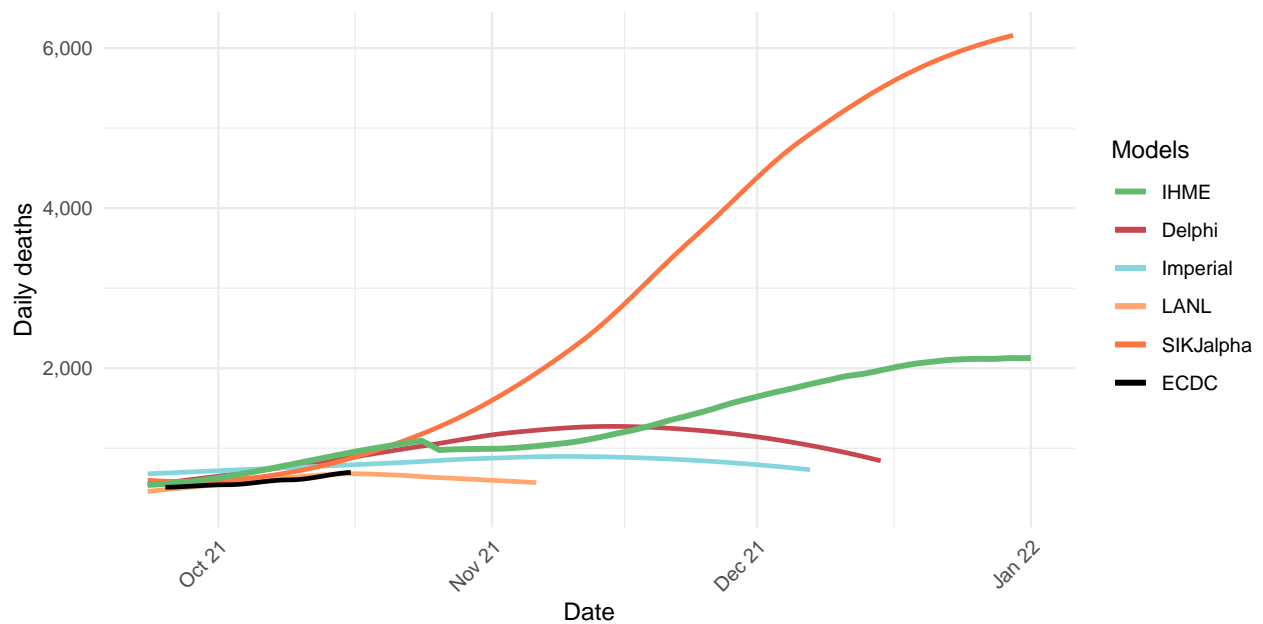
Figure 27. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and 20% or greater is considered *extreme stress*.
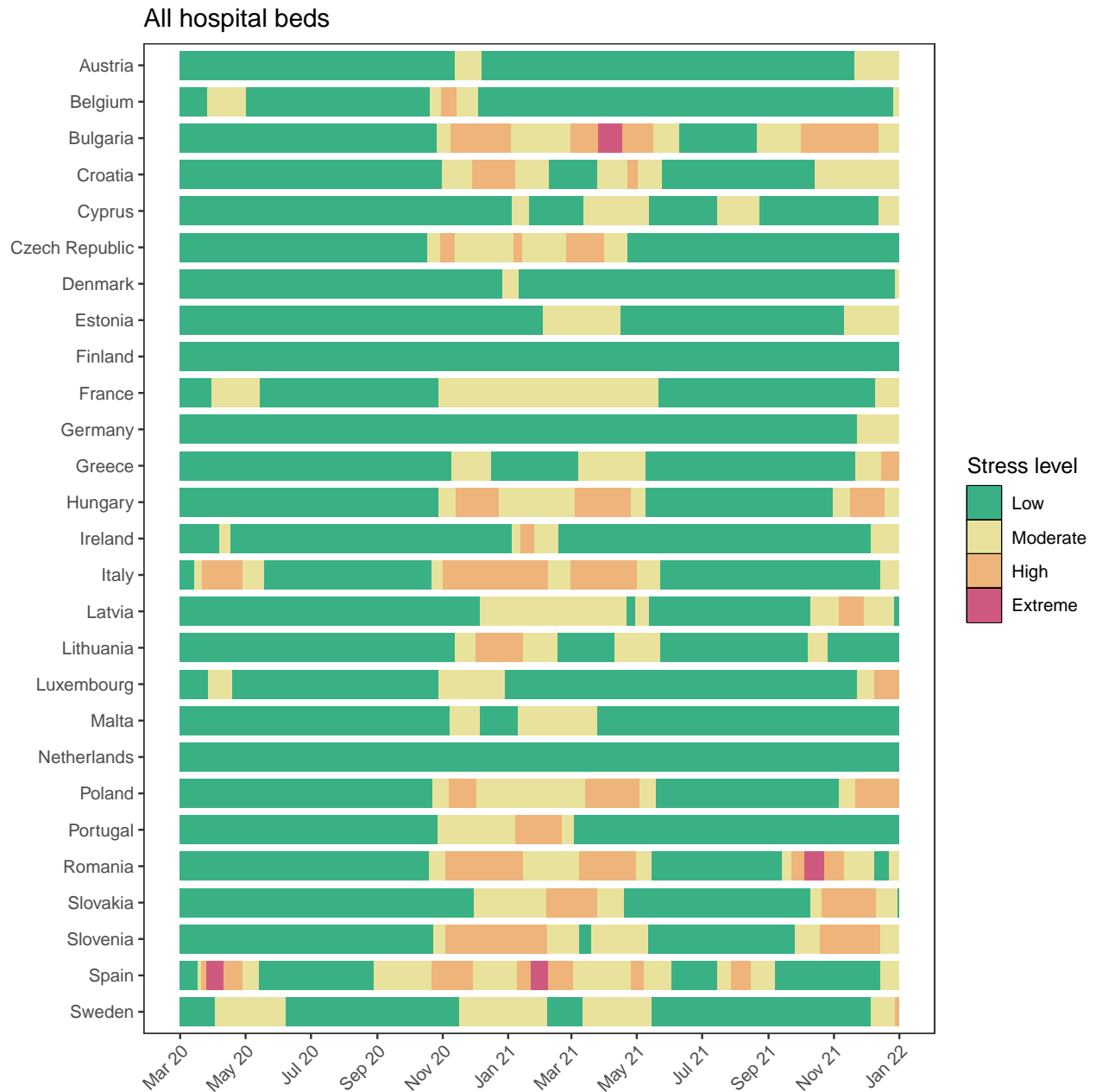
Figure 28. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *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.