COVID-19 Results Briefing

The European Union

September 15, 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 14, 2021, with data through September 13, 2021.

Delta variant surges continue to unfold in many member states, including Hungary, Romania, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Sweden, Germany, and Austria. In Cyprus, Denmark, Finland, France, Ireland, Italy, Portugal, and Spain, transmission continues to decline. Delta surges are likely to appear soon in Poland and Czechia. Given the strong west to east declining gradient in vaccination rates, the reason for the peaks in the western part of the EU is more likely linked to high vaccination rates and moderate past infection rates. Outside the EU, in Russia and Central Asia specifically, the declines are more likely linked to very high rates of past infection and low to modest vaccination rates. We estimate that 53% of the EU population is currently immune to the Delta variant, and this could increase to 67% by January 1. In our reference scenario, we expect current Delta surges, combined with seasonality, to lead to a slow but steady increase in cases and deaths starting in mid-October, with daily deaths reaching over 2,300 by early December. Given vaccination rates, the expected increase in reported cases is greater, reaching 340,000 by mid-December. These reference forecasts may be optimistic for two critical reasons. First, we do not take into account waning immunity. More and more evidence is emerging from post-vaccination studies in England, the US, and Israel and from the long-term follow-up of the Pfizer and Moderna trials that vaccine-derived immunity wanes for preventing infection. This week, some evidence is also emerging that vaccine-derived immunity for hospitalizations and deaths may also wane, albeit at a slower rate. We plan to revise our model to incorporate this evidence on waning immunity over the next weeks. Second, we do not take into account the potential emergence of a new variant with increased transmissibility or immune escape. Some analysts have raised concern about the Mu variant, but there is not yet any population-level data to suggest this will lead to new surges. Strategies to manage the pandemic include 1) expanding vaccination coverage by addressing vaccine hesitancy, particularly in the eastern part of the EU; 2) promoting behaviors such as seasonal mask use in the at-risk populations to reduce the burden in late fall and winter; 3) consideration of booster shots given the growing evidence on waning immunity, particularly in at-risk populations; 4) use of mitigation measures to avoid school-based increases in transmission, including mask use, distancing, and vaccination requirements in eligible children; and 5) hospital resource planning for potential high demand for hospitalization when both COVID-19 and influenza coincide in the winter.

Current situation

- Estimated daily infections in the last week increased to 168,000 per day on average compared to 140,000 the week before (Figure 1).
- Daily hospital census in the last week (through September 13) increased to 50,700 per day on average compared to 48,600 the week before.

- Daily reported cases in the last week remained the same at 56,300 per day on average compared to the week before (Figure 2).
- Reported deaths due to COVID-19 in the last week remained essentially constant at 470 per day on average compared to the week before (Figure 3).
- Excess deaths due to COVID-19 in the last week increased to 920 per day on average compared to 850 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 times larger than the reported number of deaths.
- The daily reported COVID-19 death rate is greater than 4 per million in Bulgaria and Lithuania (Figure 4).
- The daily rate of excess deaths due to COVID-19 is greater than 4 per million in Bulgaria, Croatia, Estonia, Latvia, Lithuania, Romania, and several regions in Spain and Italy (Figure 4).
- We estimate that 26% of people in the European Union have been infected as of September 13 (Figure 6).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in the block of countries in the eastern half of the EU (Figure 7).
- The infection-detection rate in the European Union was close to 43% on September 13 (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 remains the dominant variant in all countries of the EU.

Trends in drivers of transmission

- Denmark removed all mandates except border restrictions for non-residents. Most EU nations still have in place mask mandates and some form of gathering restrictions.
- Mobility last week was 5% higher than the pre-COVID-19 baseline (Figure 11). Mobility was near baseline (within 10%) in 26 countries. Mobility was lowest in some regions of Spain and in Ireland.
- As of September 13, in the COVID-19 Trends and Impact Survey, 44% of people self-report that they always wore a mask when leaving their home (Figure 13). Mask use was highest in Portugal, Spain, most of Italy, Ireland, Lithuania, Latvia, Finland, and Cyprus.
- There were 410 diagnostic tests per 100,000 people on September 13 (Figure 15).
- As of September 13, 10 member states have reached 70% or more of the population who have received at least one vaccine dose, and six member states have reached 70% or more of the population who are fully vaccinated (Figure 17). The percentage fully vaccinated was less than 50% in Cyprus, Slovenia, Slovakia, Romania, Bulgaria, Poland, Latvia, and Estonia.

- In the European Union, 73.2% of adults say they would accept or would probably accept a vaccine for COVID-19. The proportion of the 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 302 million people will be vaccinated with at least one dose by January 1 (Figure 20). We expect that by January 1, 65% of the population will be fully vaccinated.
- 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, 61% of people in the EU will be immune to the Delta variant (Figure 21). These two calculations do not take into account 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 932,000 cumulative reported deaths due to COVID-19 on January 1. This represents 164,000 additional deaths from September 13 to January 1. Daily reported deaths will rise to 2,300 by the end of December (Figure 22).
- Under our **reference scenario**, our model projects 1,657,000 cumulative excess deaths due to COVID-19 on January 1. This represents 321,000 additional deaths from September 13 to January 1 (Figure 22).
- If **universal mask coverage (95%)** were attained in the next week, our model projects 101,000 fewer cumulative reported deaths compared to the reference scenario on January 1.
- Under our **worse scenario**, our model projects 1,110,000 cumulative reported deaths on January 1, an additional 178,000 deaths compared to our reference scenario. Daily reported deaths in the **worse scenario** will rise to 5,500 by the first week of December (Figure 22).
- Daily infections in the **reference scenario** will rise to over 600,000 by mid-December and then remain near that level until the end of December (Figure 23). Daily infections in the **worse scenario** will rise to 1.4 million by mid-November (Figure 23).
- Daily cases in the **reference scenario** will rise to 340,000 by the end of December (Figure 24). Daily cases in the **worse scenario** will rise to 825,000 by the end of November (Figure 24).
- Daily hospital census in the **reference scenario** will rise to nearly 250,000 on January 1, 2022 (Figure 25). Daily hospital census in the **worse scenario** will rise to nearly 575,000 by early December (Figure 25).

- Figure 26 compares our reference scenario forecasts to other publicly archived models. The MIT Delphi model predicts a massive epidemic in Romania that leads to huge numbers for the EU. The other models and the ECDC ensemble have similar forecasts through mid-October and then more divergence across the models in November and December.
- At some point from September through January 1, 16 member states will have high or extreme stress on hospital beds (Figure 27). At some point from September through January 1, 24 member states will have high or extreme stress on intensive care unit (ICU) capacity (Figure 28).

Model updates

No model updates

Figure 1. Daily COVID-19 hospital census and infections

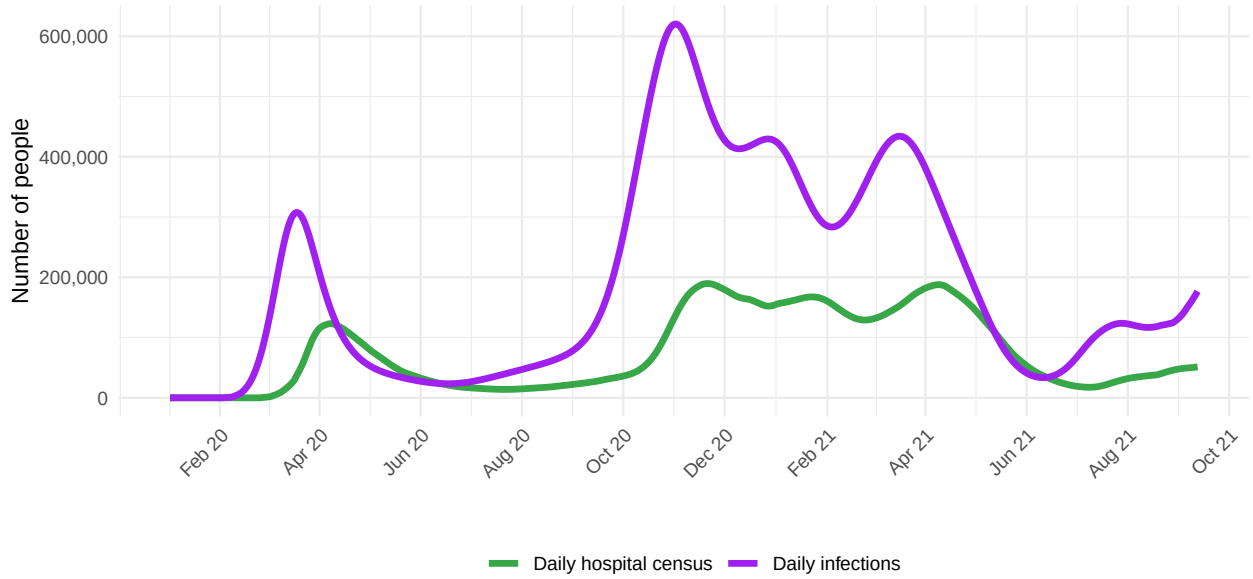


Figure 2. Reported daily COVID-19 cases, moving average

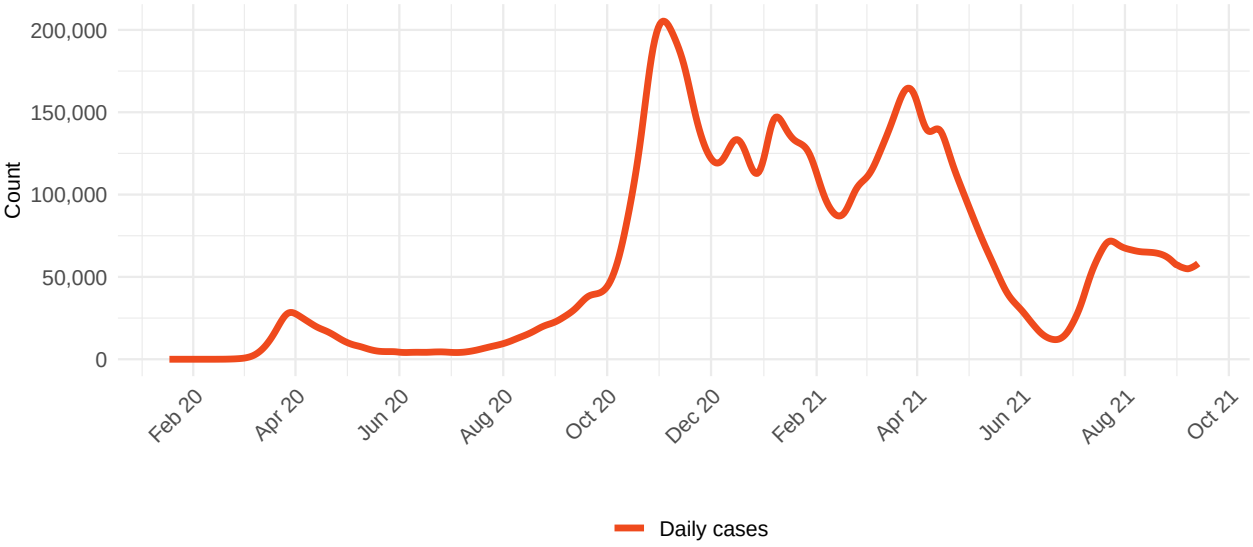


Table 1. Ranking of excess deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	18,714	1
Stroke	10,303	2
COVID-19	6,457	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)

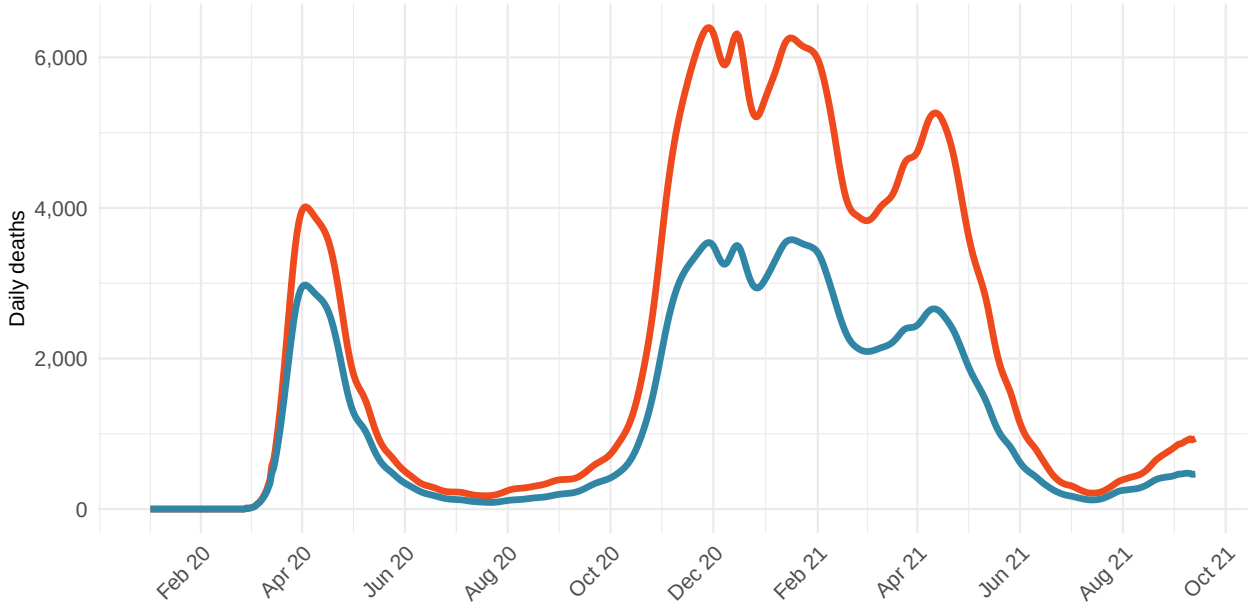
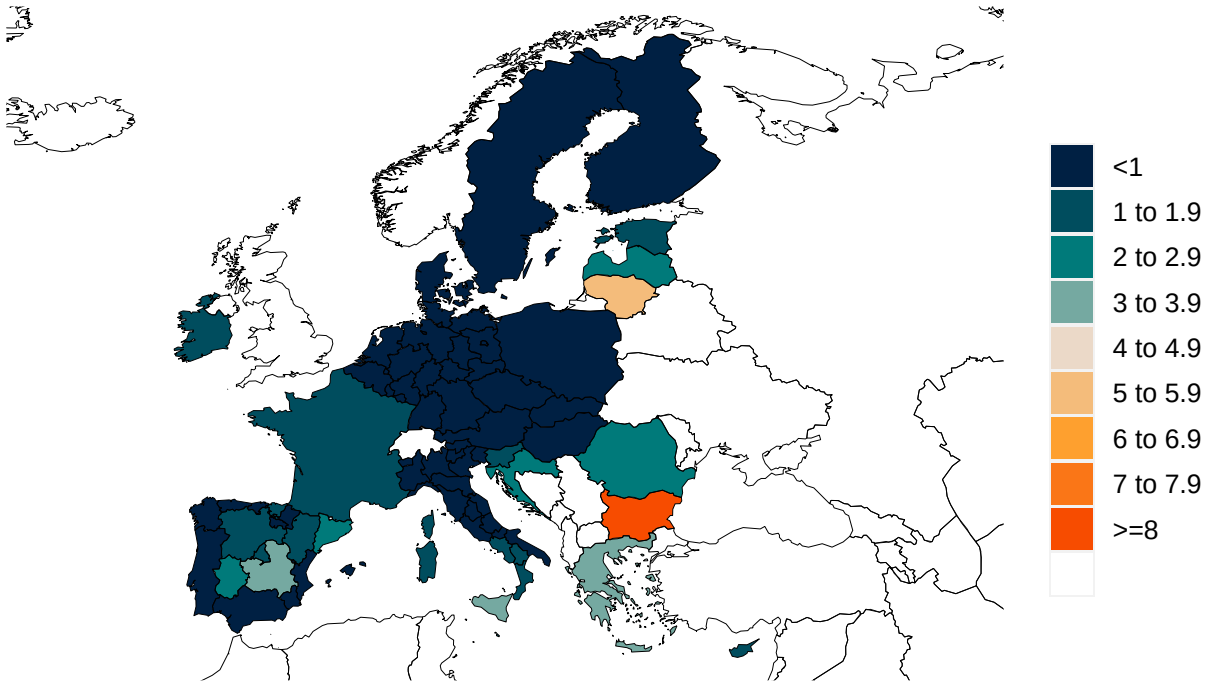


Figure 4. Daily COVID-19 death rate per 1 million on September 13, 2021

A. Daily reported COVID-19 death rate per 1 million



B. Daily excess COVID-19 death rate per 1 million

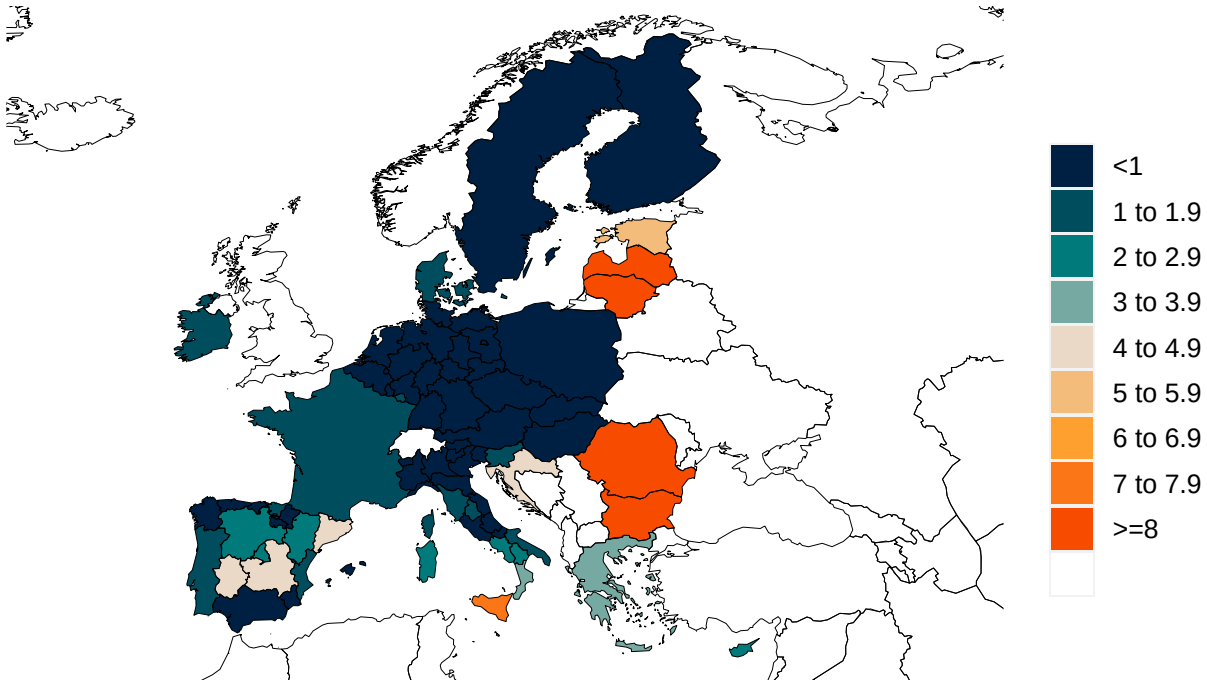
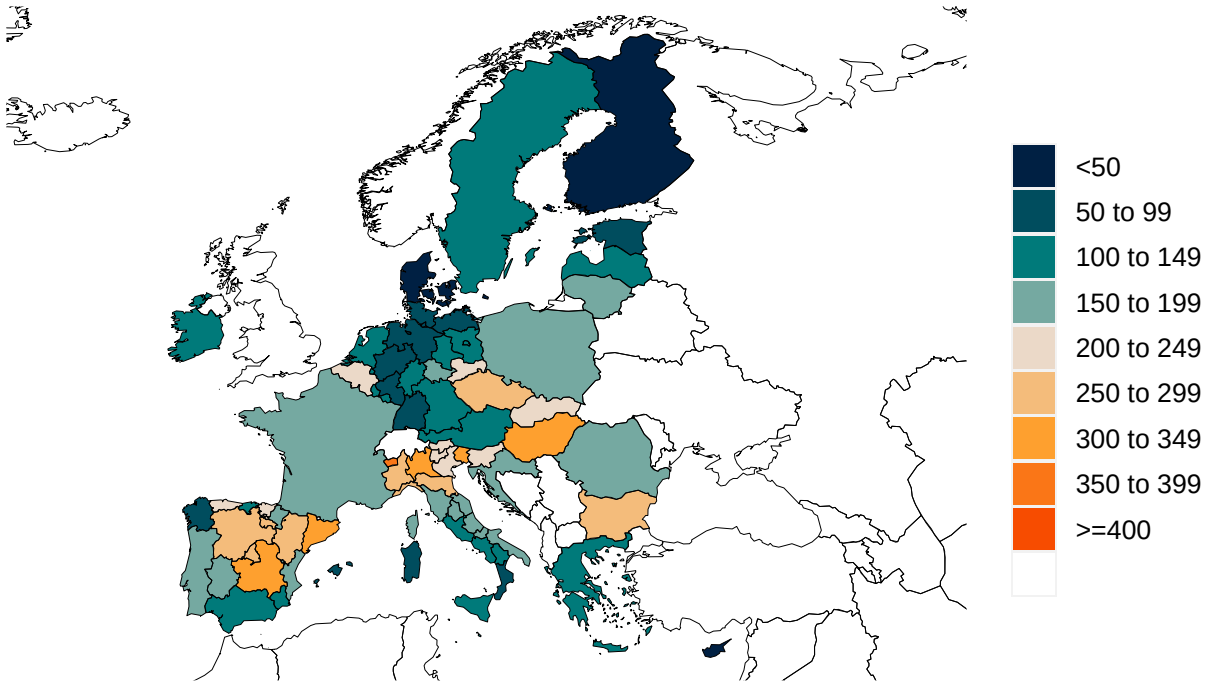


Figure 5. Cumulative COVID-19 deaths per 100,000 on September 13, 2021

A. Reported cumulative COVID-19 deaths per 100,000



B. Excess cumulative COVID-19 deaths per 100,000

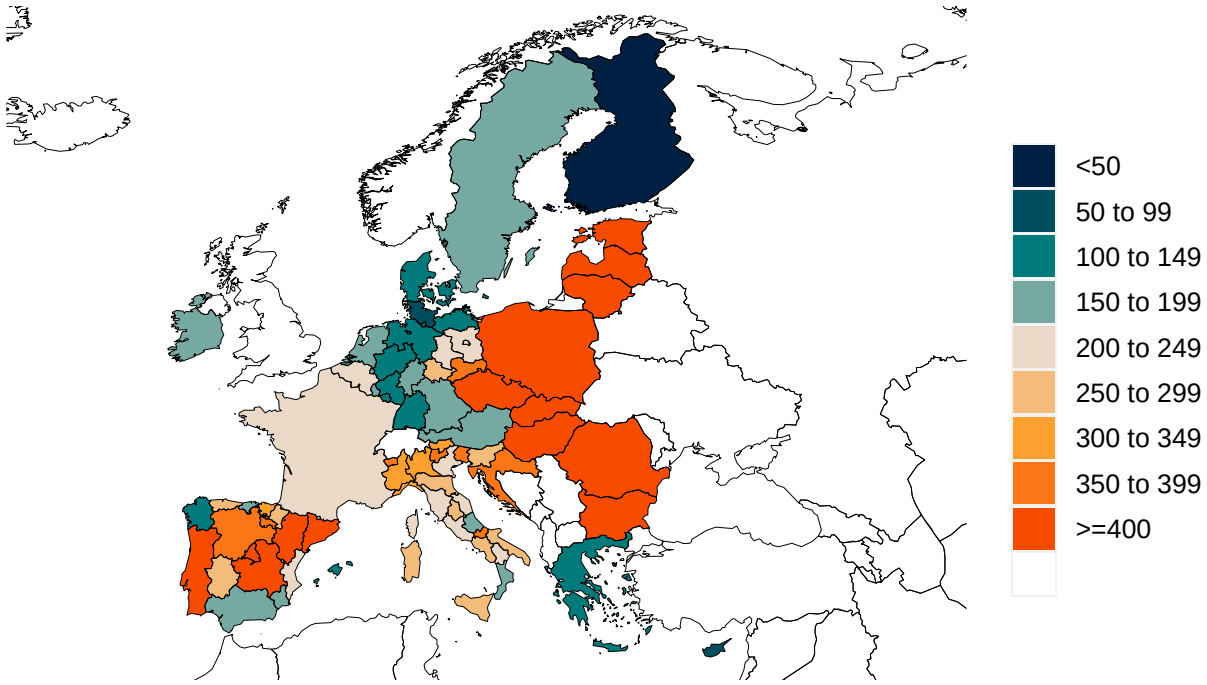


Figure 6. Estimated percent of the population infected with COVID-19 on September 13, 2021

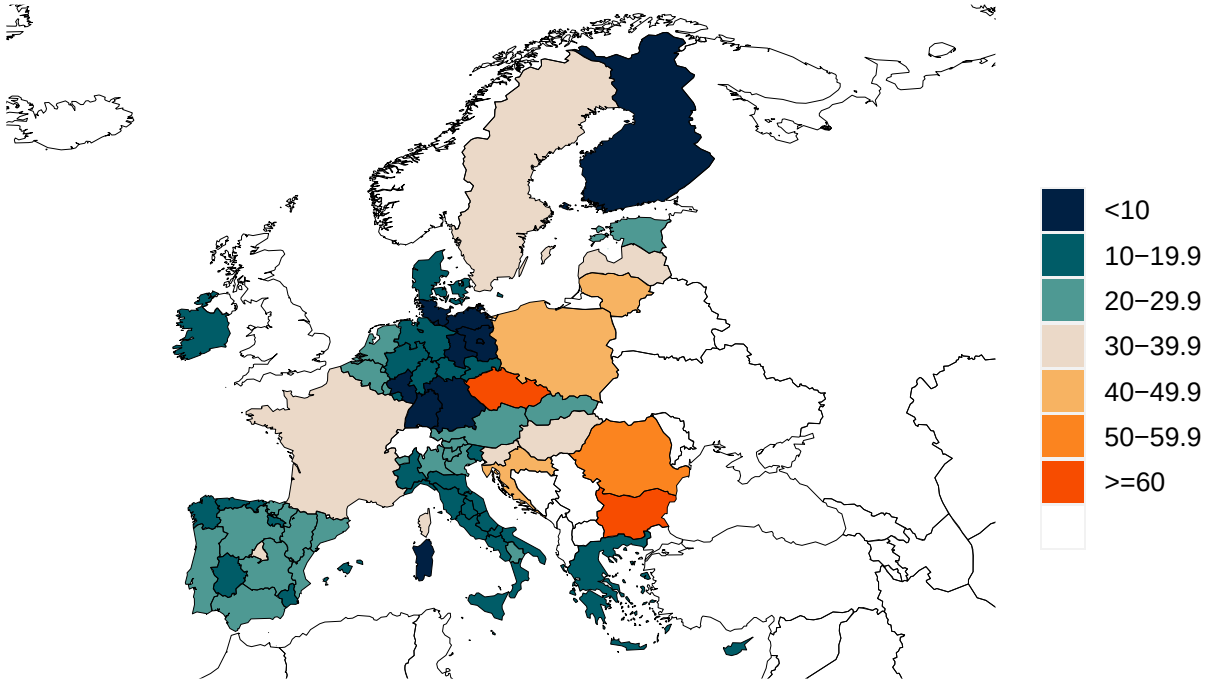


Figure 7. Mean effective R on September 2, 2021. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.

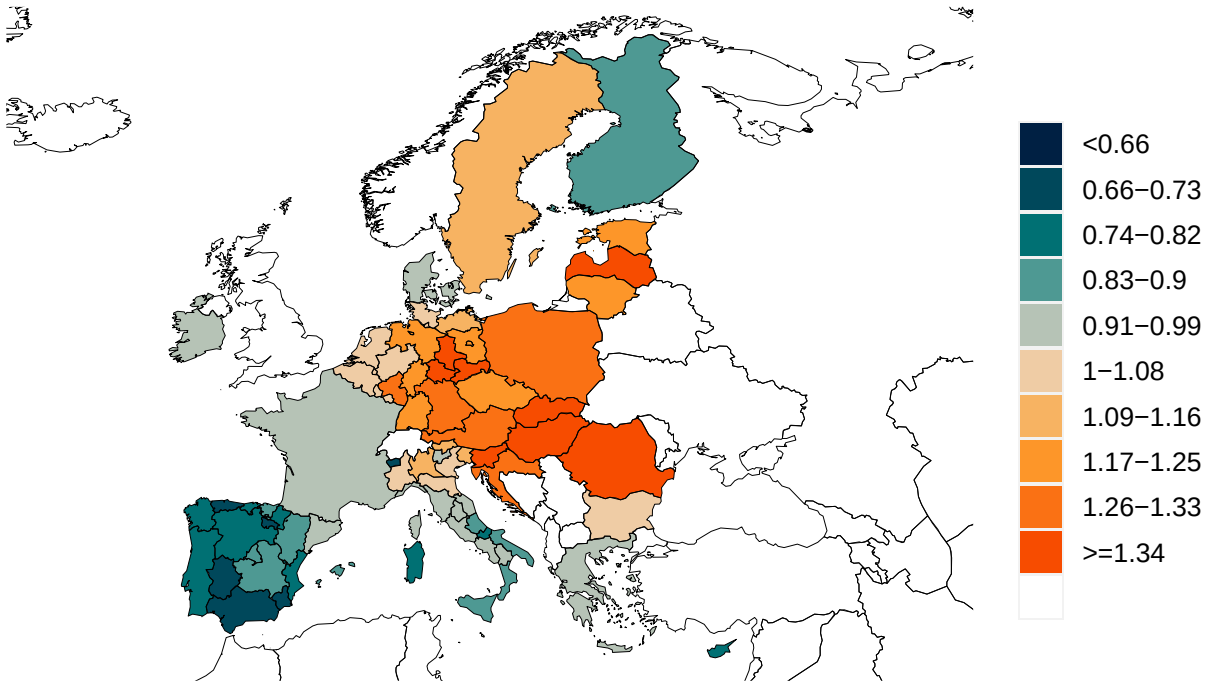


Figure 8. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100% at particular points in time.

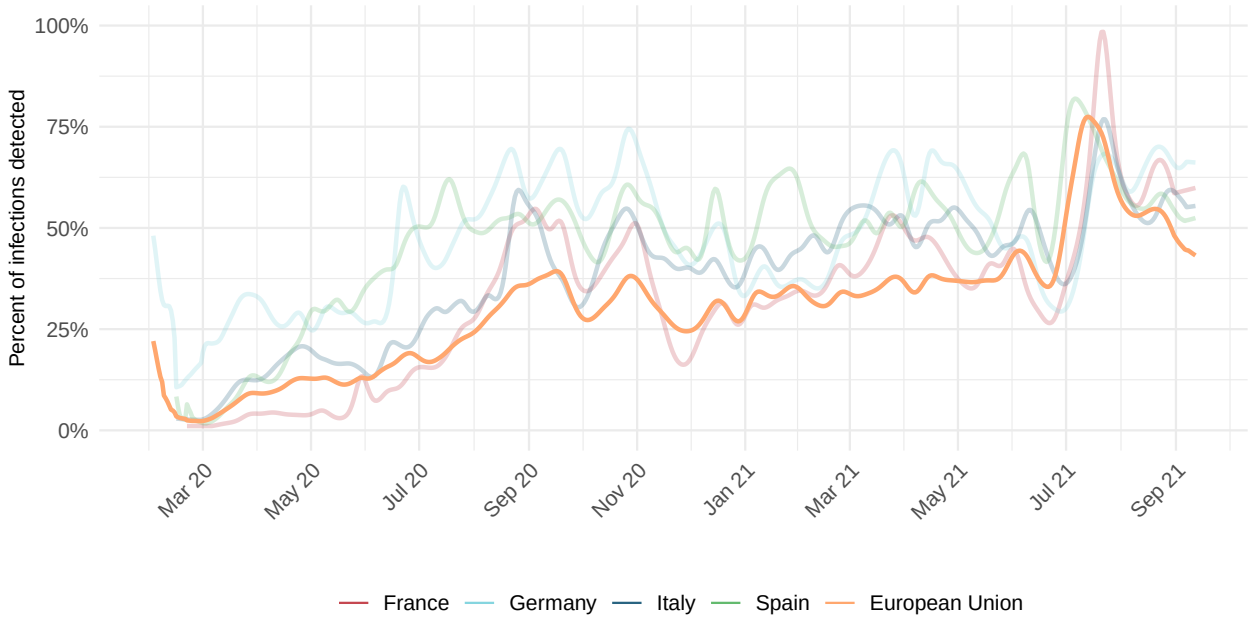
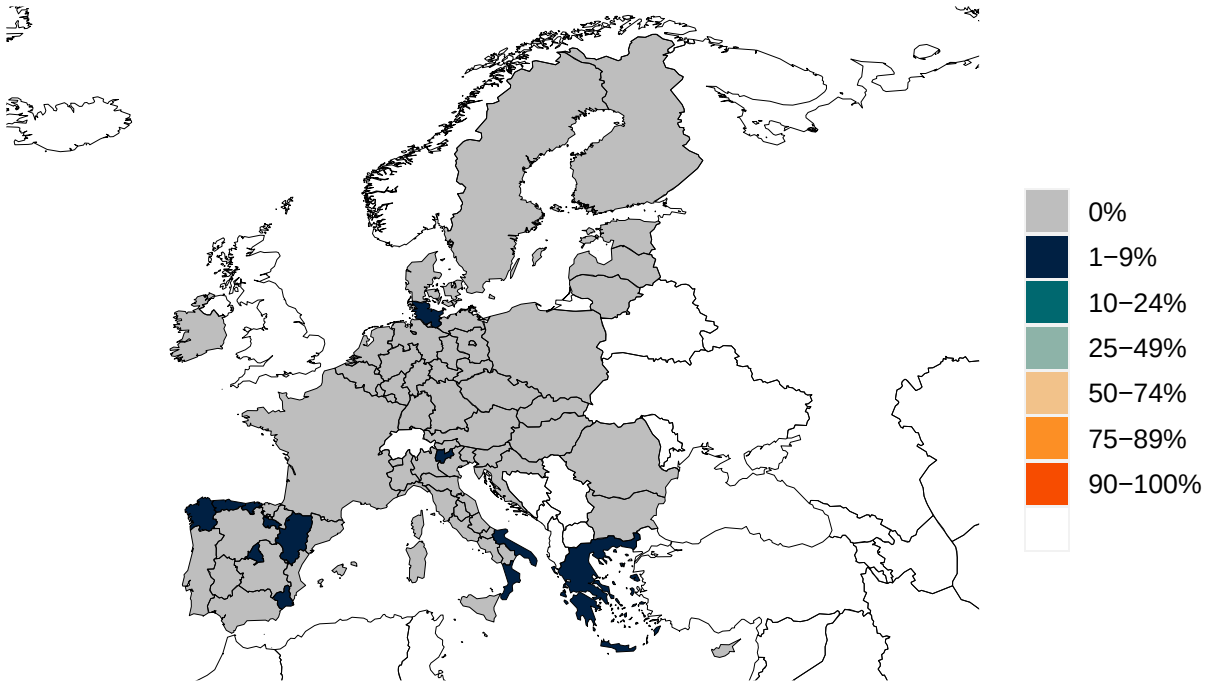
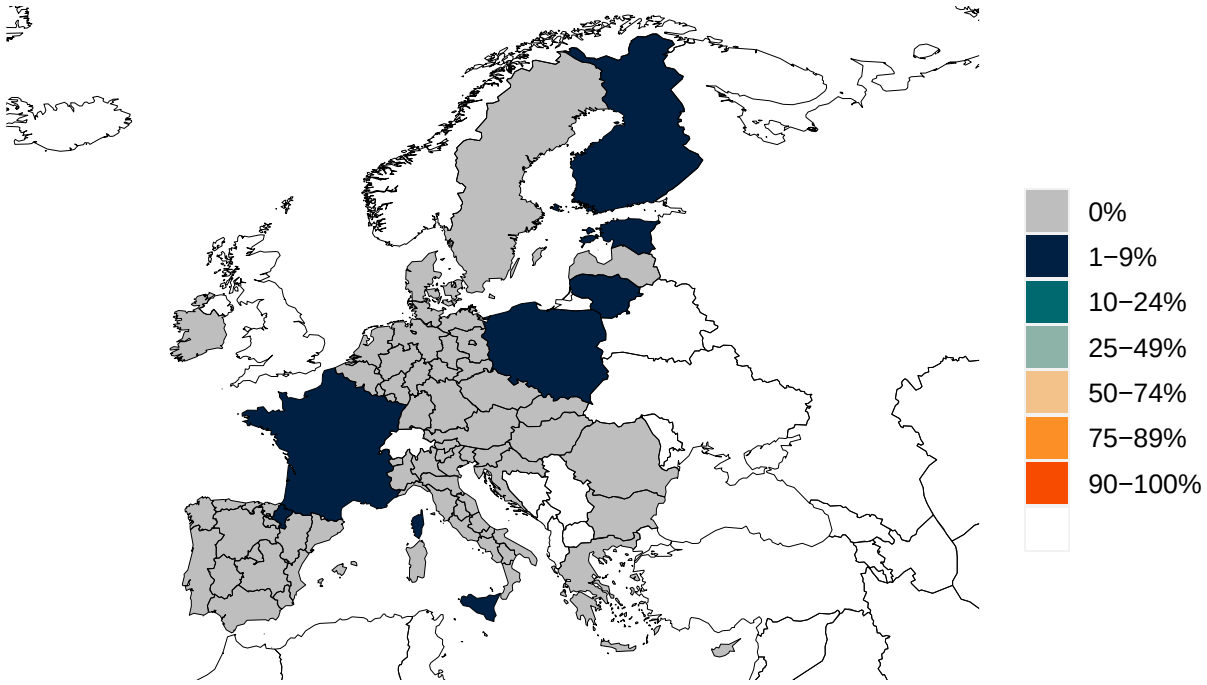


Figure 9. Estimated percent of circulating SARS-CoV-2 for primary variant families on September 13, 2021

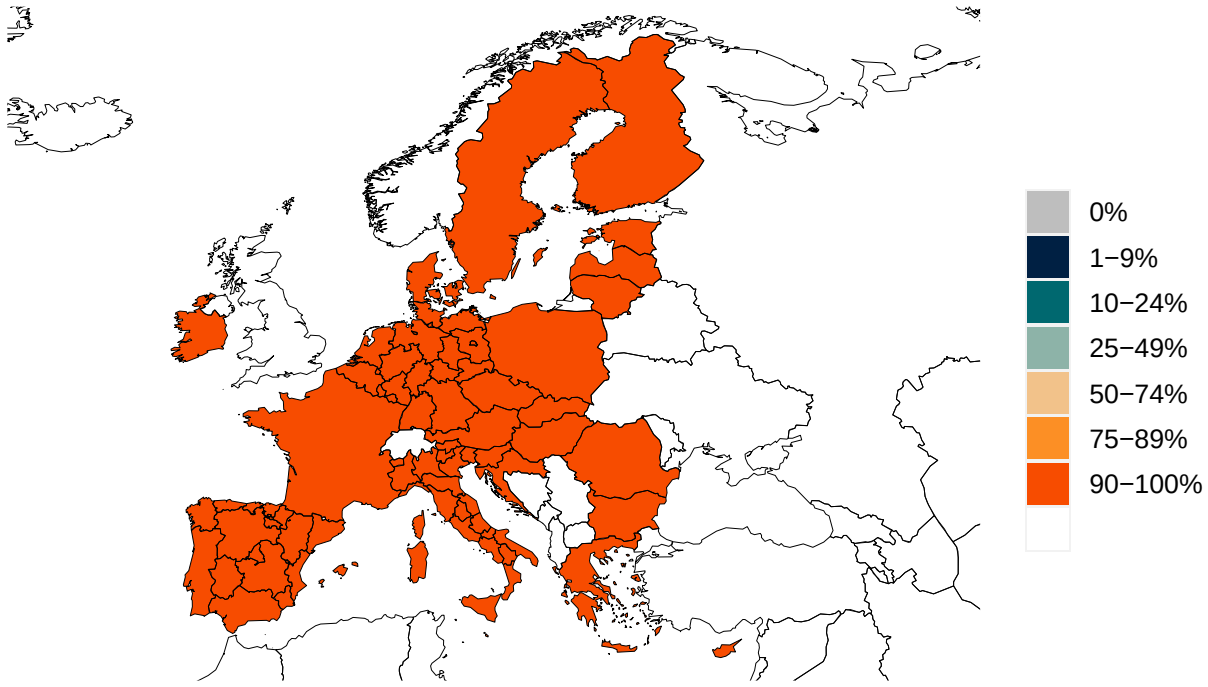
A. Estimated percent Alpha variant



B. Estimated percent Beta variant



C. Estimated percent Delta variant



D. Estimated percent Gamma variant

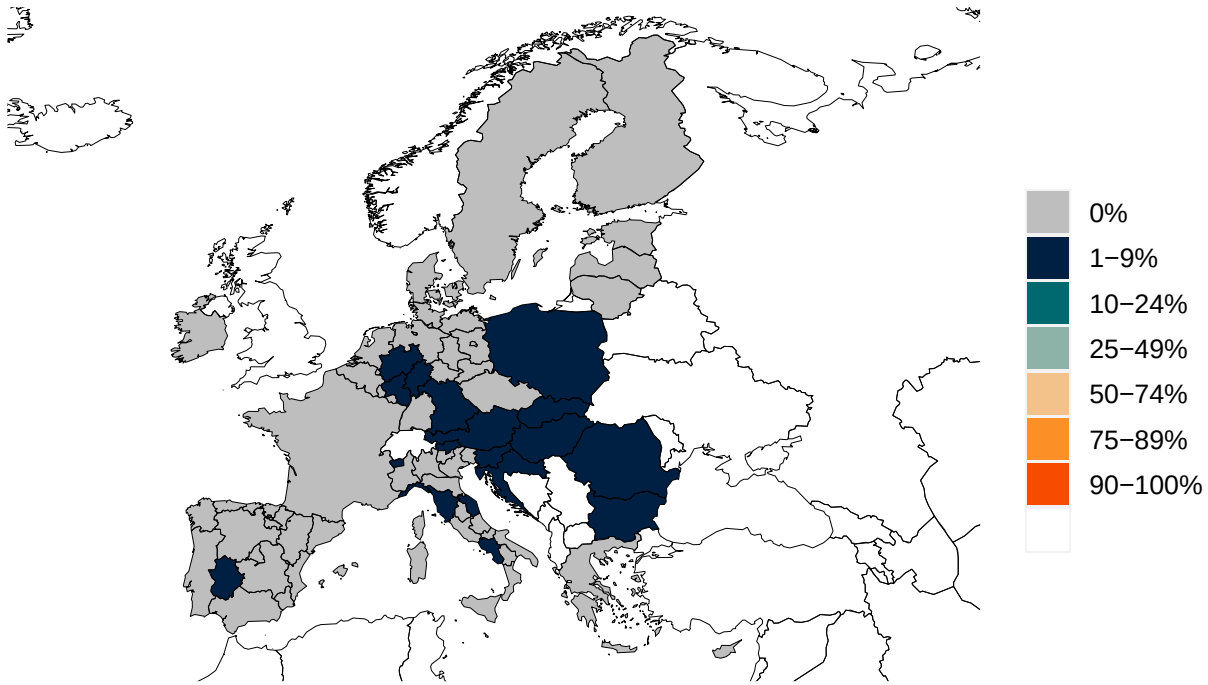
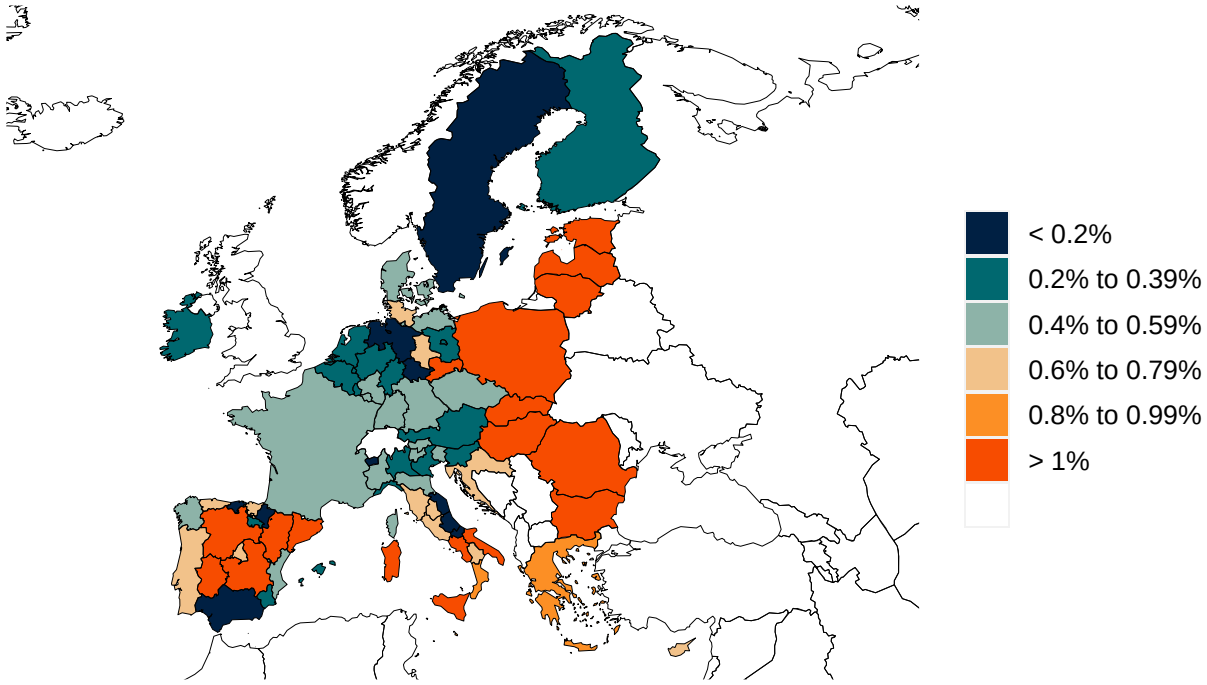
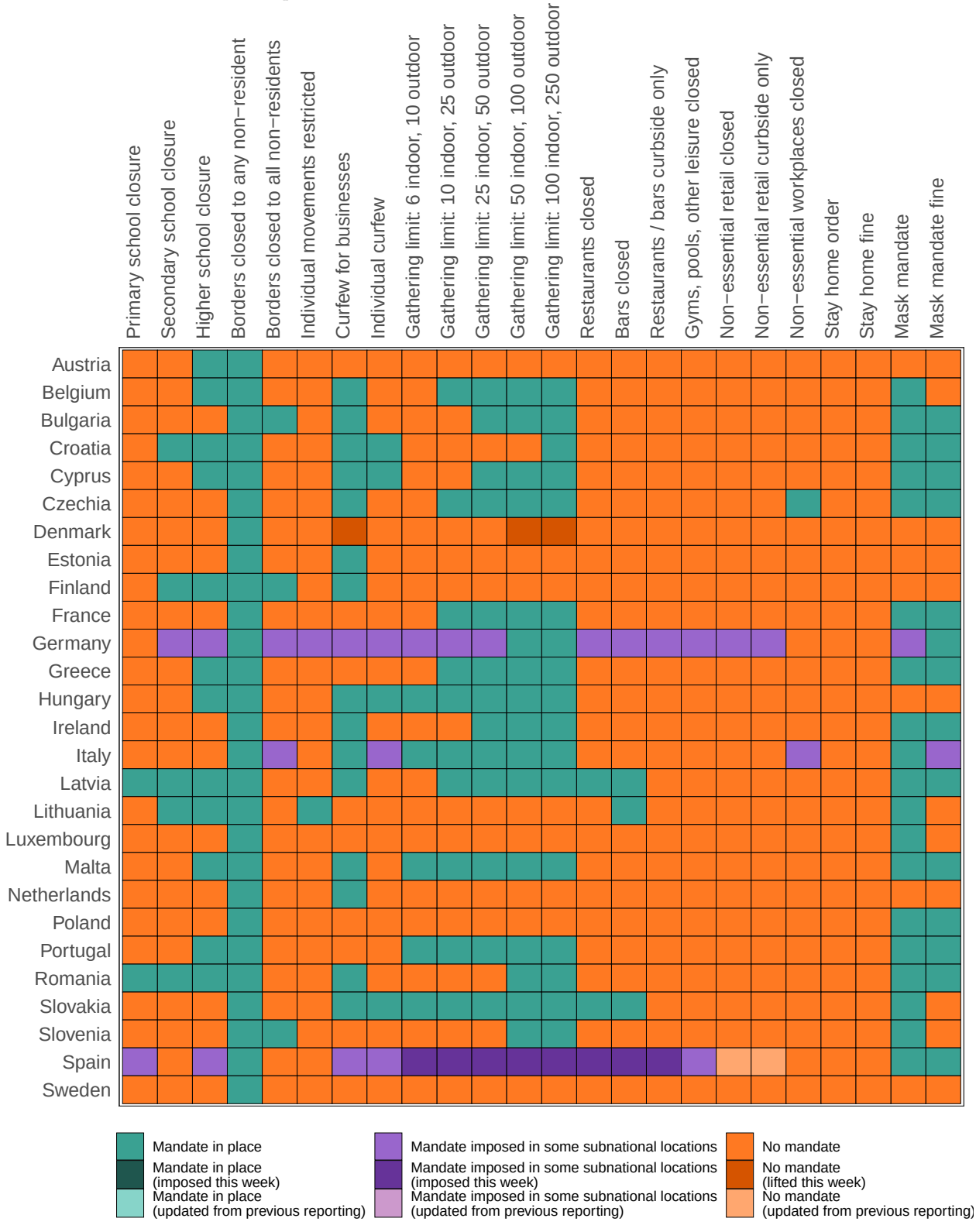


Figure 10. Infection-fatality rate on September 13, 2021. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.



Critical drivers

Table 2. Current mandate implementation



*Not all locations are measured at the subnational level.

Figure 11. Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

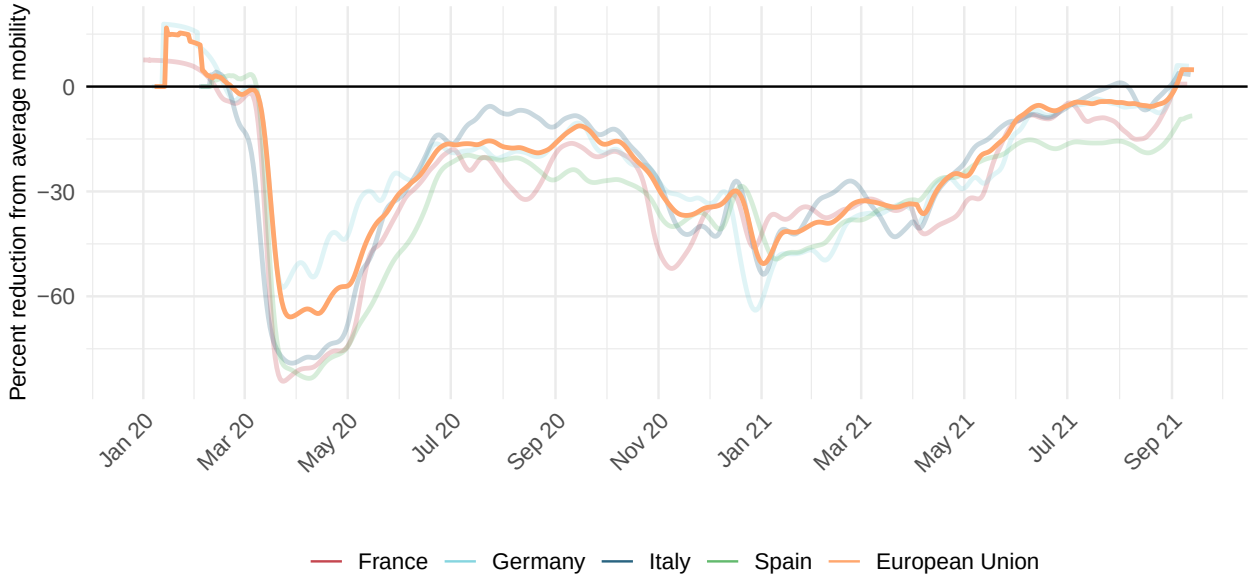


Figure 12. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on September 13, 2021

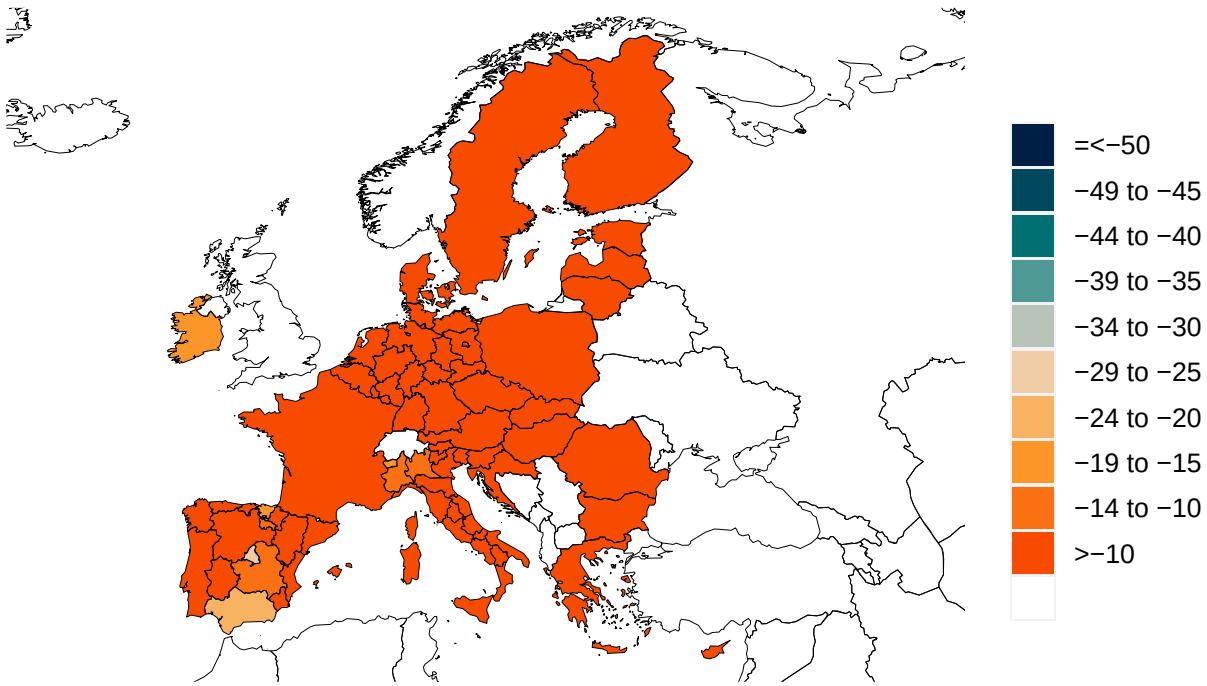


Figure 13. Trend in the proportion of the population reporting always wearing a mask when leaving home

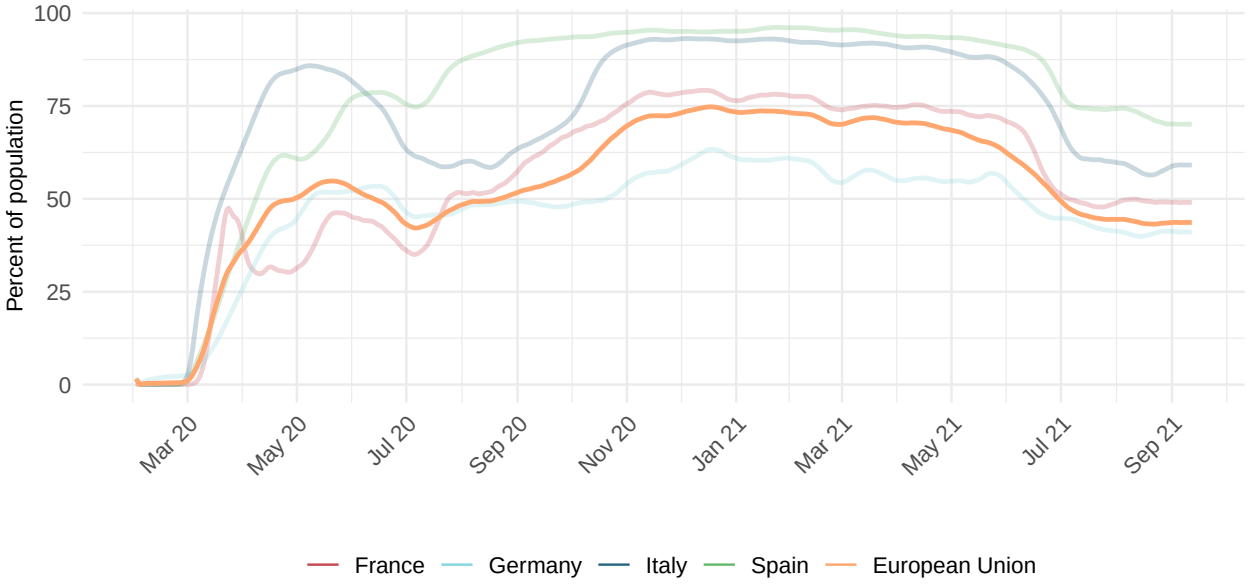


Figure 14. Proportion of the population reporting always wearing a mask when leaving home on September 13, 2021

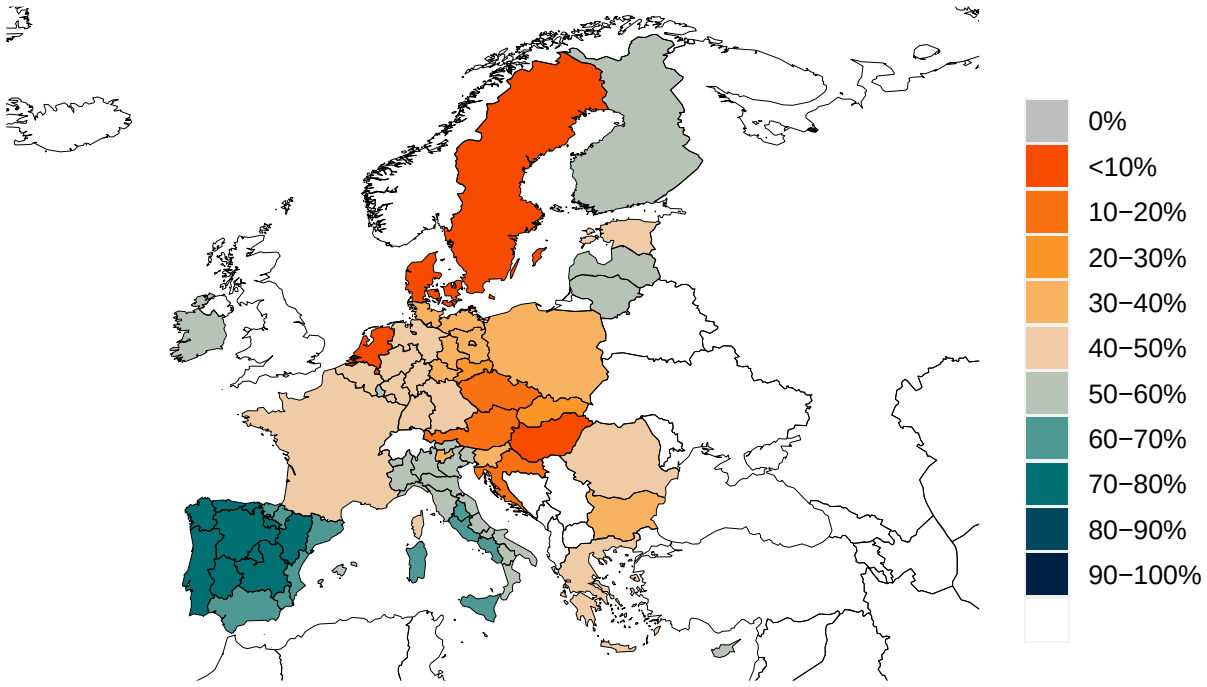


Figure 15. Trend in COVID-19 diagnostic tests per 100,000 people

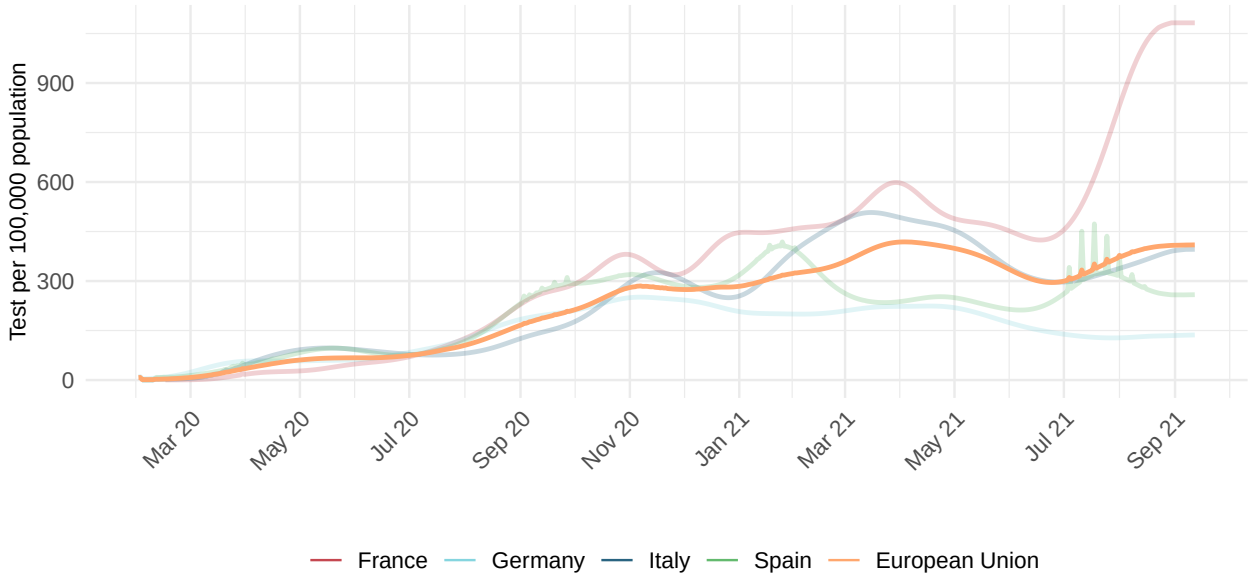


Figure 16. COVID-19 diagnostic tests per 100,000 people on September 13, 2021

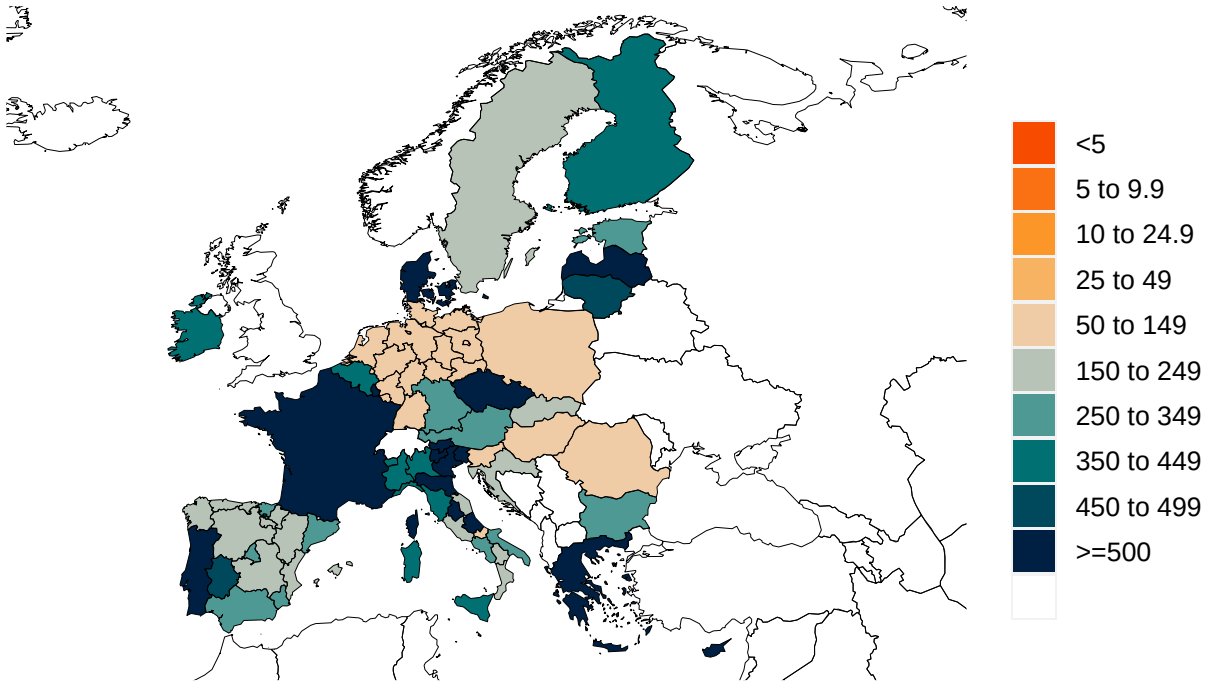
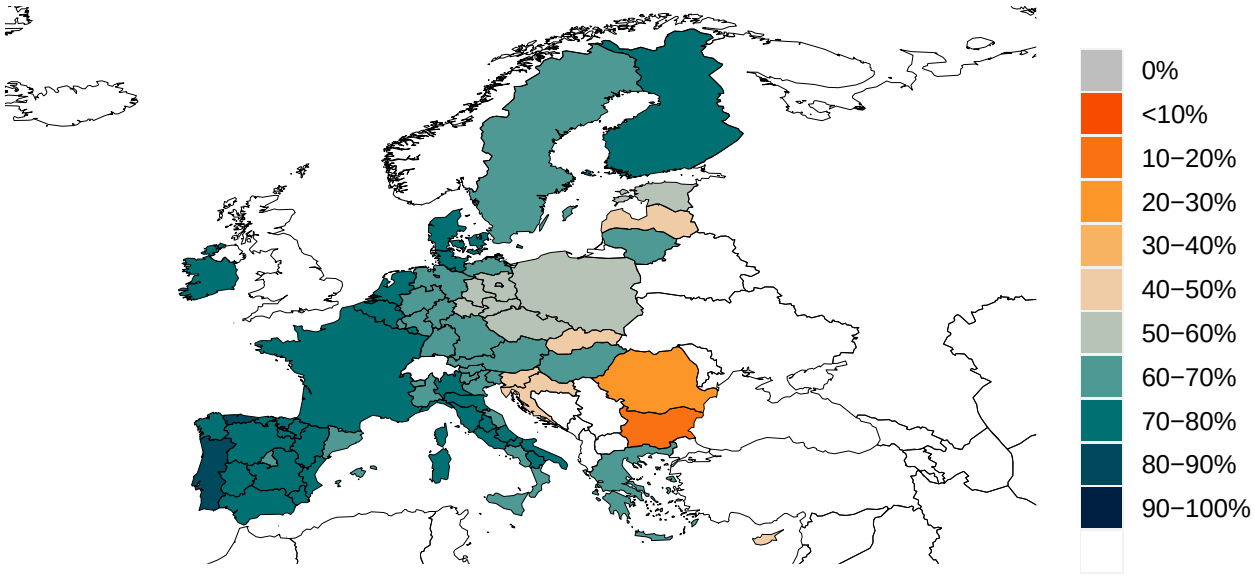


Table 3. Estimates of vaccine efficacy for specific vaccines used in the model at preventing disease and infection. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available, 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 13, 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

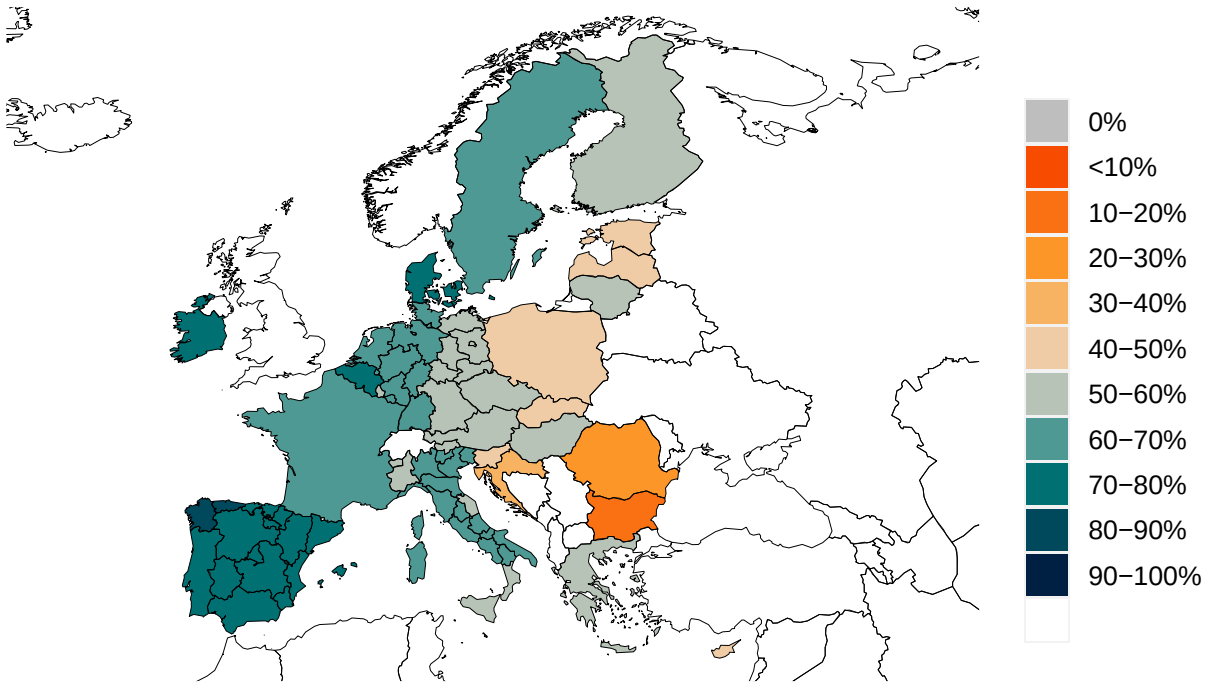


Figure 18. Trend in the estimated proportion of the adult (18+) population that have been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

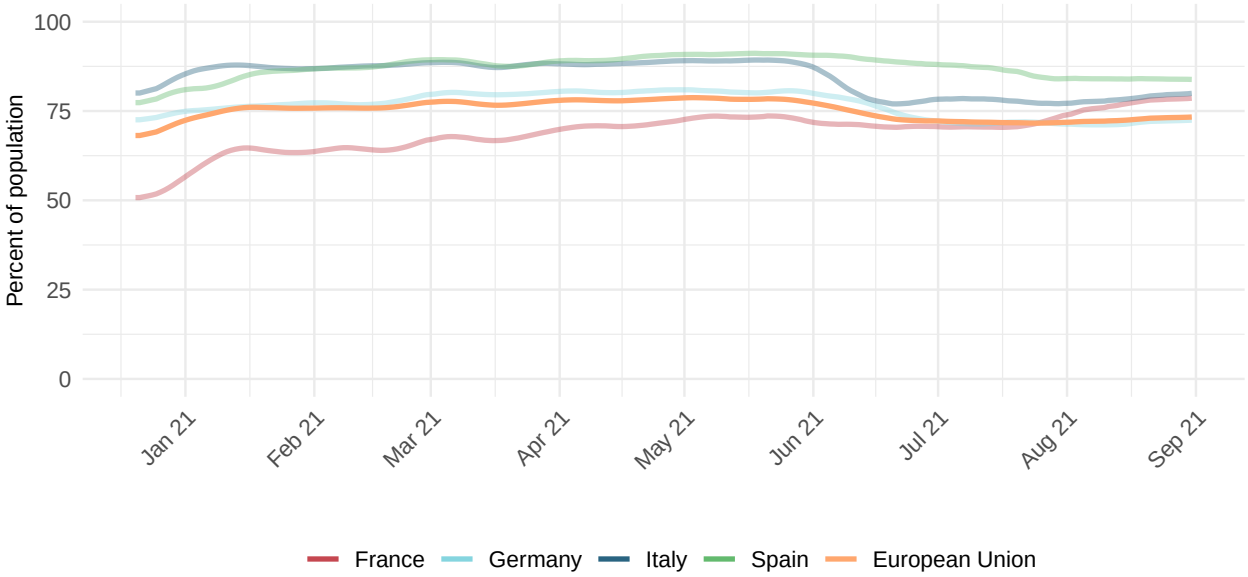


Figure 19. This figure shows the estimated proportion of the adult (18+) population that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

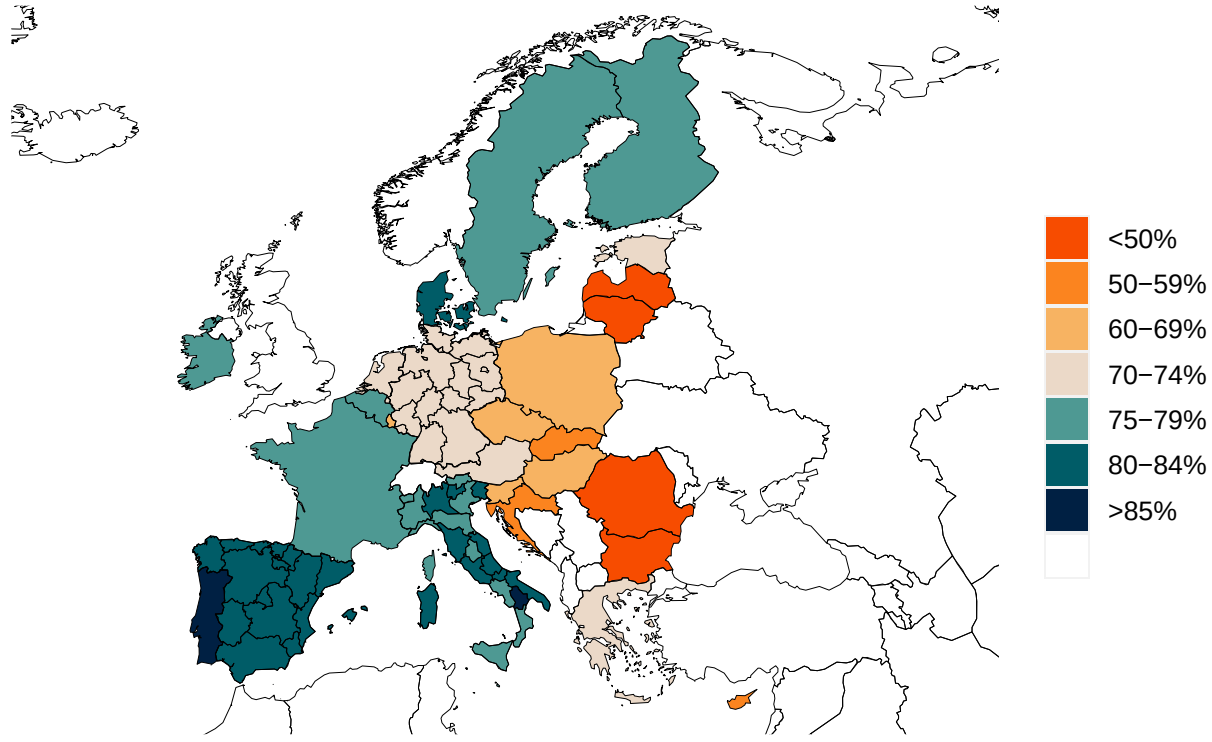


Figure 20. Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated

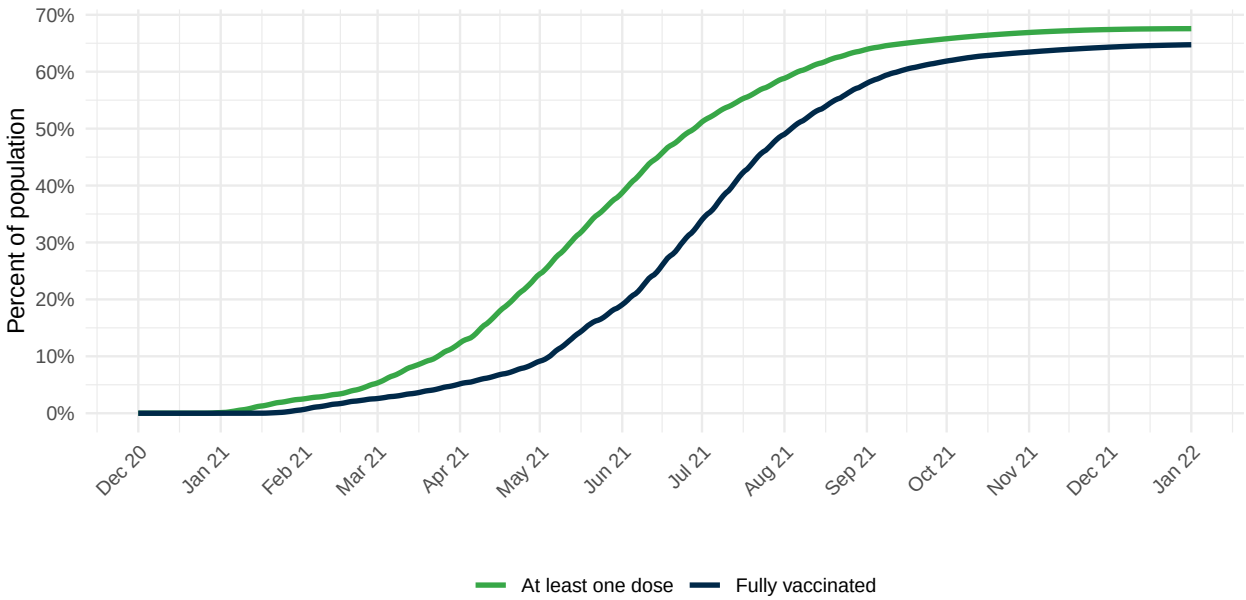
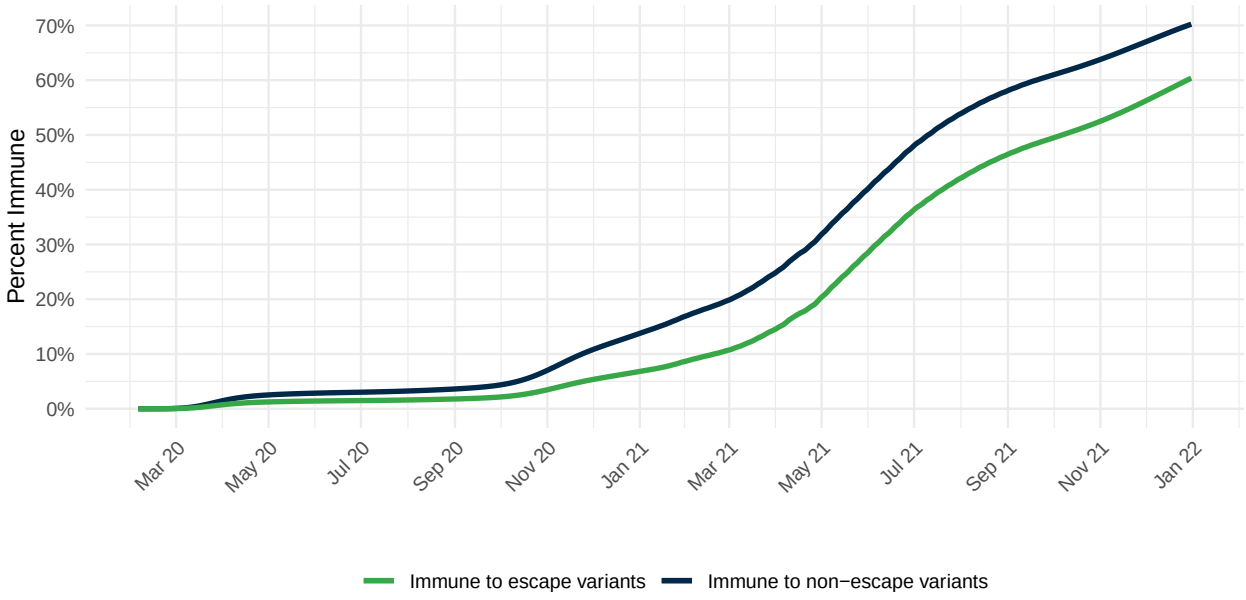


Figure 21. Percentage of people who are immune to non-escape variants and the percentage of people who are immune to escape variants



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.

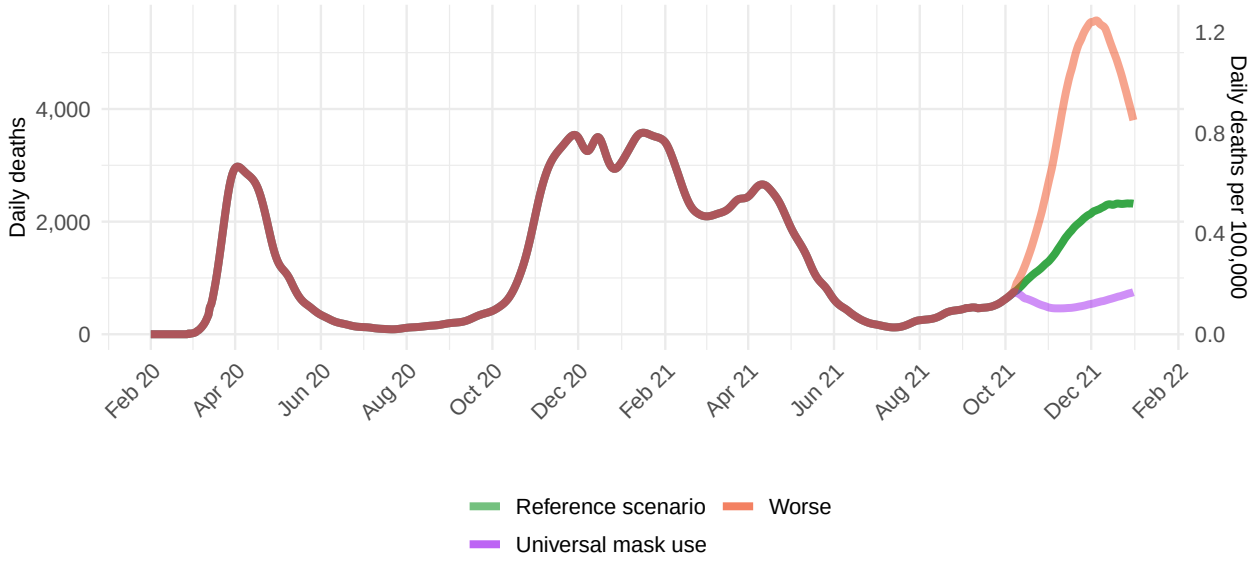
The **worse scenario** modifies the reference scenario assumption in four ways:

- 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



B. Excess daily COVID-19 deaths per 100,000

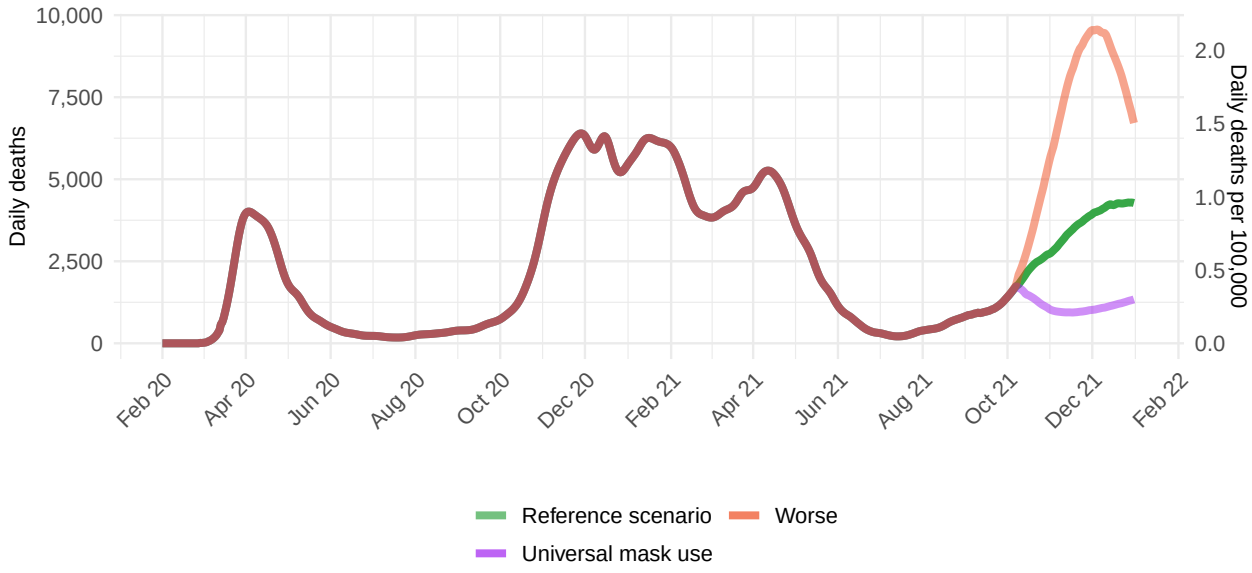


Figure 23. Daily COVID-19 infections until January 01, 2022 for three scenarios

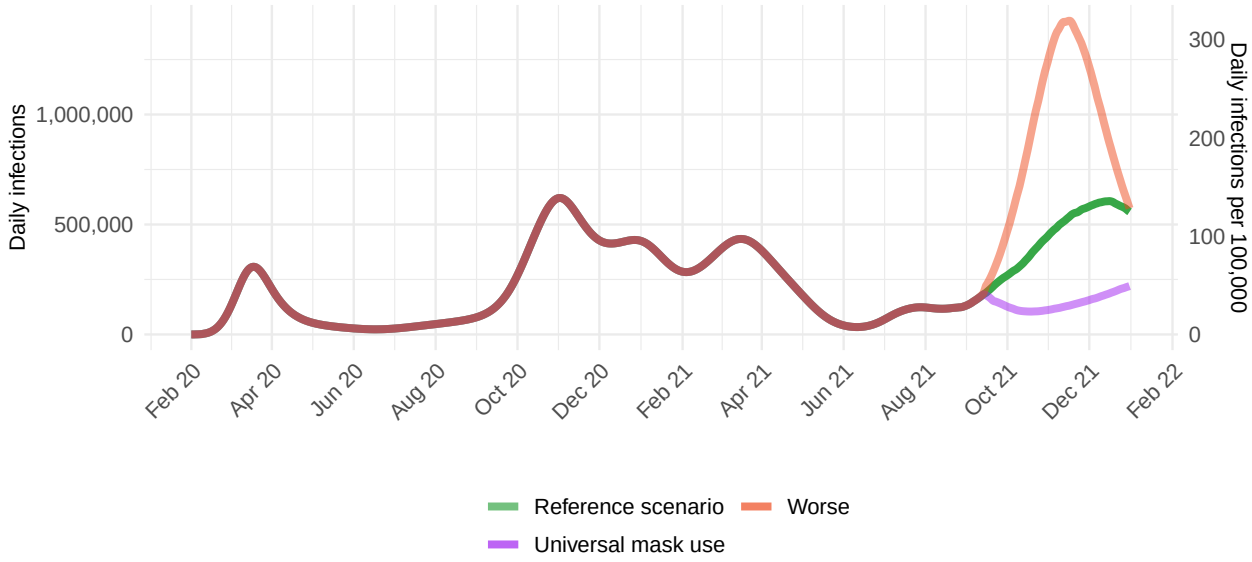


Figure 24. Daily COVID-19 reported cases until January 01, 2022 for three scenarios

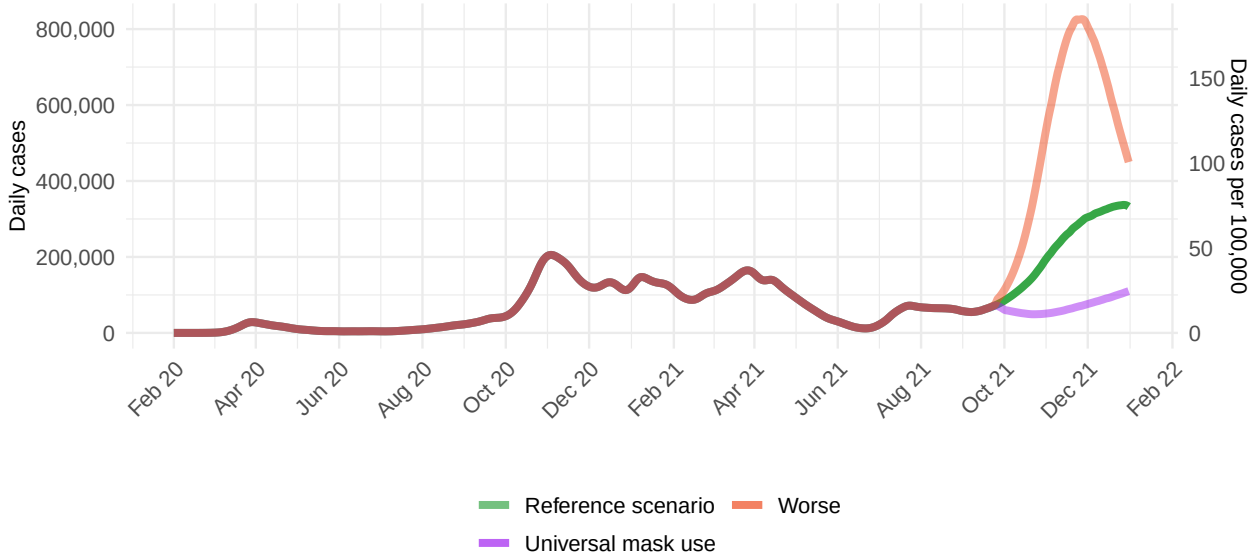


Figure 25. Daily COVID-19 hospital census until January 01, 2022 for three scenarios

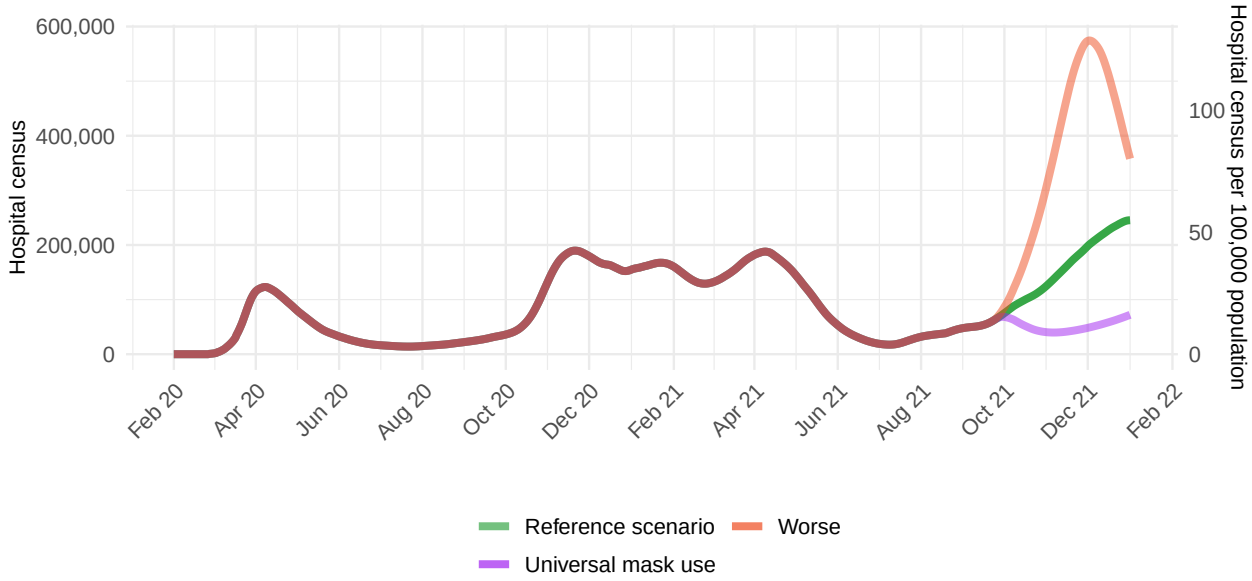


Figure 26. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachusetts Institute of Technology (Delphi), Imperial College London (Imperial), 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.

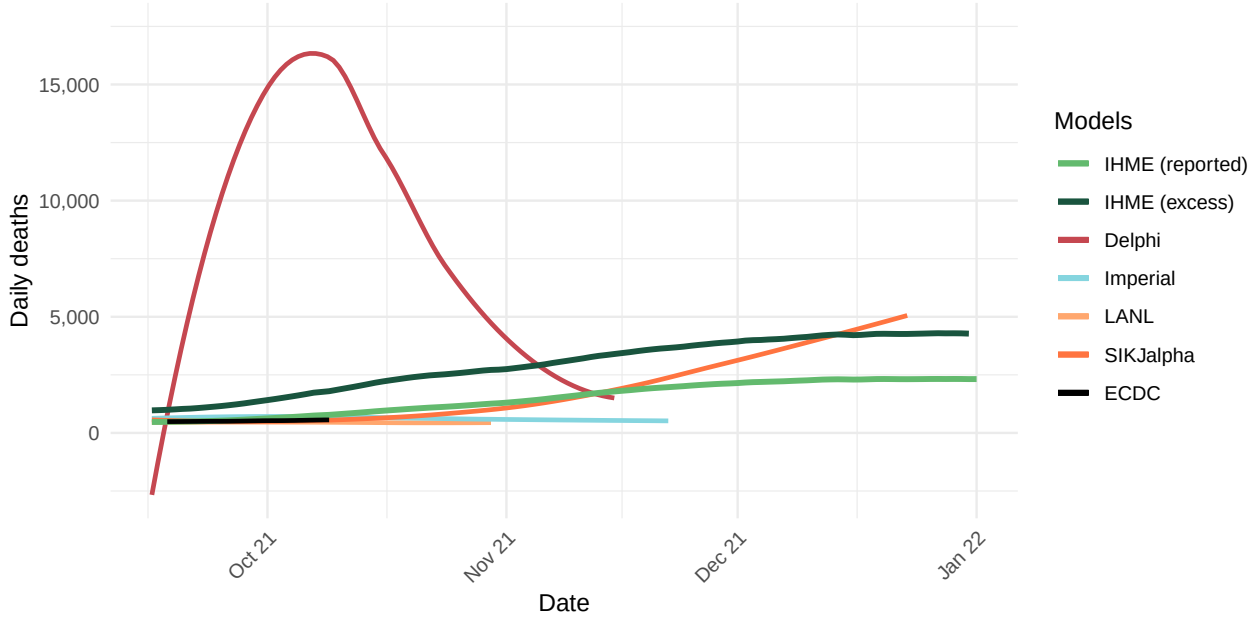


Figure 27. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and 20% or greater is considered *extreme stress*.

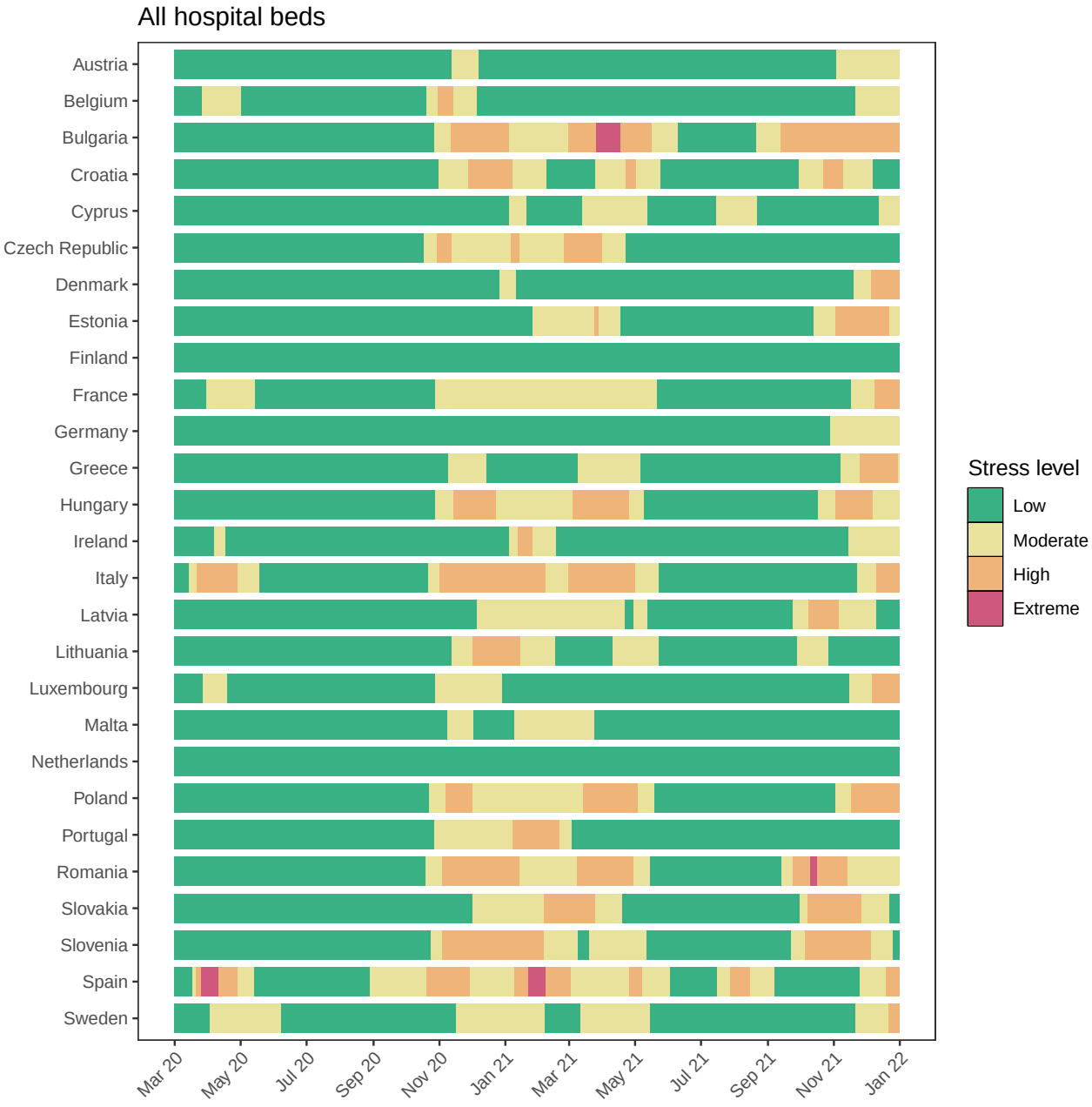
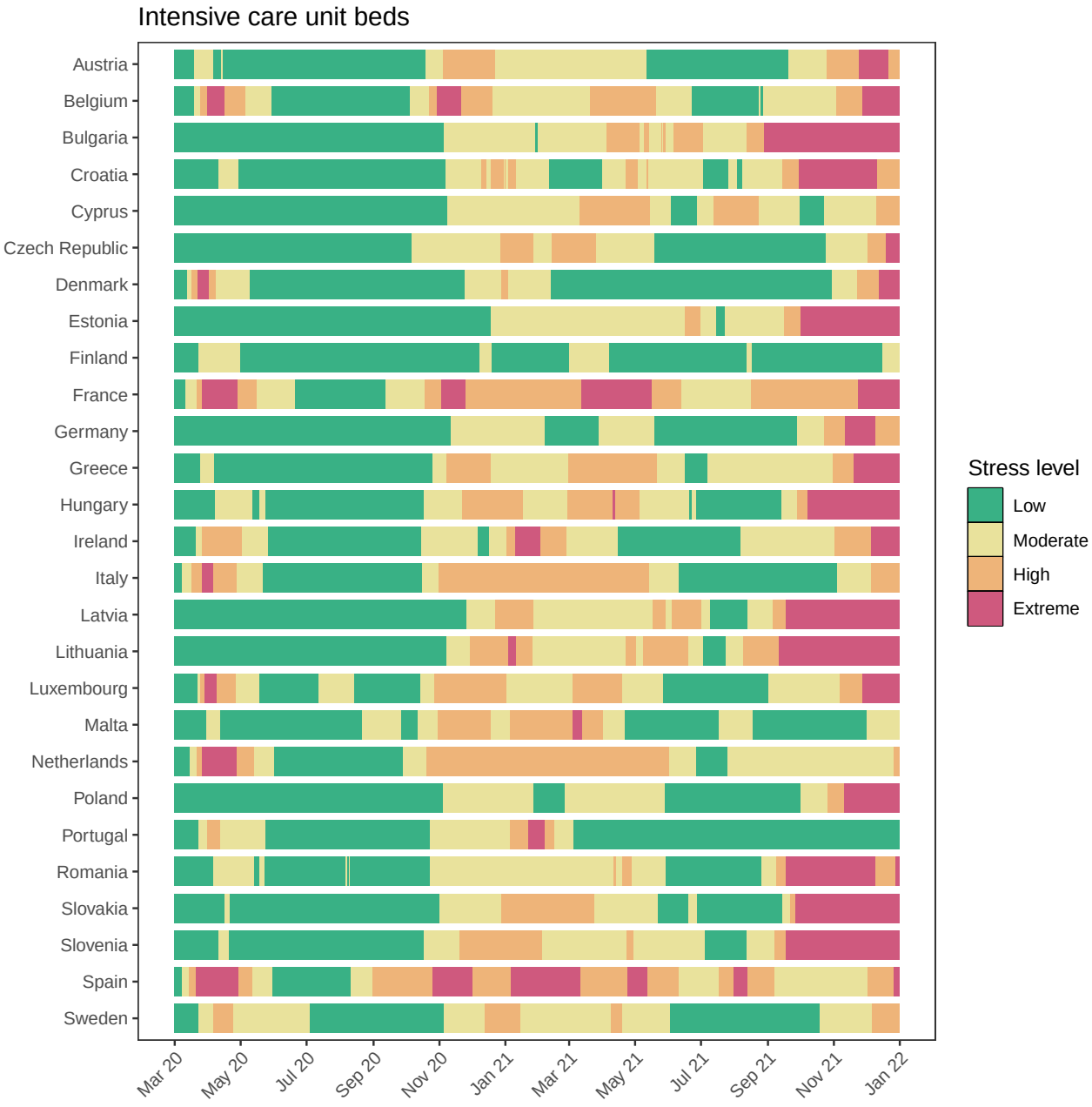


Figure 28. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *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.