COVID-19 Results Briefing

The United States of America

November 3, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in the United States of America. The model was run on November 2, 2021, with data through November 1, 2021.

There are early indications that the decline in the Delta surge at the national level has ended. Nineteen states have increasing transmission, including a number of states such as Arizona, California, and New Mexico that had previously appeared to have been declining. We expect that cases will begin to increase, with daily deaths increasing towards the end of November. The increases are expected based on winter seasonality, waning immunity, and declining protective behaviors such as mask use. Our reference forecast currently suggests only a modest winter surge peaking in the second week of February. Many factors can influence the magnitude and timing of the next peak. First, we have not incorporated the rollout of vaccination of children ages 5–11 in this iteration of the model. Given data on vaccine hesitancy of parents for their children, we expect that approximately half of children will be vaccinated over the next two months. Second, this model does not take into account waning immunity. We expect the next release of our models will factor this in. Vaccine-derived immunity against infection appears to drop considerably by six months, suggesting greater transmission potential as we approach the winter season. Third, we have not explicitly modeled the fraction of those eligible who will get a booster in the next months. Boosters may counteract the risks for wider transmission from waning immunity. Given a number of factors that can go in either direction, the magnitude of the winter peak and the timing of the peak is quite uncertain. It is, however, clear that the notion that COVID-19 is over is very unlikely to be true. Given that mask use is down to only 38%, and mobility is close to the pre-COVID-19 baseline, we should expect the joint impact of a considerable flu season and COVID-19 on hospitals. The main strategies at this point to modulate the pandemic are: 1) rapid vaccination of children ages 5–11, 2) continued outreach to promote adult vaccination, 3) promotion of boosters, and 4) promotion of seasonal mask use for those at risk.

Current situation

- Estimated daily infections in the last week decreased slightly to 158,700 per day on average compared to 160,000 the week before (Figure 1.1).
- Daily hospital census in the last week (through November 1) decreased to 48,000 per day on average compared to 53,500 the week before.
- Daily reported cases in the last week decreased to 71,600 per day on average compared to 71,800 the week before (Figure 2.1).
- Reported deaths due to COVID-19 in the last week decreased to 1,200 per day on average compared to 1,400 the week before (Figure 3.1).

- Total deaths due to COVID-19 in the last week decreased to 1,400 per day on average compared to 1,700 the week before (Figure 3.1). This makes COVID-19 the number 2 cause of death in the US this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 1.2 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 20 states (Figure 4.1).
- The daily rate of total deaths due to COVID-19 is greater than 4 per million in 29 states (Figure 4.2).
- We estimate that 34% of people in the US have been infected as of November 1 (Figure 6.1).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 19 states (Figure 7.1).
- The infection-detection rate in the US was close to 45% on November 1 (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 (Figure 9.1). The Delta variant is the dominant variant in all states.

Trends in drivers of transmission

- Mask mandates have been lifted in Louisiana. Seven states continue to have mandates. Some form of gathering restrictions are in place in five states.
- Mobility last week was 6% lower than the pre-COVID-19 baseline (Figure 11.1). Mobility was near baseline (within 10%) in 41 states. Mobility was lower than 30% of baseline in no locations.
- As of November 1, in the COVID-19 Trends and Impact Survey, 38% of people self-report that they always wore a mask when leaving their home (Figure 13.1).
- There were 484 diagnostic tests per 100,000 people on November 1 (Figure 15.1).
- As of November 1, 18 states have reached 70% or more of the population who have received at least one vaccine dose, and four states have reached 70% or more of the population who are fully vaccinated (Figure 17.1). Wyoming and West Virginia have one-dose vaccination coverage of less than 50%.
- In the US, 81.6% of the population 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. The proportion of the population who are open to receiving a COVID-19 vaccine ranges from 59% in West Virginia to 95% in Massachusetts (Figure 19.1).

- In our current reference scenario, we expect that 219 million people will be vaccinated with at least one dose by March 1 (Figure 20.1). We expect that 63% of the population will be fully vaccinated by March 1. These projections do not include the rollout of child vaccination. Based on limited survey data, we expect that childhood vaccination will increase all age vaccination rates by 4 percentage points above what is shown.
- 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 59% of the region is immune to the Delta variant. In our current reference scenario, we expect that by March 1, 67% of people will be immune to the Delta variant (Figure 21.1). 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 863,000 cumulative reported deaths due to COVID-19 on March 1. This represents 120,000 additional deaths from November 1 to March 1. Daily reported deaths will rise to 1,200 by February 9, 2022 (Figure 22.1).
- Under our **reference scenario**, our model projects 1,004,000 cumulative total deaths due to COVID-19 on March 1. This represents 141,000 additional deaths from November 1 to March 1 (Figure 22.1).
- If **universal mask coverage (95%)** were attained in the next week, our model projects 69,000 fewer cumulative reported deaths compared to the reference scenario on March 1.
- Under our **worse scenario**, our model projects 1,027,000 cumulative reported deaths on March 1, an additional 164,000 deaths compared to our reference scenario. Daily reported deaths in the **worse scenario** will rise to 4,330 by January 23, 2022 (Figure 22.1).
- Daily infections in the **reference scenario** will rise to 228,000 by January 18, 2022 (Figure 22.3). Daily infections in the **worse scenario** will rise to 830,000 by December 29, 2021 (Figure 22.3).
- Daily cases in the **reference scenario** will rise to 114,000 by the end of January (Figure 22.4). Daily cases in the **worse scenario** will rise to over 400,000 by mid-January (Figure 22.4).
- Daily hospital census in the **reference scenario** will rise to 69,720 by February 5, 2022 (Figure 22.5). Daily hospital census in the **worse scenario** will rise to 247,270 by January 16, 2022 (Figure 22.5).
- Figure 23.1 compares our reference scenario forecasts to other publicly archived models. Imperial, USC, and our model suggest deaths will begin rising again at the end of November or earlier.

- At some point from November through March 1, 19 states will have high or extreme stress on hospital beds (Figure 24.1). At some point from November through March 1, 22 states will have high or extreme stress on intensive care unit (ICU) capacity (Figure 25.1).

Model updates

No model updates.

Figure 1.1. Daily COVID-19 hospital census and infections

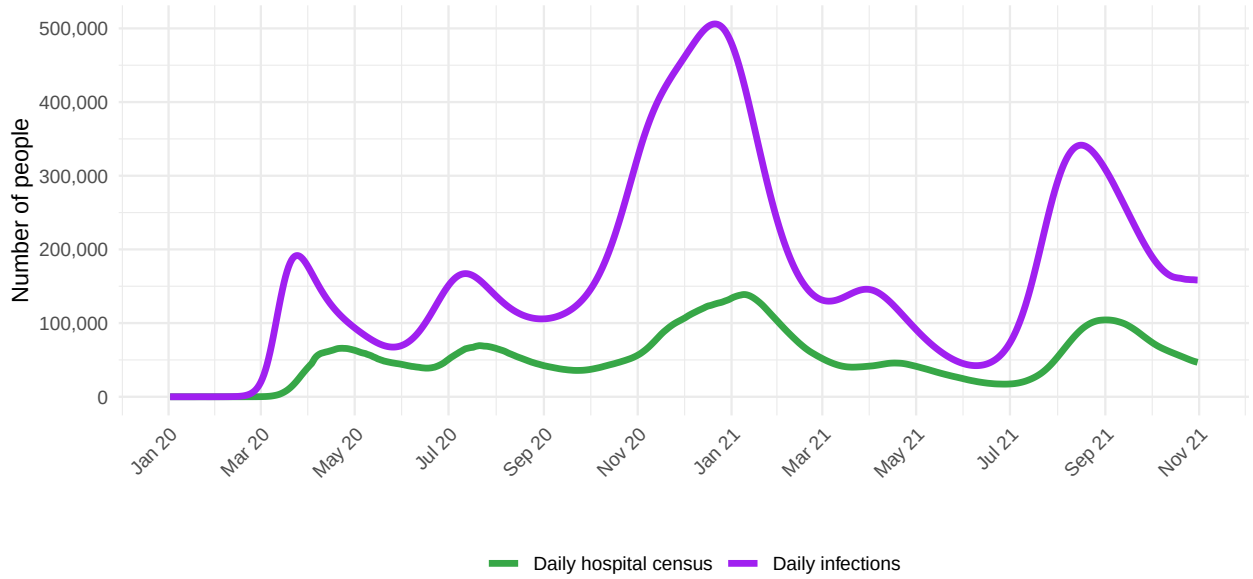


Figure 2.1. Reported daily COVID-19 cases, moving average

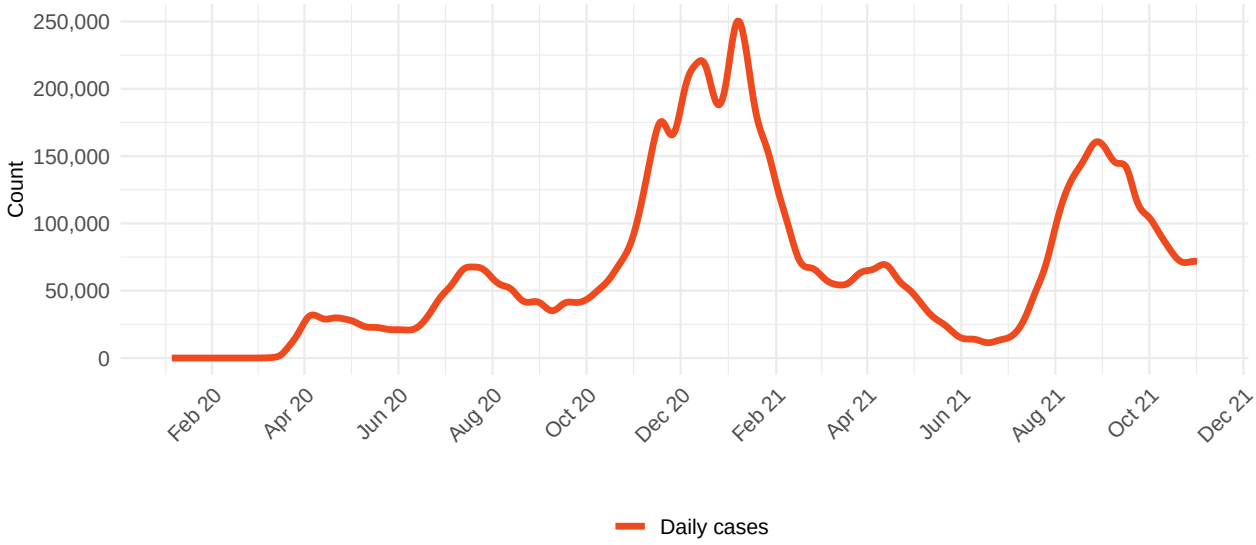
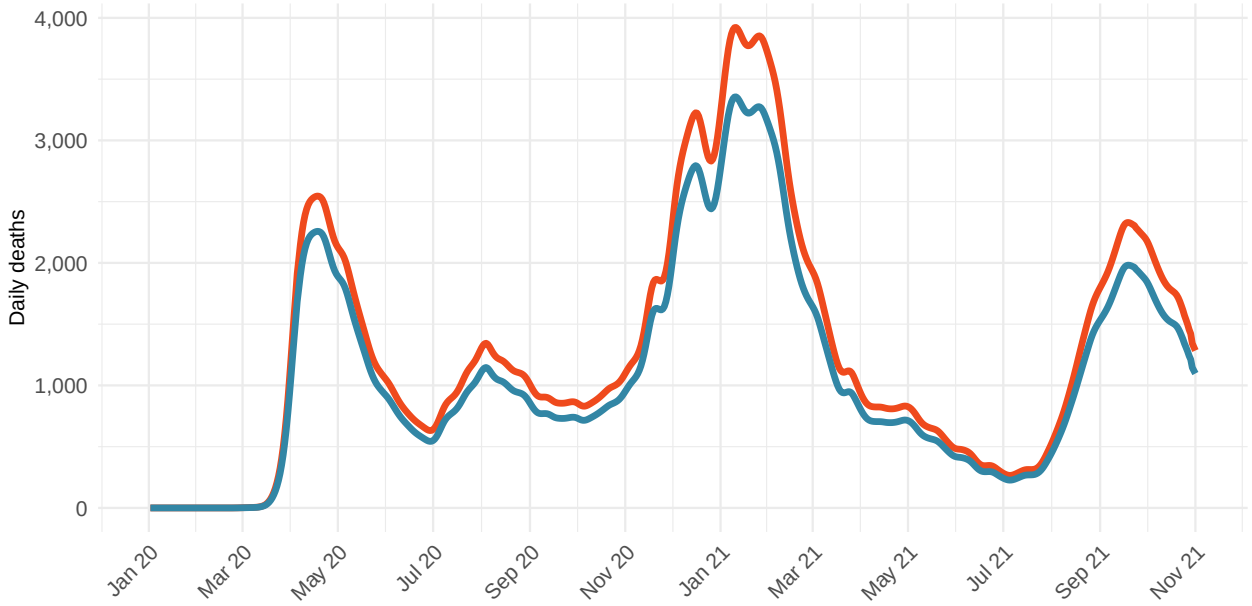


Table 1. Ranking of total deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	10,724	1
COVID-19	9,851	2
Tracheal, bronchus, and lung cancer	3,965	3
Chronic obstructive pulmonary disease	3,766	4
Stroke	3,643	5
Alzheimer's disease and other dementias	2,768	6
Chronic kidney disease	2,057	7
Colon and rectum cancer	1,616	8
Lower respiratory infections	1,575	9
Diabetes mellitus	1,495	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 November 1, 2021

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

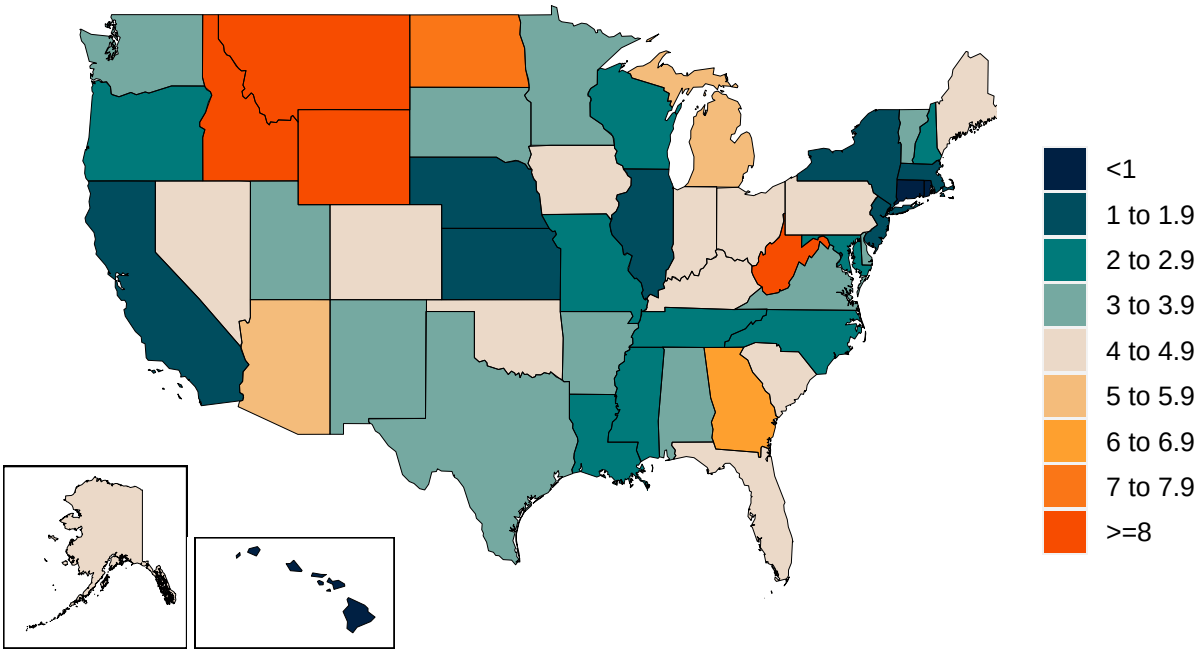
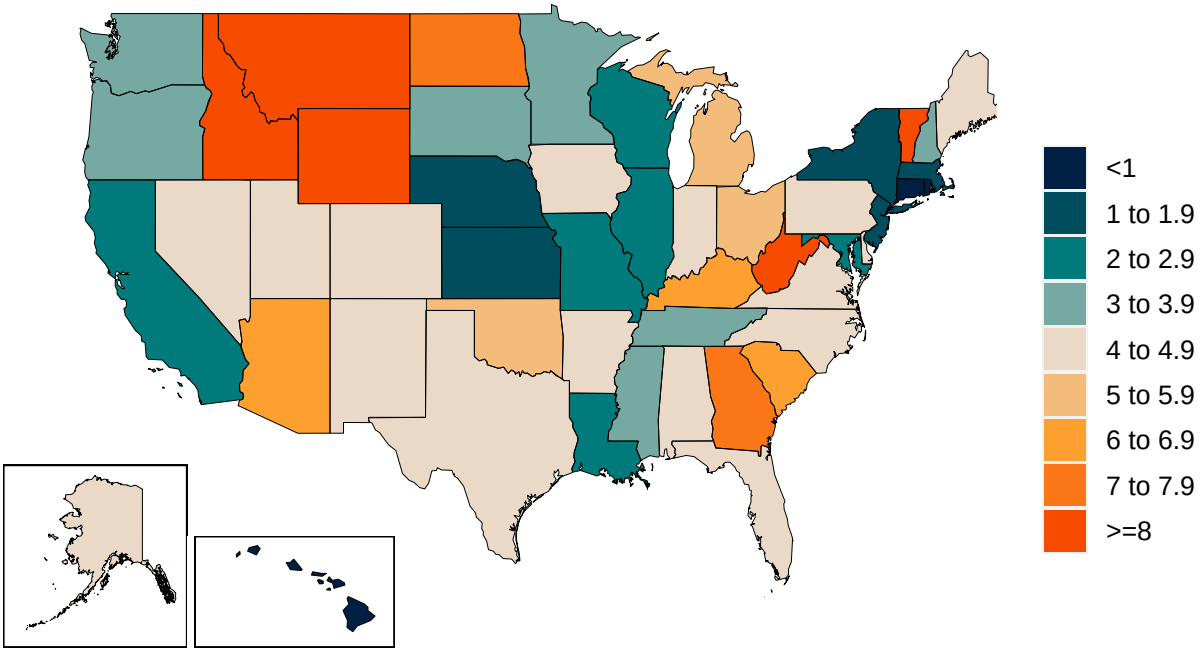


Figure 4.2 Daily total COVID-19 death rate per 1 million



Cumulative COVID-19 deaths per 100,000 on November 1, 2021

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

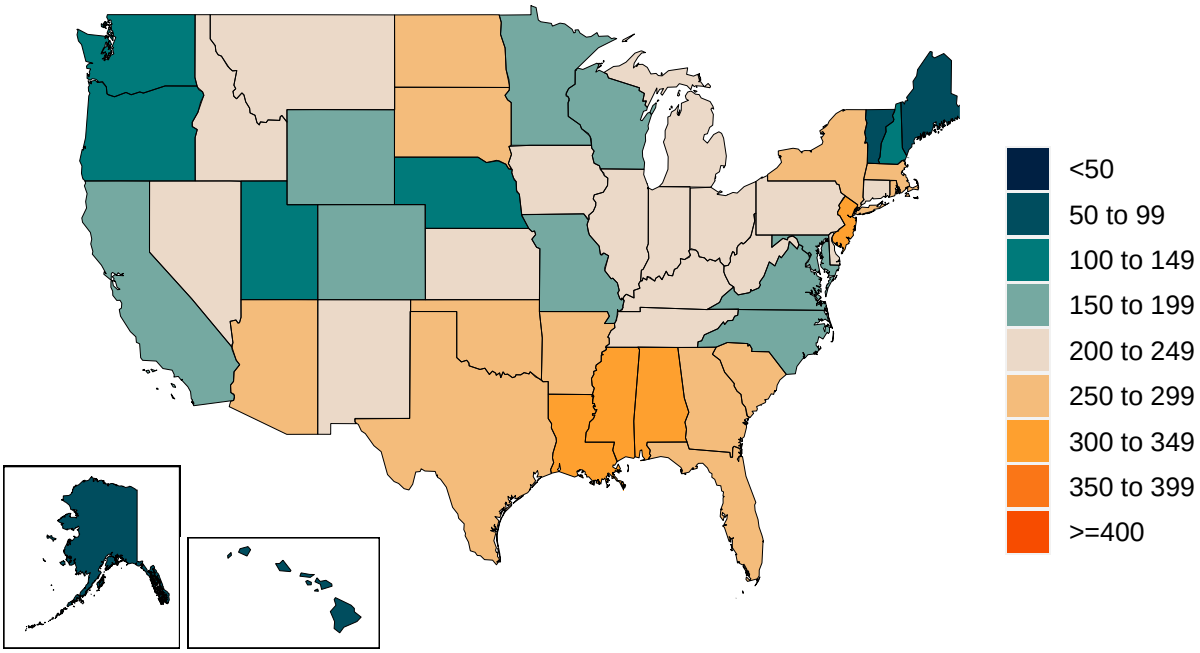


Figure 5.2 Total cumulative COVID-19 deaths per 100,000

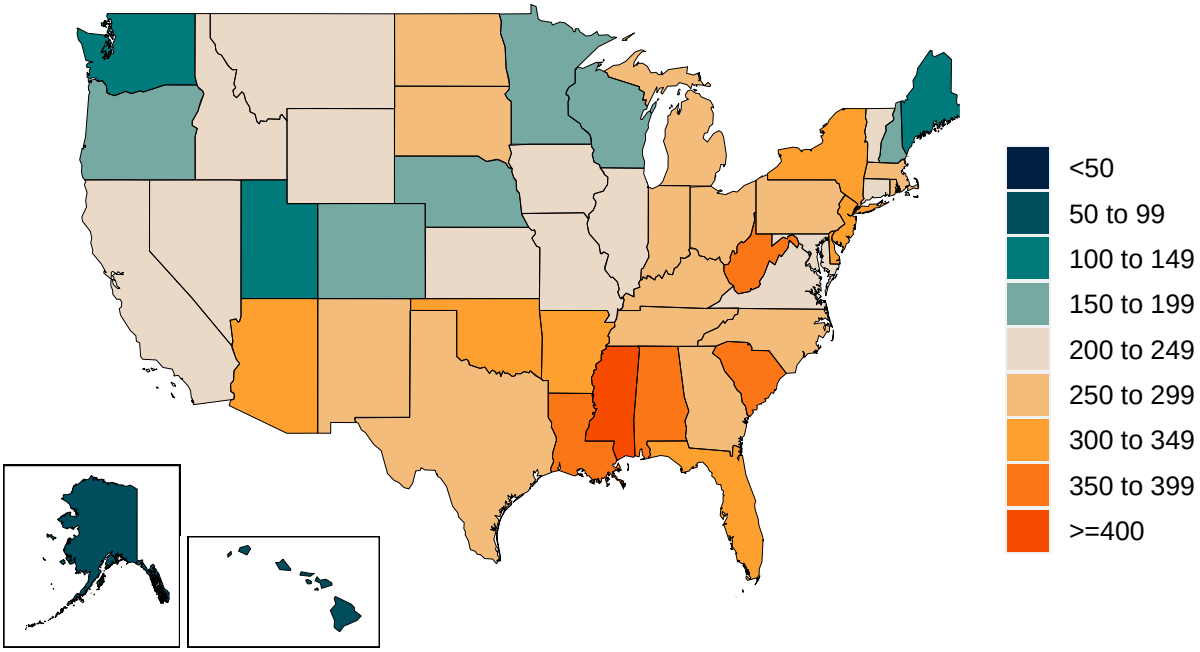


Figure 6.1. Estimated percent of the population infected with COVID-19 on November 1, 2021

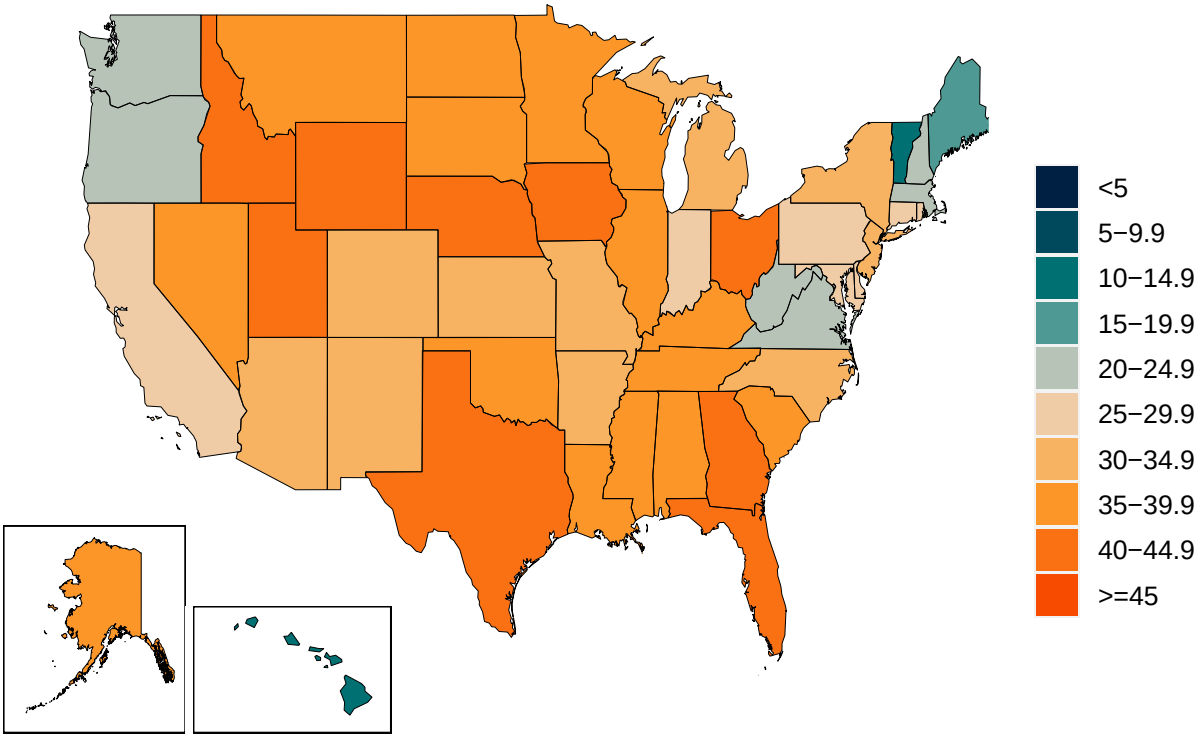


Figure 7.1. Mean effective R on October 21, 2021. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.

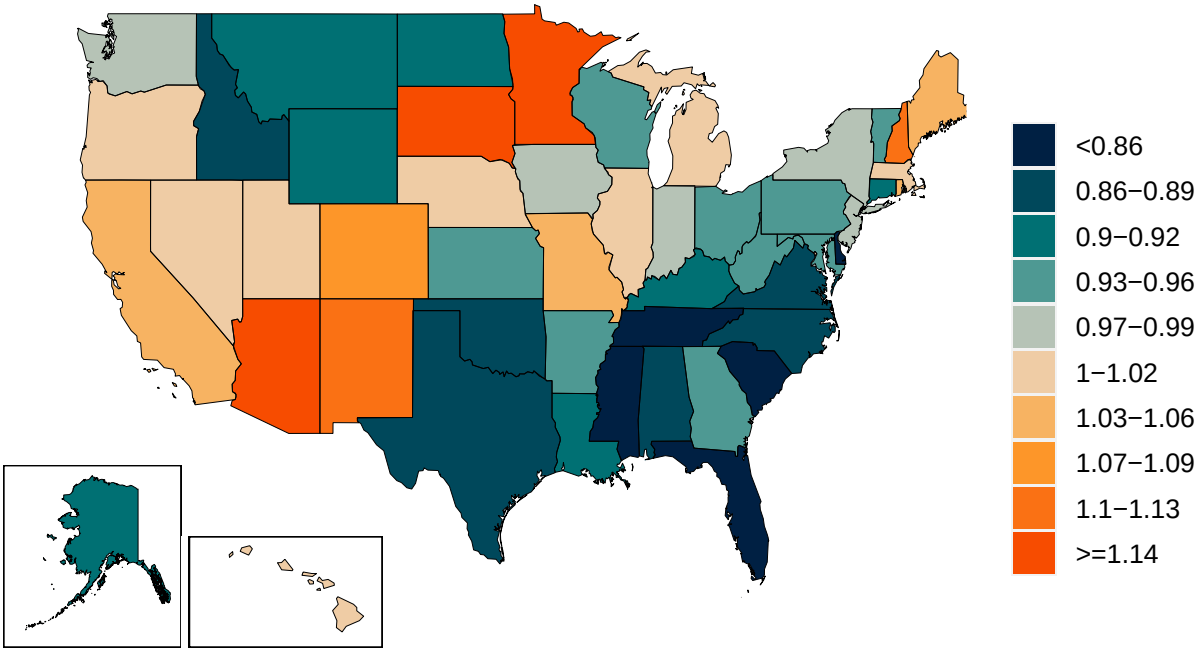
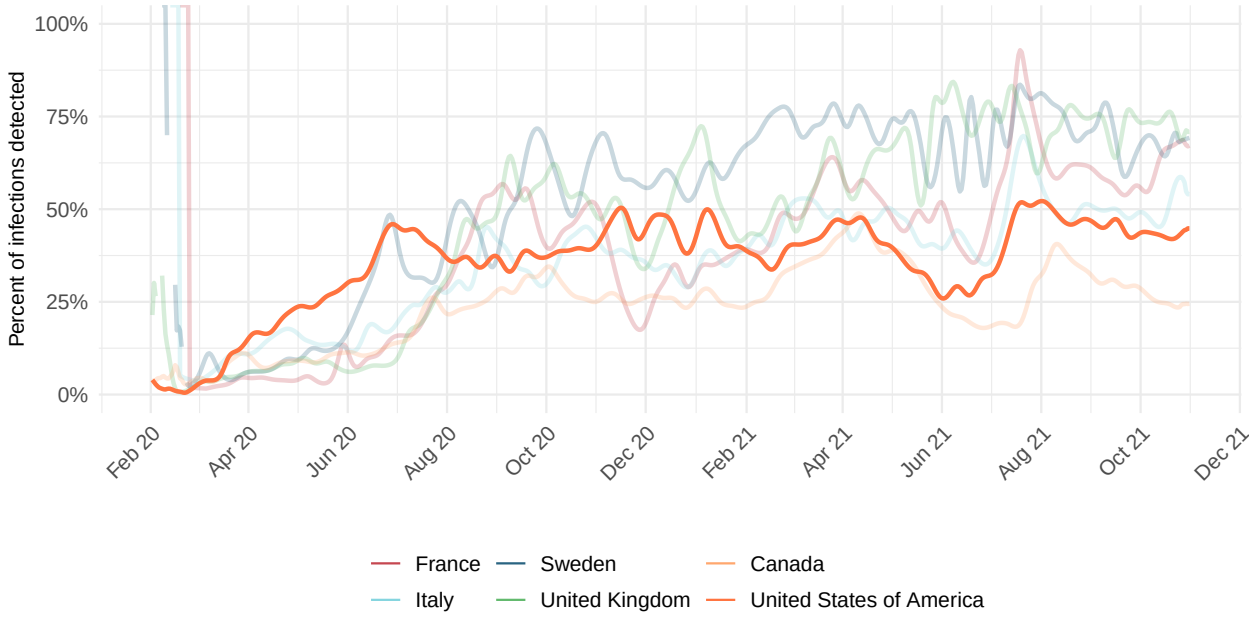


Figure 8.1. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100%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



Estimated percent of circulating SARS-CoV-2 for primary variant families on November 1, 2021

Figure 9.1 Estimated percent Alpha variant

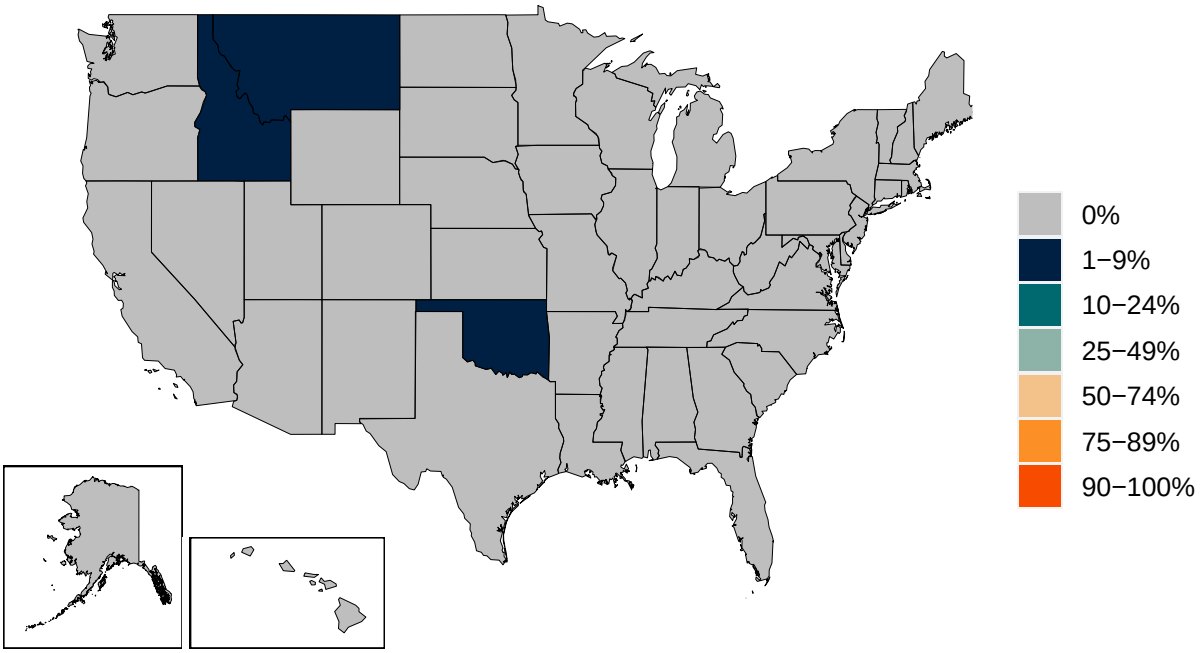


Figure 9.2 Estimated percent Beta variant

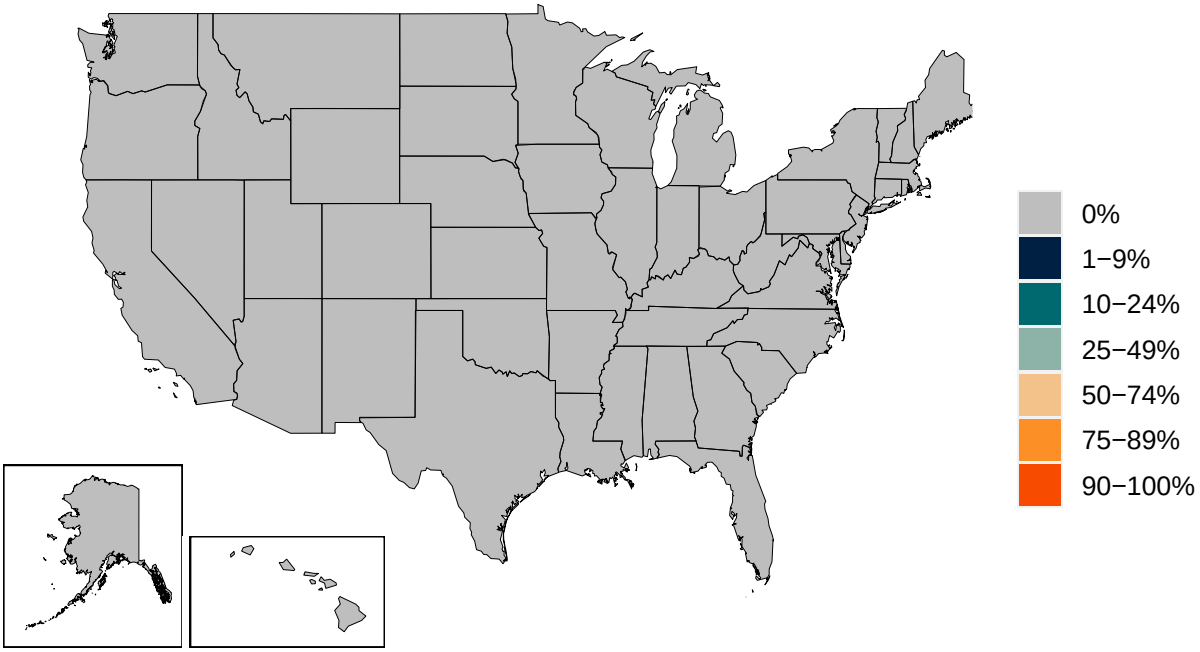


Figure 9.3 Estimated percent Delta variant

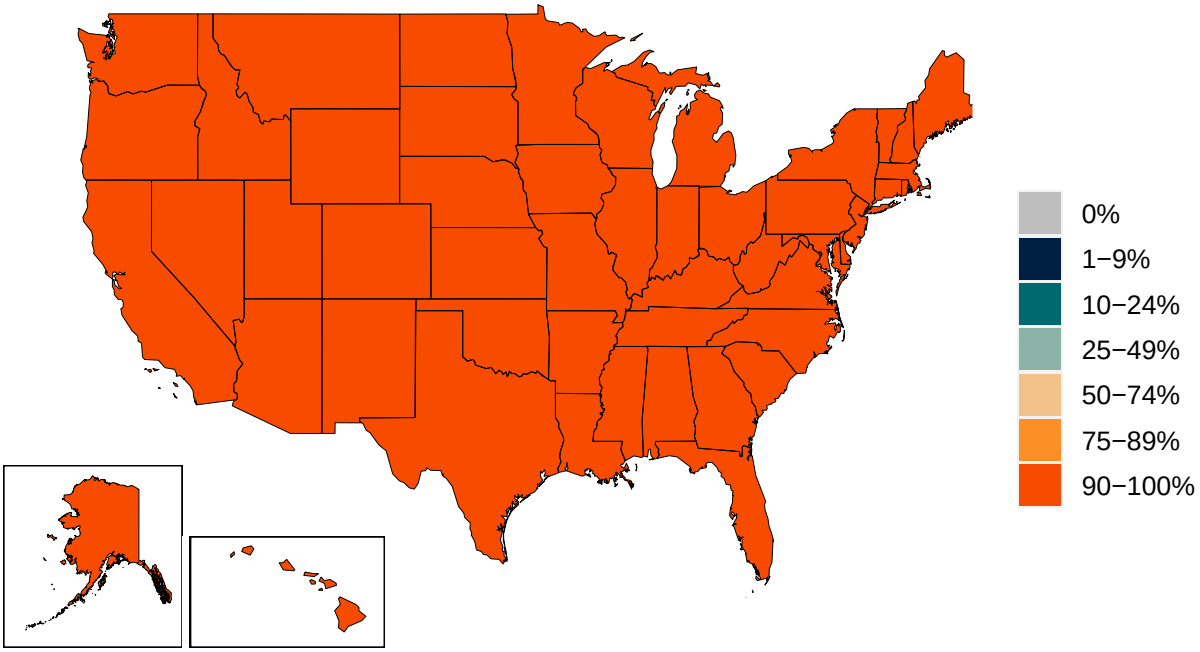


Figure 9.4 Estimated percent Gamma variant

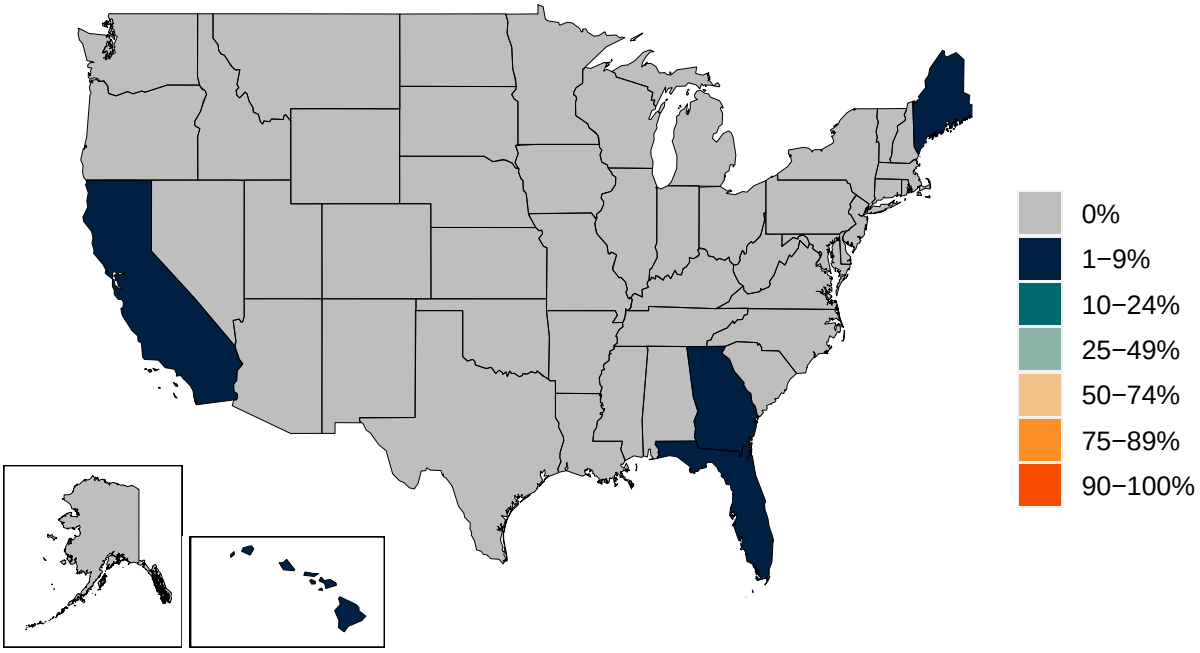
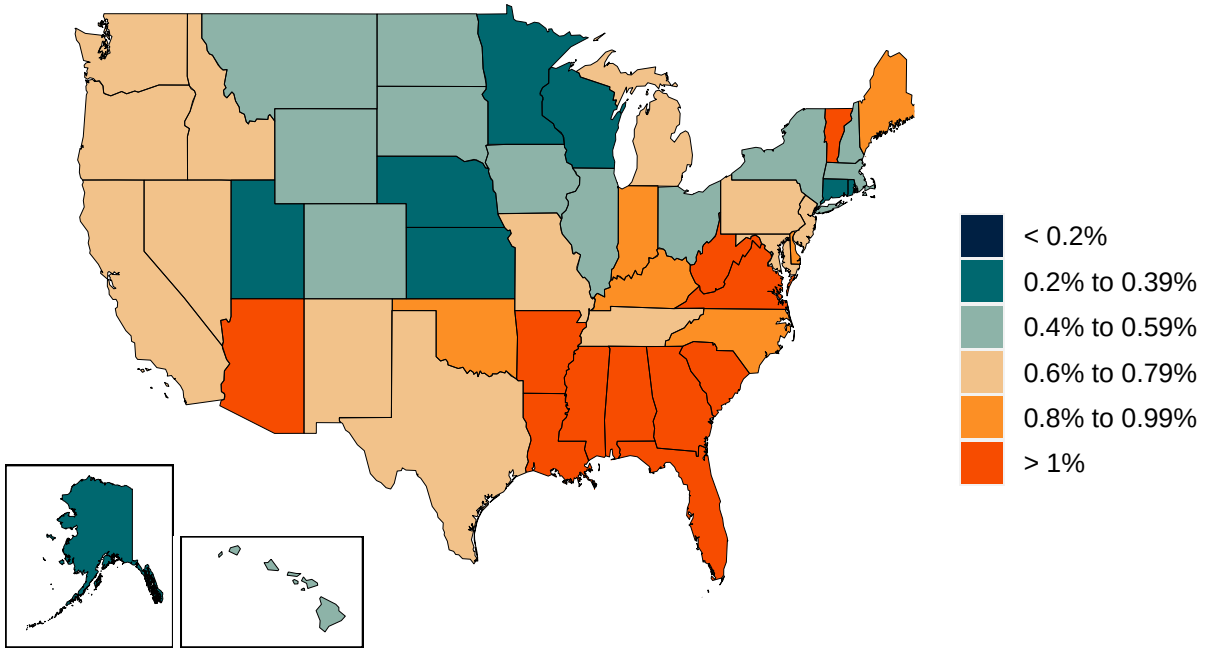


Figure 10.1. Infection-fatality rate on November 1, 2021. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.



Critical drivers

Table 2. Current mandate implementation

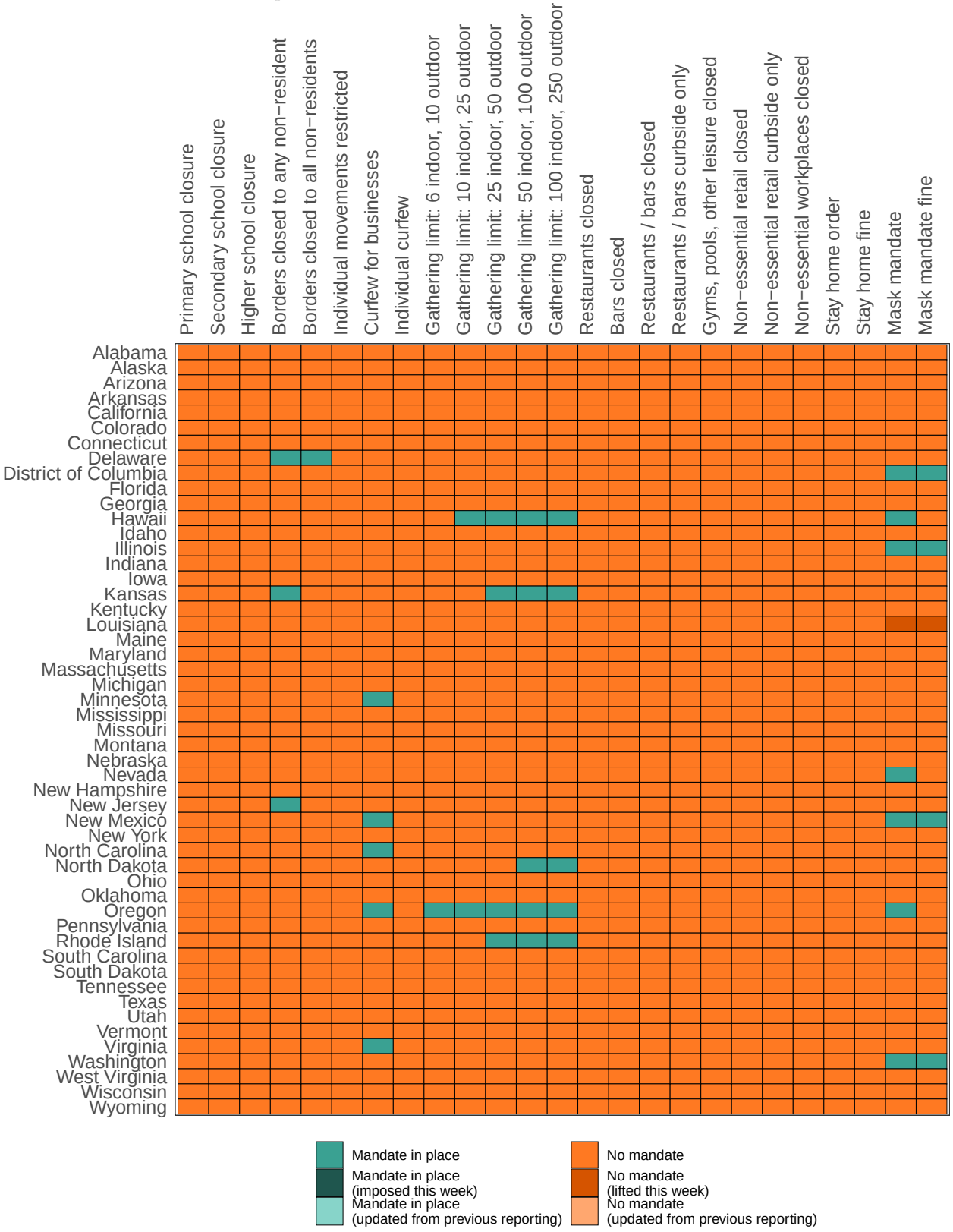


Figure 11.1. Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

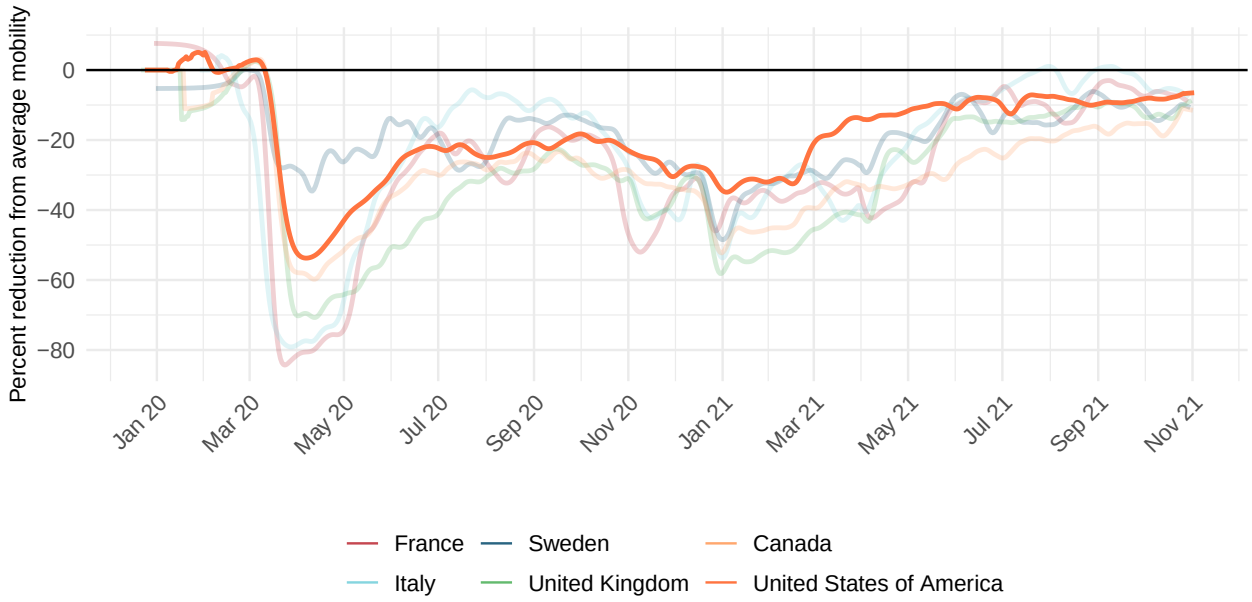


Figure 12.1. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on November 1, 2021

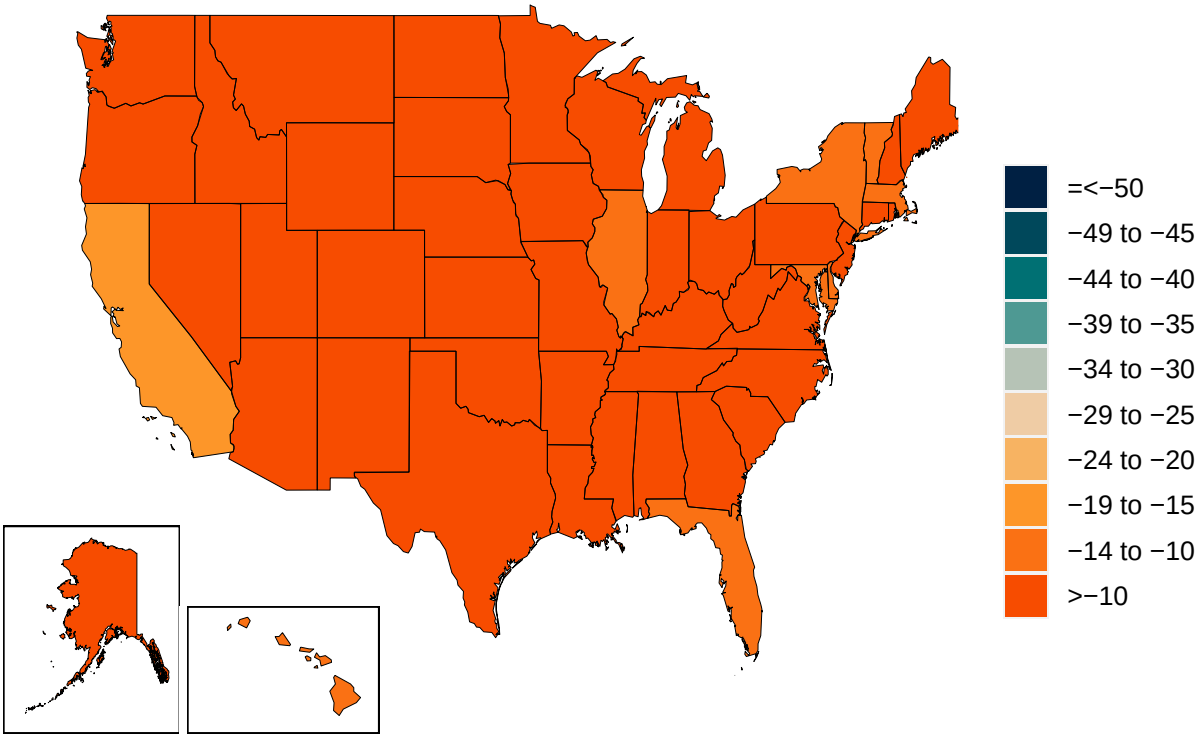


Figure 13.1. Trend in the proportion of the population reporting always wearing a mask when leaving home

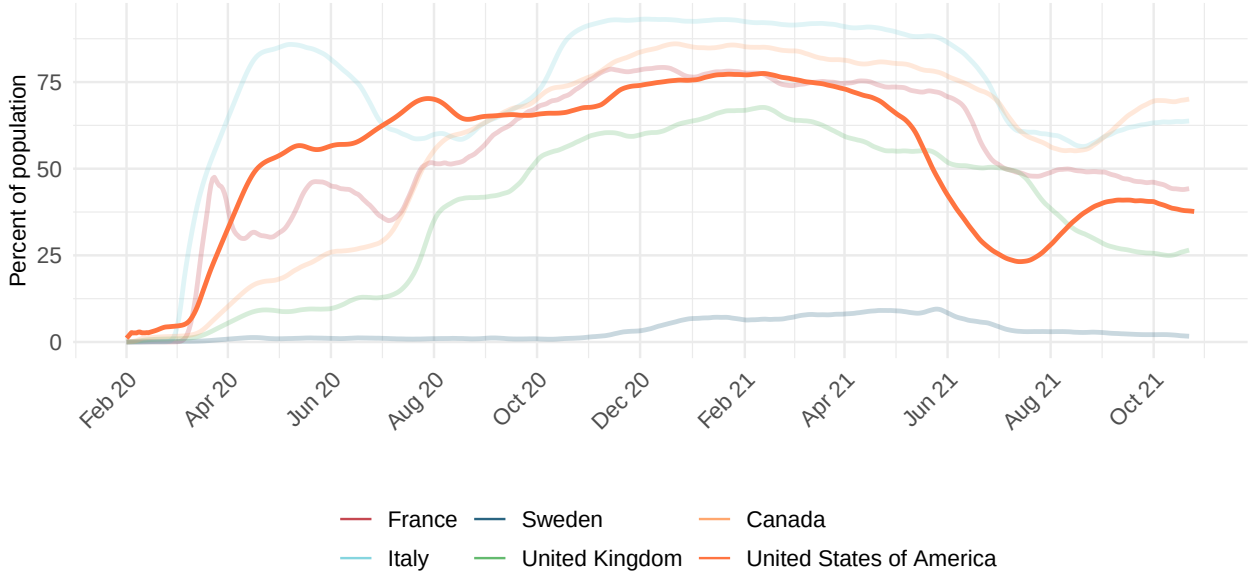


Figure 14.1. Proportion of the population reporting always wearing a mask when leaving home on November 1, 2021

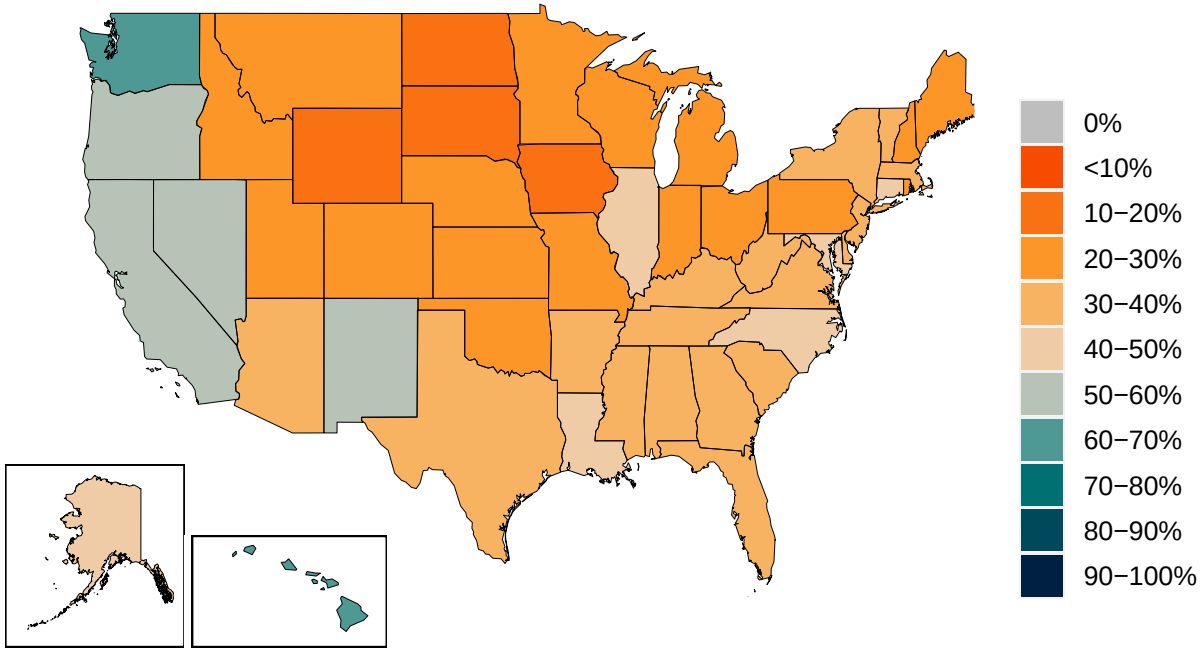


Figure 15.1. Trend in COVID-19 diagnostic tests per 100,000 people

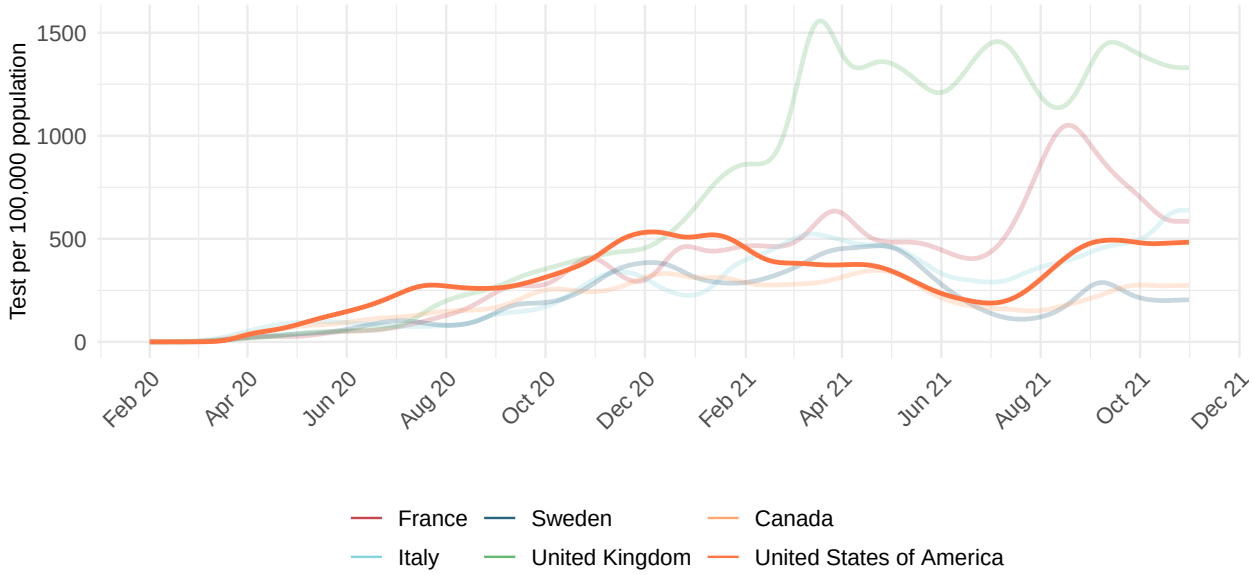


Figure 16.1. COVID-19 diagnostic tests per 100,000 people on November 1, 2021

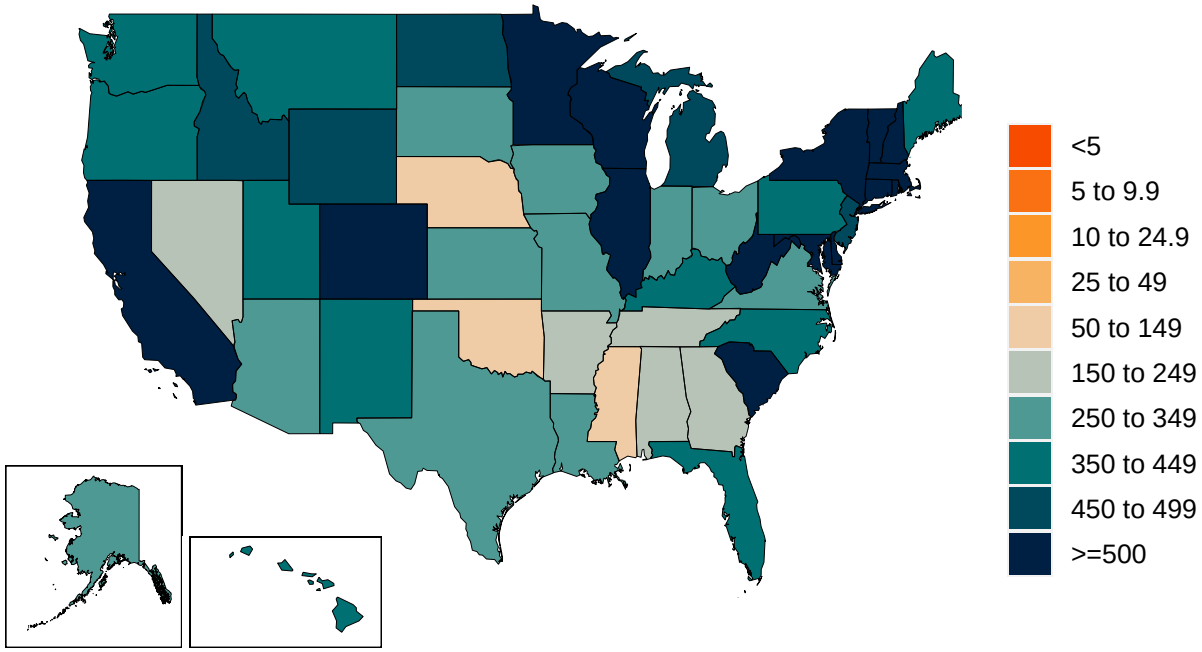


Table 3. Estimates of vaccine efficacy for specific vaccines used in the model at preventing disease and infection. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available,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

Percent of the population having received at least one dose (17.1) and fully vaccinated against SARS-CoV-2 (17.2) by November 1, 2021

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

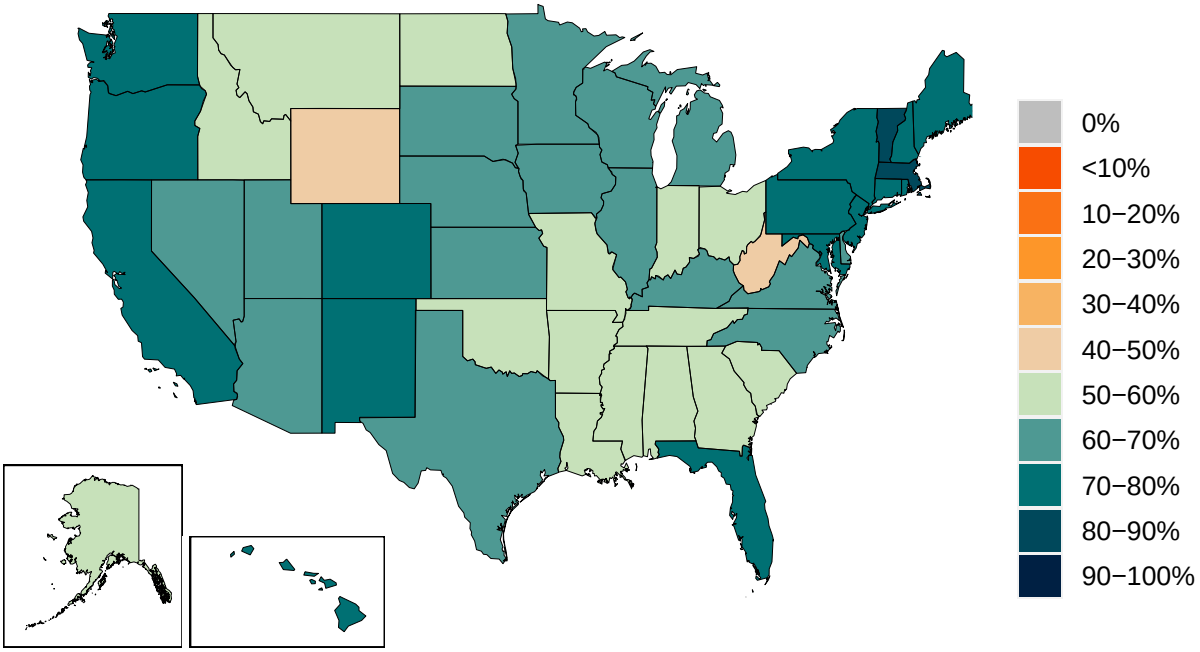


Figure 17.2 Percent of the population fully vaccinated against SARS-CoV-2

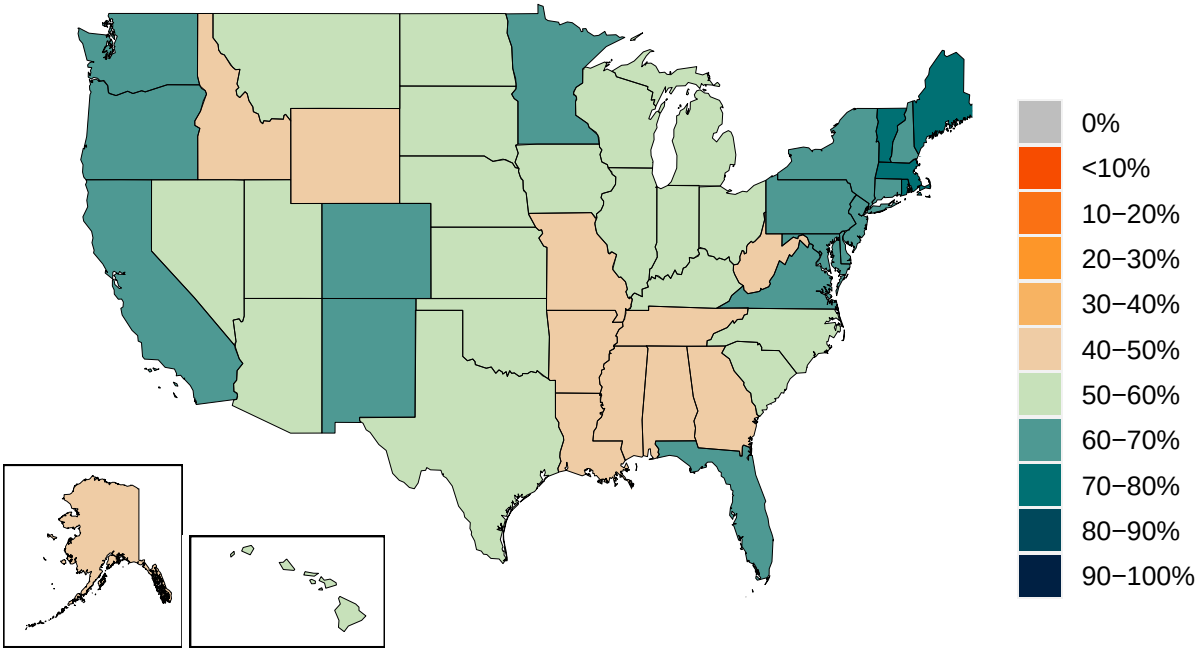


Figure 18.1. Trend in the estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

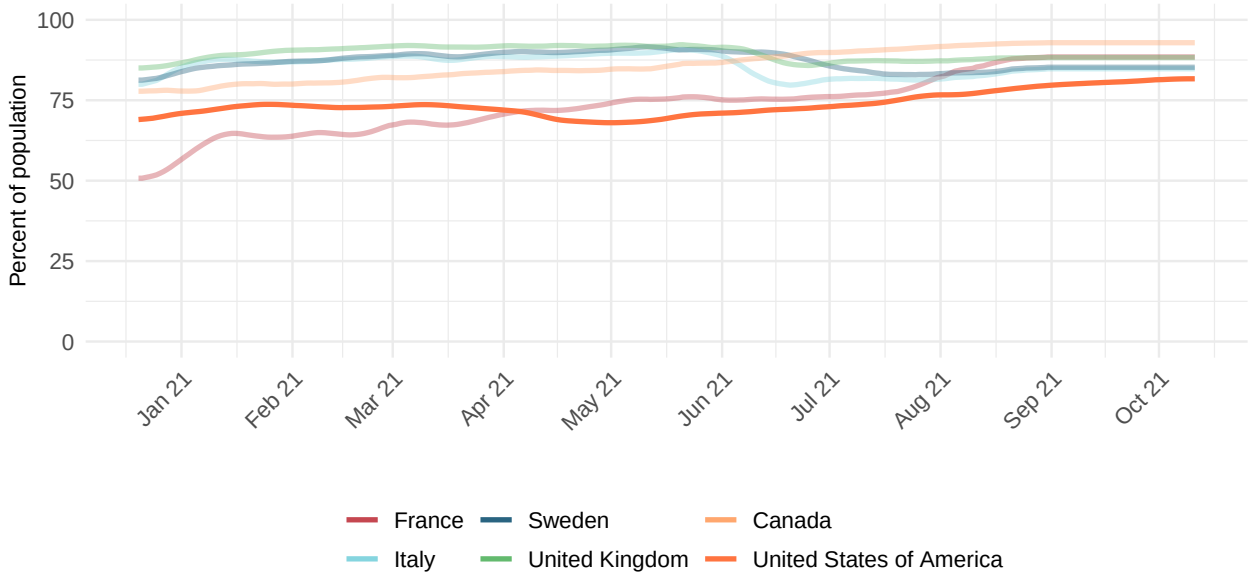


Figure 19.1. Estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

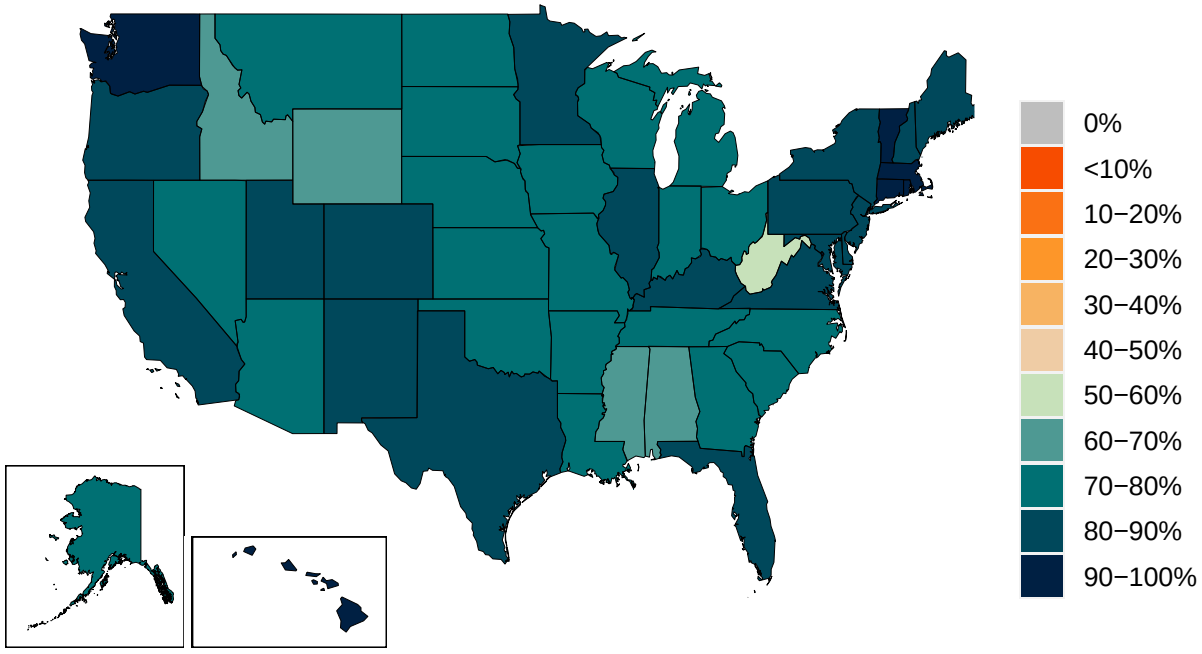


Figure 20.1. Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated

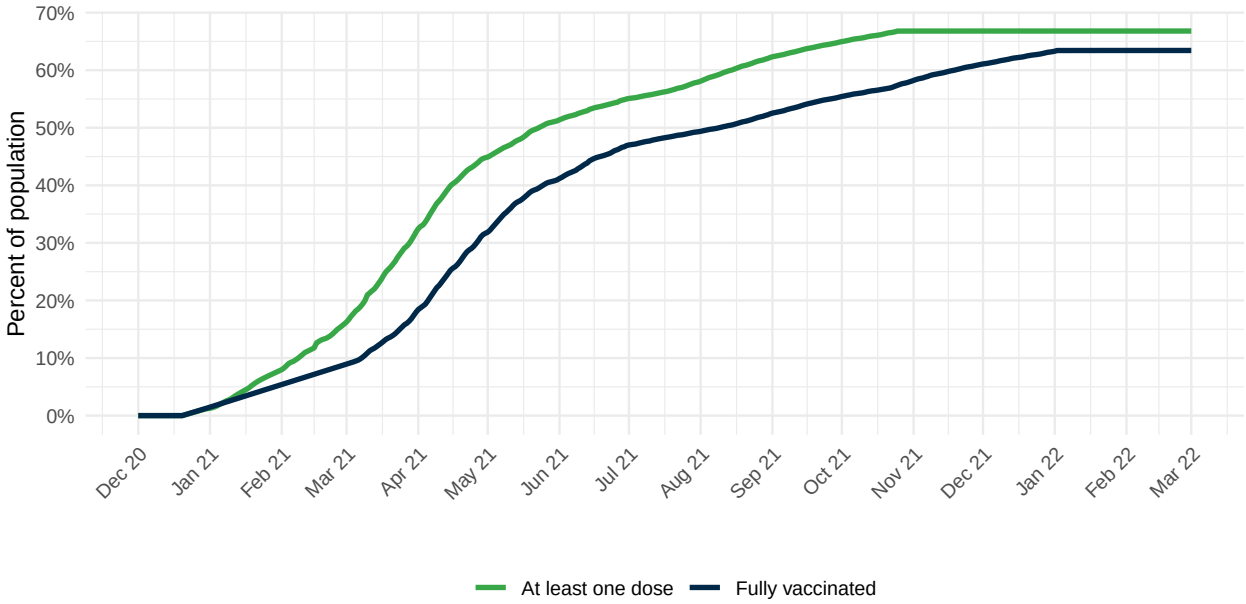
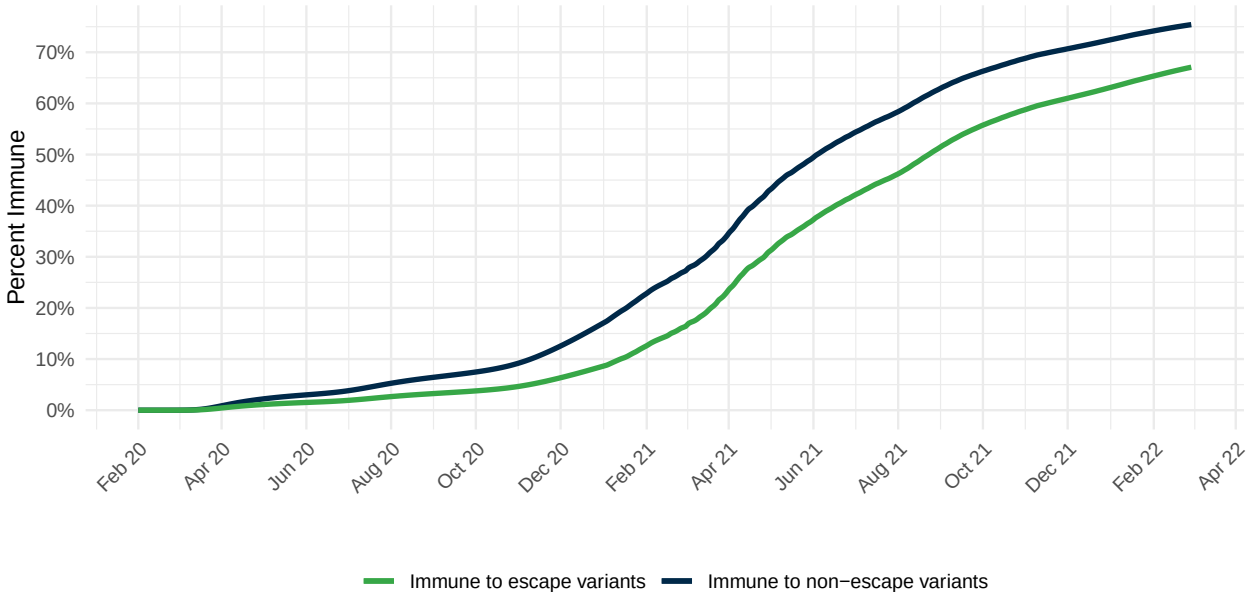


Figure 21.1. Percentage of people who are immune to non-escape variants and the percentage of people who are immune to escape variants



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.

Daily COVID-19 deaths until March 01, 2022 for three scenarios

Figure 22.1 Reported daily COVID-19 deaths per 100,000

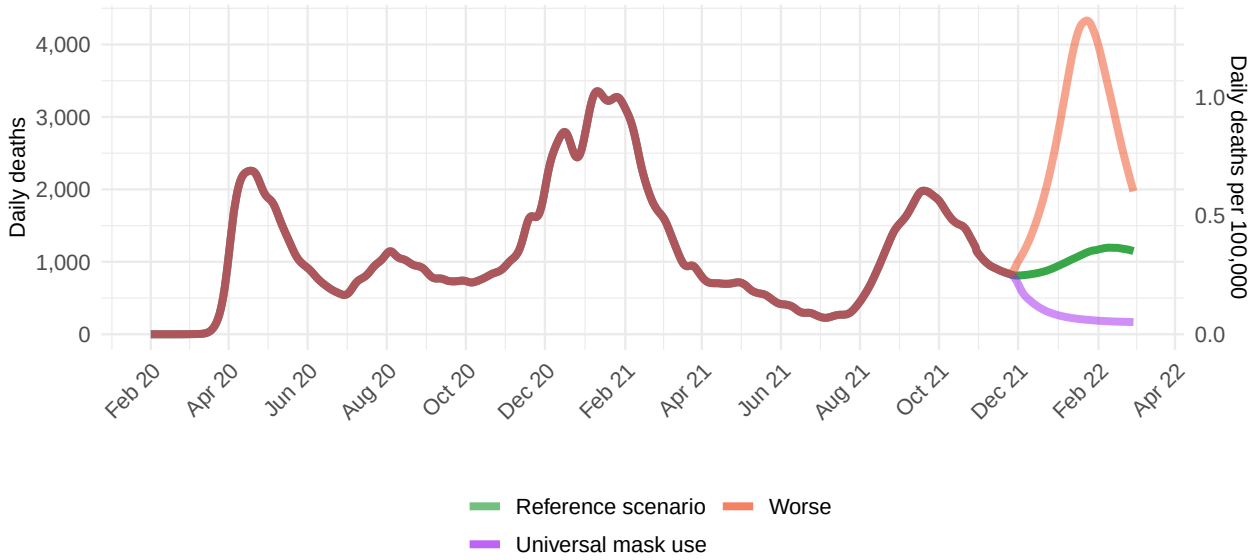


Figure 22.2 Total daily COVID-19 deaths per 100,000

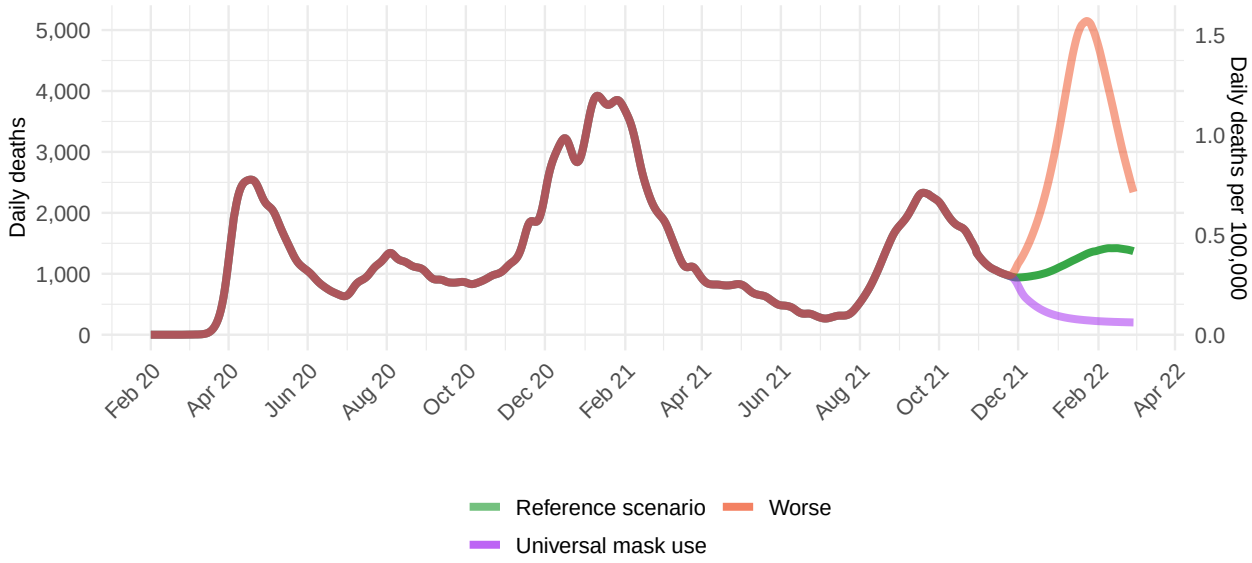


Figure 22.3. Daily COVID-19 infections until March 01, 2022 for three scenarios

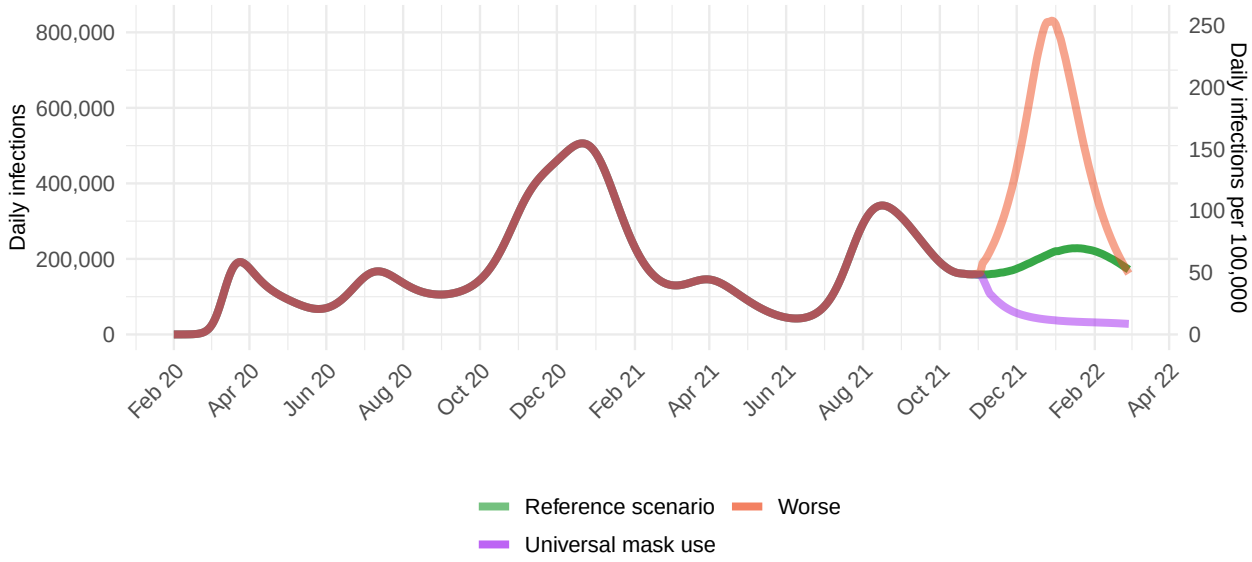


Figure 22.4. Daily COVID-19 reported cases until March 01, 2022 for three scenarios

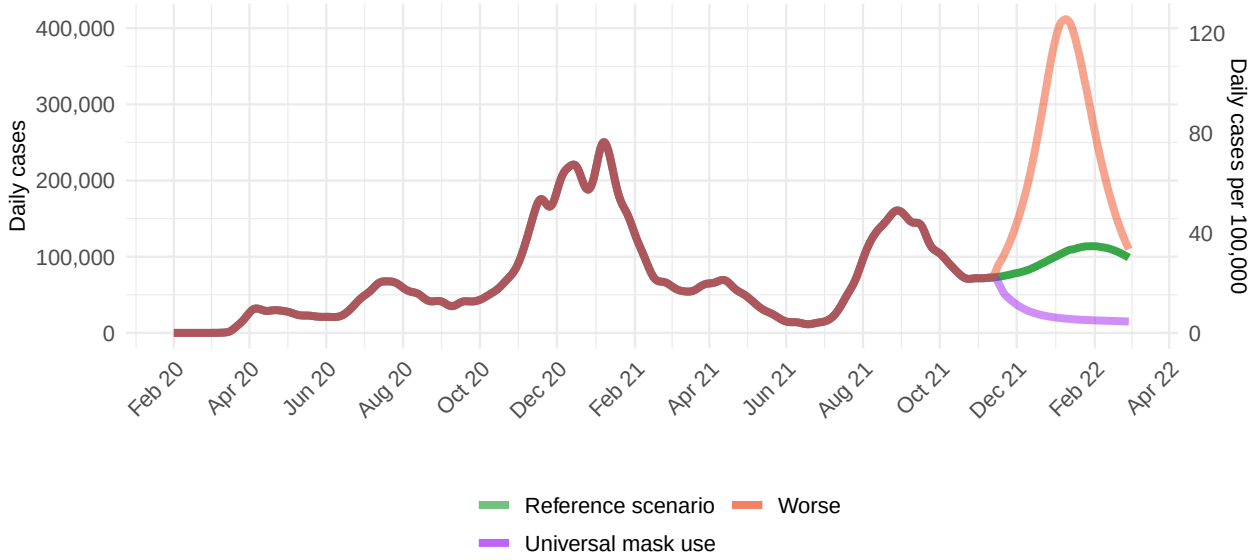


Figure 22.5. Daily COVID-19 hospital census until March 01, 2022 for three scenarios

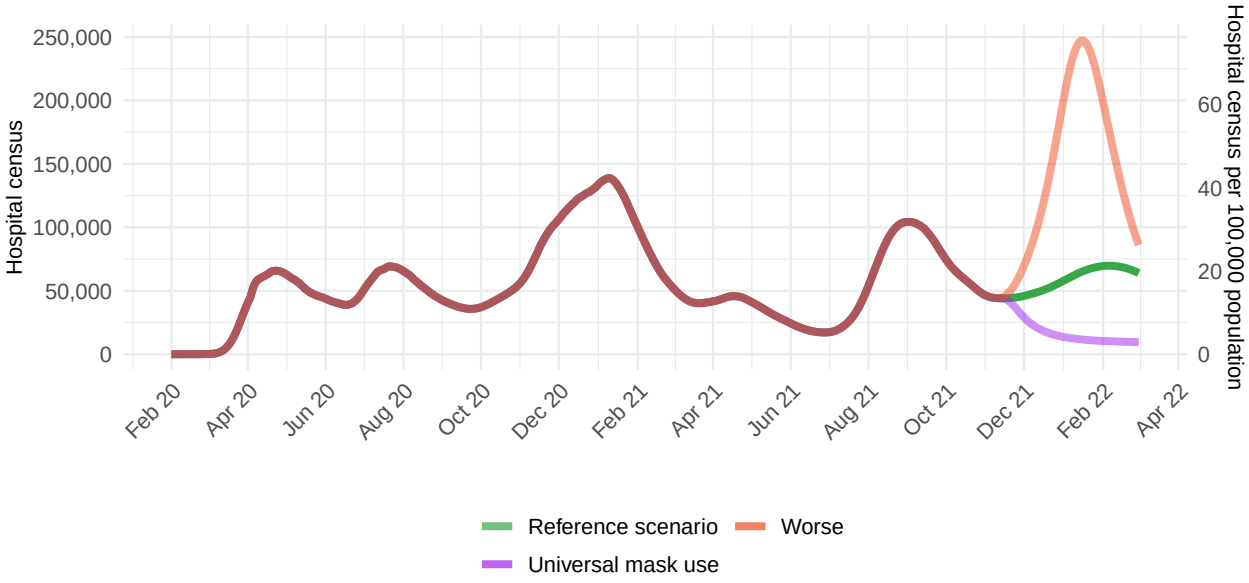


Figure 23.1. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available, last model update in brackets: Delphi from the Massachusetts Institute of Technology (Delphi) [November 3, 2021], Imperial College London (Imperial) [October 27, 2021], the SI-KJalpha model from the University of Southern California (SIKJalpha) [November 3, 2021], and the CDC Ensemble Model (CDC) [November 1, 2021]. Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from available locations in that region.

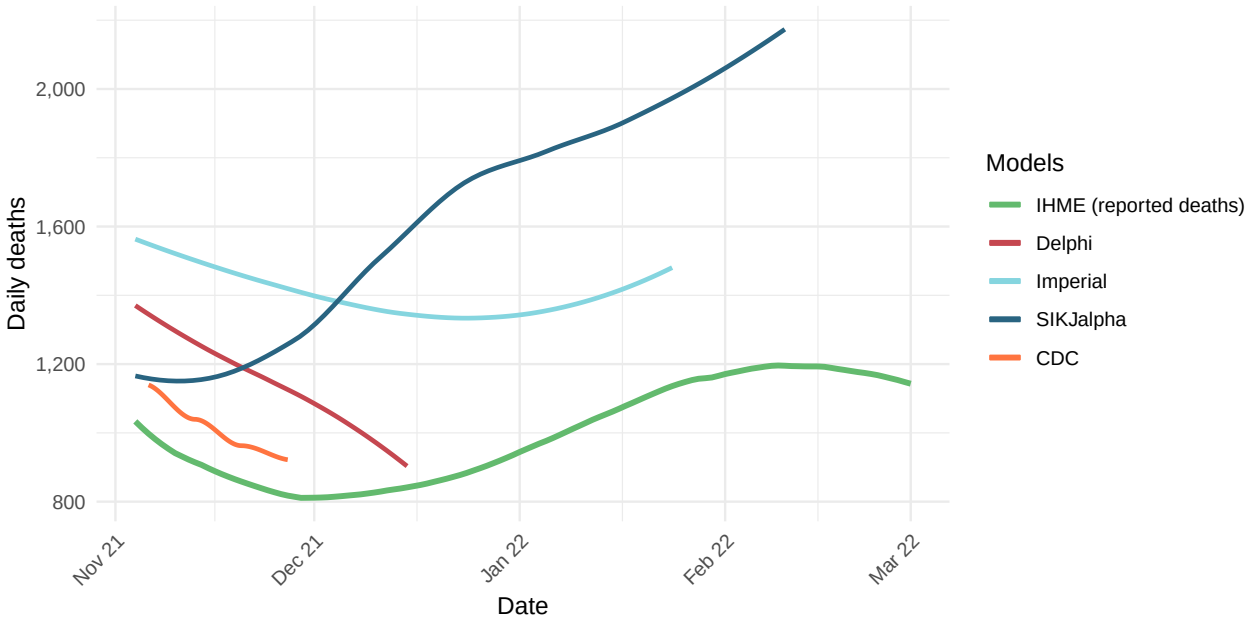


Figure 24.1. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate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

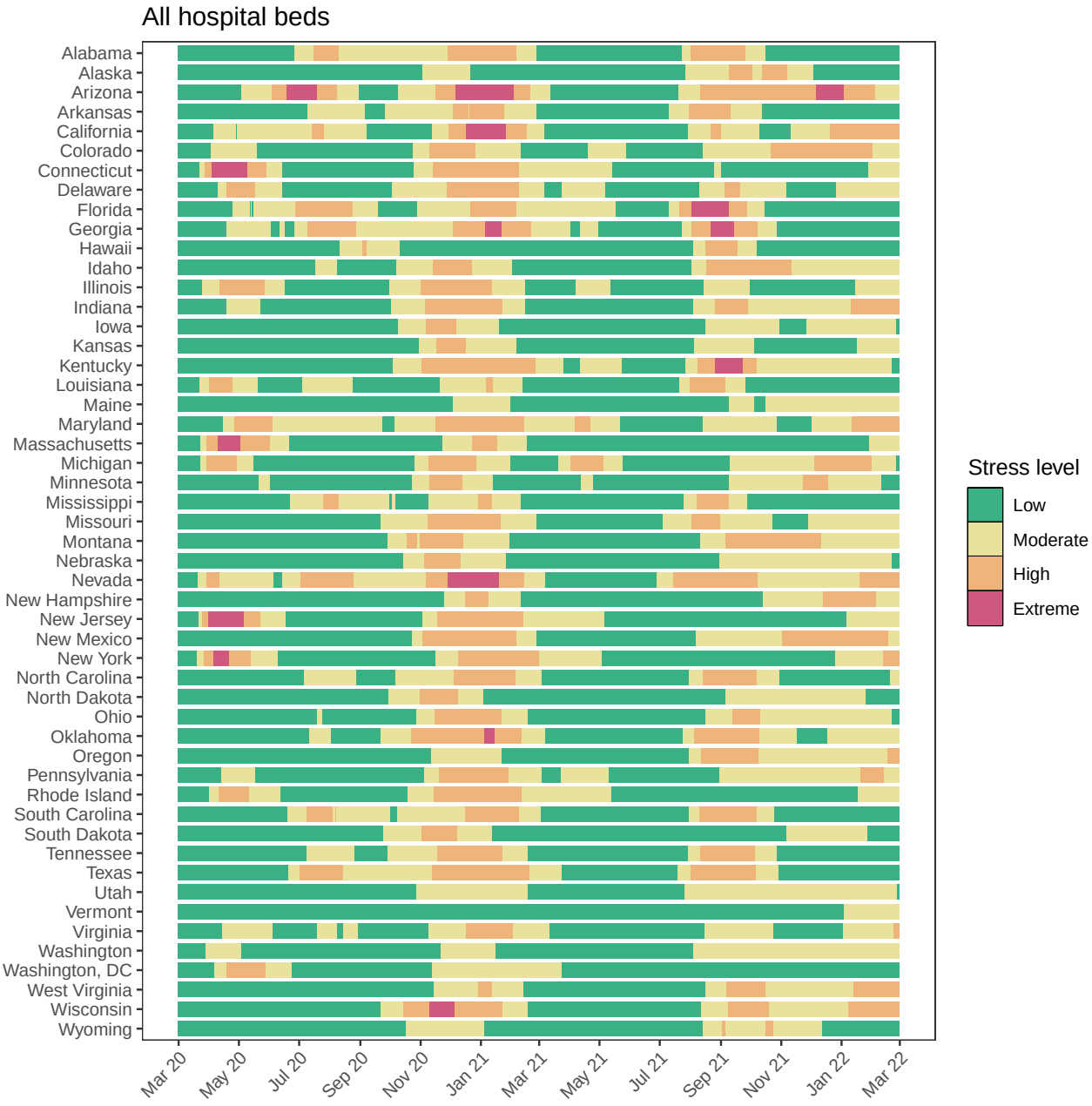
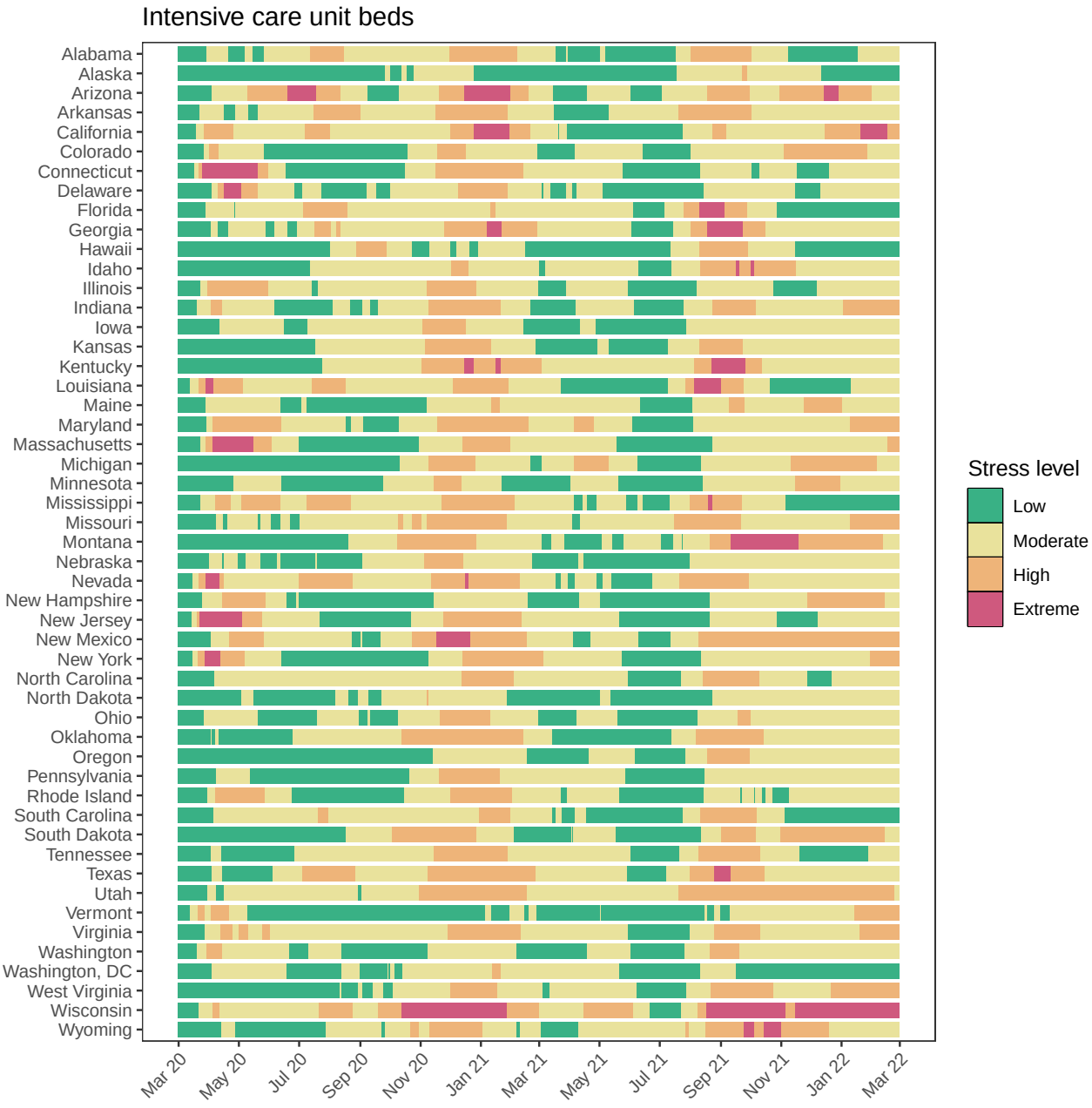


Figure 25.1. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *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.