

COVID-19 Results Briefing

The United States of America

September 1, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in the US. The model was run on August 31, 2021, with data through August 30, 2021.

The Delta surge in the US continues to unfold. Transmission has peaked or is peaking in a number of Southern states including Missouri, Arkansas, Louisiana, Texas, Mississippi, Alabama, and Florida, along with Nevada and Hawaii. In most other states transmission continues to increase, with particularly rapid increases in Oregon and Kentucky.

Transmission is being driven by the increased transmissibility of the Delta variant combined with only 36% mask use and mobility near pre-COVID levels. Our reference scenario suggests a peak in deaths in mid-September followed by a very slow decline until December 1. We have not explicitly modeled the potential increase in transmission due to the opening of schools. The second Delta surge in Scotland after a peak and a decline when schools opened is potentially a warning sign on the potential for school openings to drive increases in transmission. Already 11 states are reporting record hospital admissions for the pandemic demonstrating the potential for severe disease despite previous infection and/or vaccination. The large difference between our reference scenario and a universal mask use scenario demonstrates the importance of behavioral modification on the course of the pandemic in each state. The main strategies at this point for states to manage the epidemic include: 1) every possible effort to increase vaccination rates in those eligible, including through the use of employer and school mandates; 2) routine school and workplace testing of the vaccinated and unvaccinated to aid in early detection of cases; 3) mask mandates in settings where transmission and particularly hospitalizations are increasing rapidly; and 4) careful monitoring of the impact of school openings on transmission, along with mitigation efforts to reduce the risk of transmission in schools. Given the key role of vaccination in the long-term strategy to reduce hospitalization and death from COVID (but not infections), tracking vaccination rates is critical. As more and more individuals get a booster dose, differentiating third doses from first and second doses will be important. Reporting cases, hospitalizations, and deaths disaggregated by vaccination status is becoming ever more important in order to track breakthrough infections and vaccine efficacy.

Current situation

- Estimated daily infections in the last week stayed constant at 410,000 per day compared to the week before (Figure 1). Daily hospital census in the last week (through August 30) increased to 109,500 per day on average compared to 100,500 the week before.
- Daily reported cases in the last week increased to 154,900 per day on average compared to 148,000 the week before (Figure 2).

- Reported deaths due to COVID-19 in the last week increased to 1,300 per day on average compared to 1,100 the week before (Figure 3).
- Excess deaths due to COVID-19 in the last week increased to 2,100 per day on average compared to 1,700 the week before (Figure 3). This makes COVID-19 the number 1 cause of death in the US this week (Table 1). Estimated excess daily deaths due to COVID-19 were 1.6 times larger than the reported number of deaths.
- The daily reported COVID-19 death rate is greater than 4 per million in 18 states (Figure 4).
- The daily rate of excess deaths due to COVID-19 is greater than 4 per million in 28 states (Figure 4).
- We estimate that 33% of people in the US have been infected as of August 30 (Figure 6). This estimate is down from last week's analysis based on a revision of the method used to correct seroprevalence surveys for waning sensitivity – see methods updates.
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 41 states (Figure 7). In a number of states in the South, along with Nevada and Hawaii, transmission appears to have peaked. The rest of the country has increasing transmission.
- The infection-detection rate in the US was close to 38% on August 30 (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). We estimate that the Delta variant is the dominant variant in all states.

Trends in drivers of transmission

- Few mandates remain in place. Pennsylvania has school mandates still in place. Mask mandates are in place in eight states. Gathering restrictions are in place in six states.
- Mobility last week was 7% lower than the pre-COVID-19 baseline (Figure 11). Mobility was near baseline (within 10%) in 41 states. Mobility was lower than 30% of baseline in no locations.
- As of August 30, in the COVID-19 Trends and Impact Survey, 37% of people self-report that they always wore a mask when leaving home, indicating a slow increase since a low of below 25% in mid-July (Figure 13). Mask use is over 50% in California, Nevada, and Louisiana.
- There were 212 diagnostic tests per 100,000 people on August 30 (Figure 15).
- As of August 30, 10 states have reached 70% or more of the population who have received at least one vaccine dose, and one state has reached 70% or more of the population who are fully vaccinated (Figure 17). Four states have less than 40% fully vaccinated: Wyoming, Mississippi, Alabama, and West Virginia.

- In the US, 68% of people 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 50% in Mississippi to 84% in Massachusetts (Figure 19).
- In our current reference scenario, we expect that 202 million people will be vaccinated with at least one dose by December 1 (Figure 20). We expect that 58% of the population will be vaccinated by December 1.
- Based on past infection and vaccination rates combined with the protection provided by both against infection, we estimate that currently 56% of the population is immune to the Delta variant. In our current reference scenario, we expect that by December 1, 67% of people will be immune to the Delta variant (Figure 21).

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 751,000 cumulative reported deaths due to COVID-19 on December 1. This represents 116,000 additional deaths from August 30 to December 1. Daily reported deaths will rise to a peak of over 1,400 by mid-September and then decline slowly until December 1 (Figure 22).
- Under our **reference scenario**, our model projects 1,171,000 cumulative excess deaths due to COVID-19 on December 1. This represents 187,000 additional deaths from August 30 to December 1 (Figure 22).
- If **universal mask coverage (95%)** were attained in the next week, our model projects 52,000 fewer cumulative reported deaths compared to the reference scenario on December 1.
- Under our **worse scenario**, our model projects 845,000 cumulative reported deaths on December 1, an additional 94,000 deaths compared to our reference scenario. Daily reported deaths in the **worse scenario** will rise to over 3,000 by mid-November (Figure 22).
- Daily infections in the **reference scenario** will decline from a peak in early September to just under 300,000 on December 1, 2021 (Figure 23). Daily infections in the **worse scenario** will rise to over 850,000 by mid-October (Figure 23).
- Daily cases in the **reference scenario** will peak in early September and then decline to just over 100,000 on December 1, 2021 (Figure 24). Daily cases in the **worse scenario** will rise to over 300,000 by the end of October (Figure 24).
- Daily hospital census in the **reference scenario** will rise to 116,510 by September 14, 2021 (Figure 25). Daily hospital census in the **worse scenario** will rise to 267,840 by November 3, 2021 (Figure 25).
- Figure 26 compares our reference scenario forecasts to other publicly archived models. The CDC ensemble and Los Alamos National Labs forecast steadily rising daily deaths in September and through into October. Other models forecast a peak in mid-September and then declines. The lowest forecasts for November are from Imperial.

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- At some point from August through December 1, 40 states will have high or extreme stress on hospital beds (Figure 27). At some point from August through December 1, 44 states will have high or extreme stress on intensive care unit (ICU) capacity (Figure 28).

Model updates

For 22 US states, we have observed poor temporal concordance over recent weeks when comparing (a) deaths, hospitalizations, and cases to (b) seroprevalence surveys after performing assay-specific corrections for sero-reversion. To improve this, we changed the assumptions in the model as to which assay was used in those particular states – from one with substantial declines in sensitivity over time to one with more robust long-term sensitivity – which resulted in a smaller adjustment for these data, and thus lower estimates of seroprevalence. The below are examples from Florida. The top figure shows the previous approach; the lower figure shows the new approach. Squares are reported, circles are post-correction.

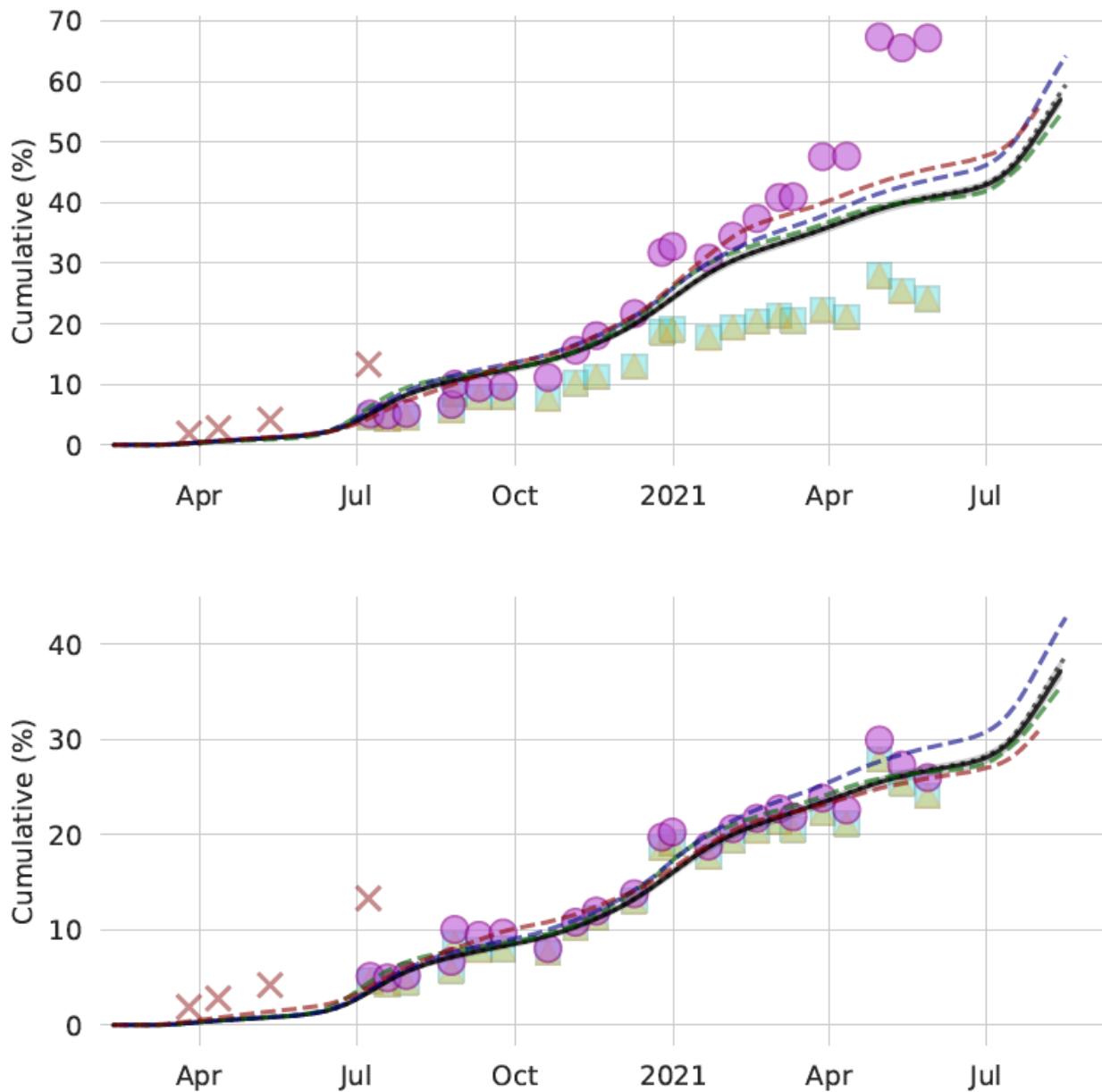


Figure 1. Daily COVID-19 hospital census and infections

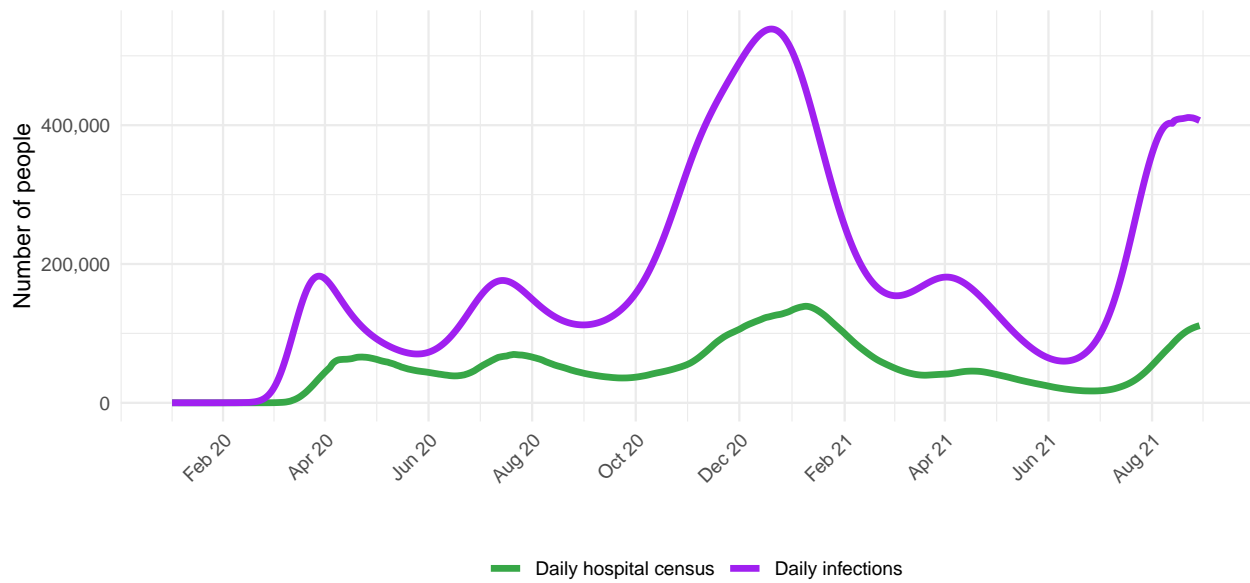


Figure 2. Reported daily COVID-19 cases, moving average

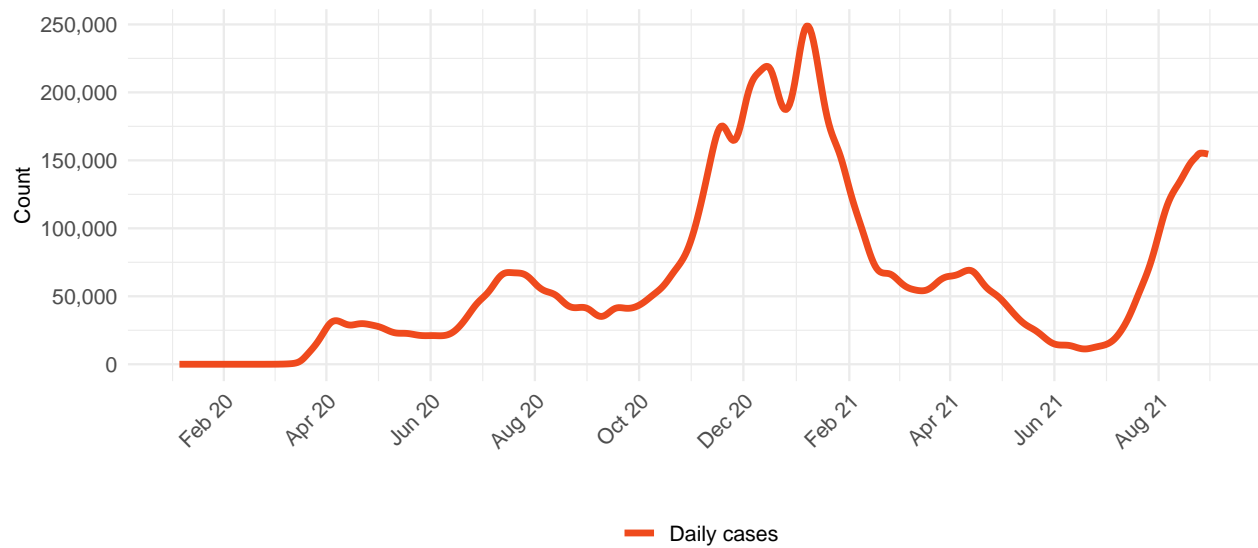


Table 1. Ranking of excess deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	14,514	1
Ischemic heart disease	10,724	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. Smoothed trend estimate of reported daily COVID-19 deaths (blue) and excess daily deaths due to COVID-19 (orange)

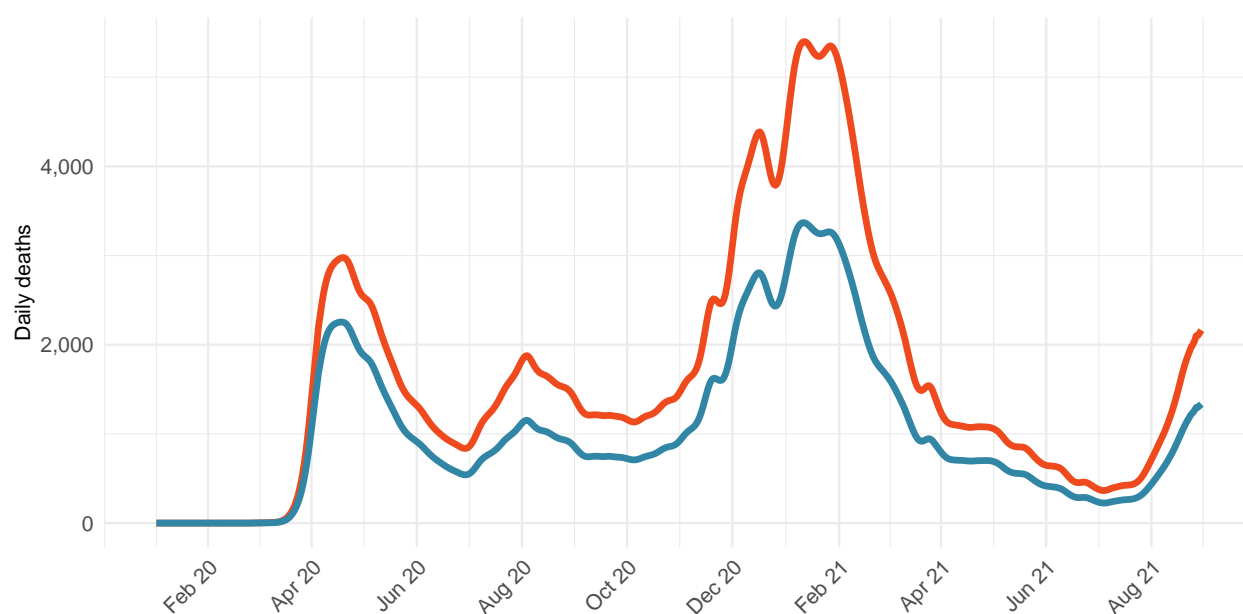
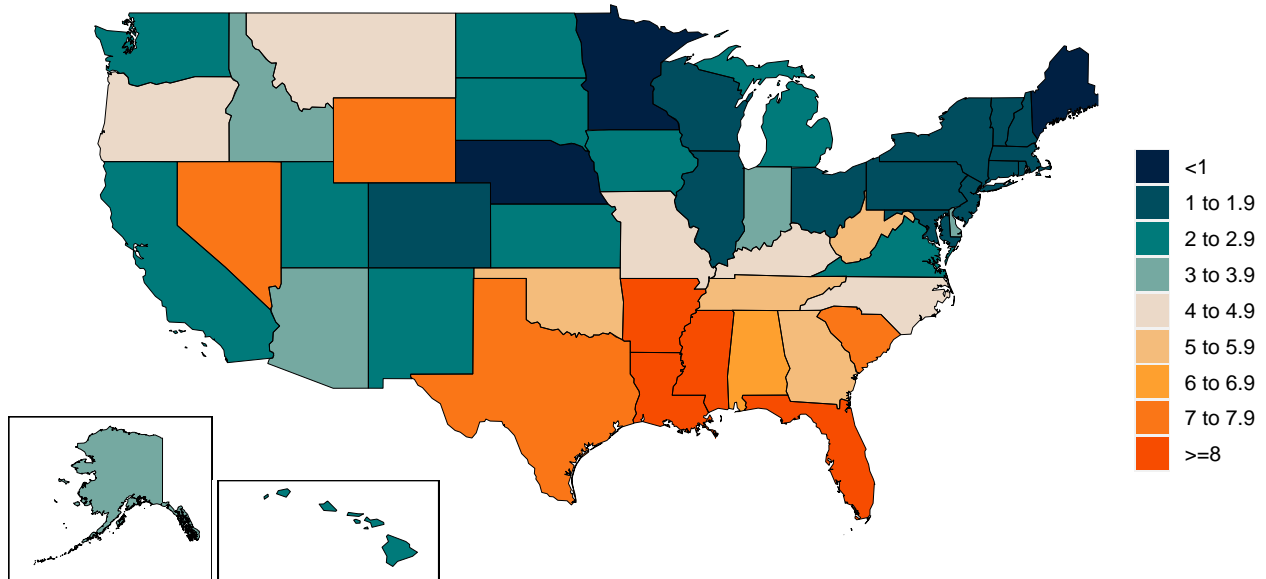


Figure 4. Daily COVID-19 death rate per 1 million on August 30, 2021

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



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

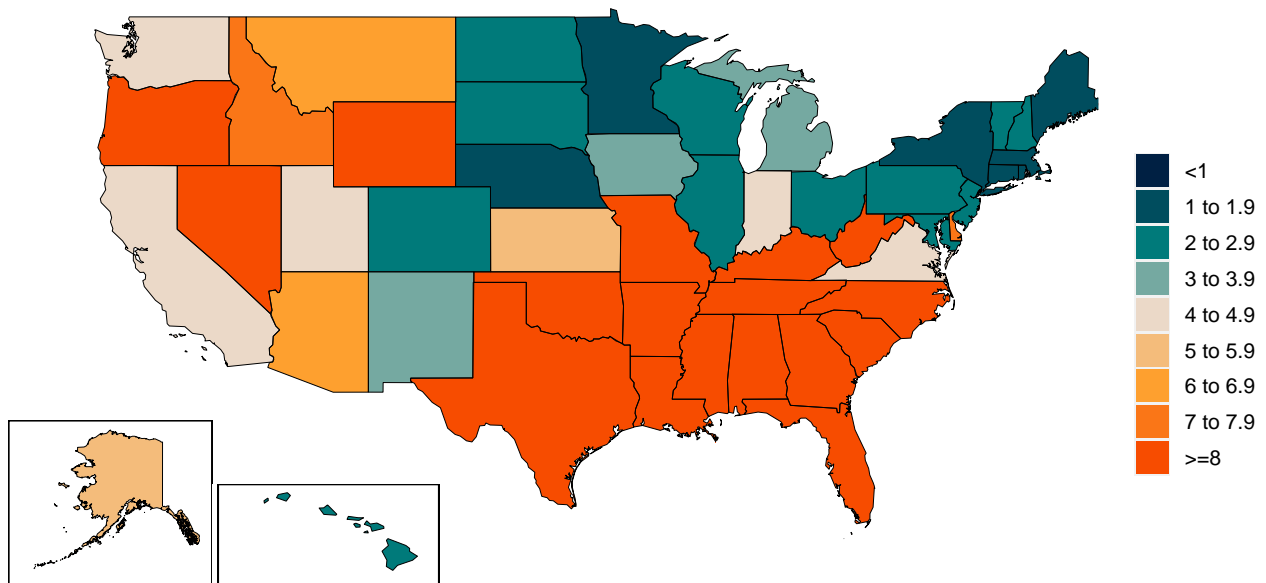
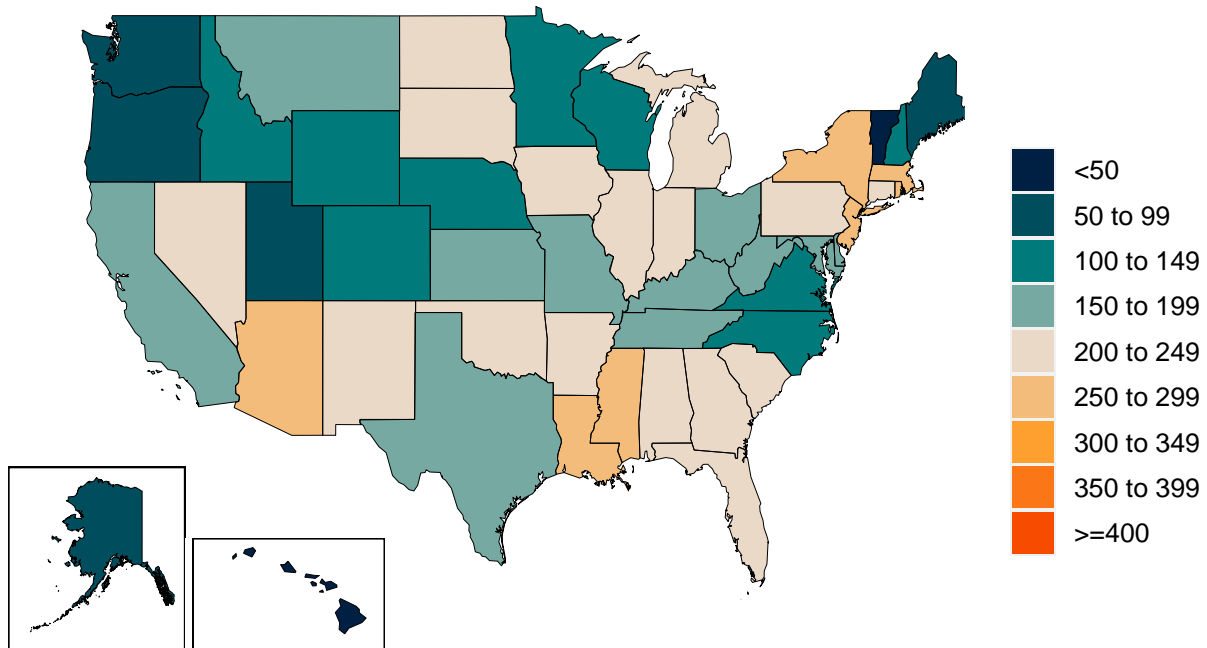


Figure 5. Cumulative COVID-19 deaths per 100,000 on August 30, 2021

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



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

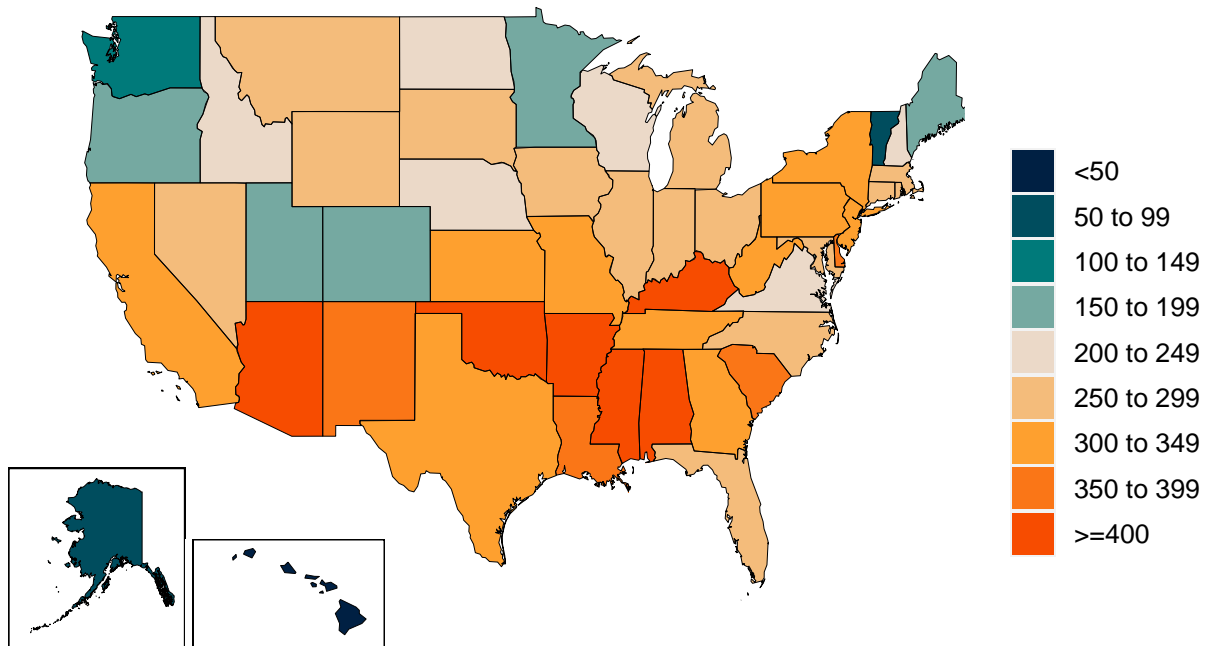


Figure 6. Estimated percent of the population infected with COVID-19 on August 30, 2021

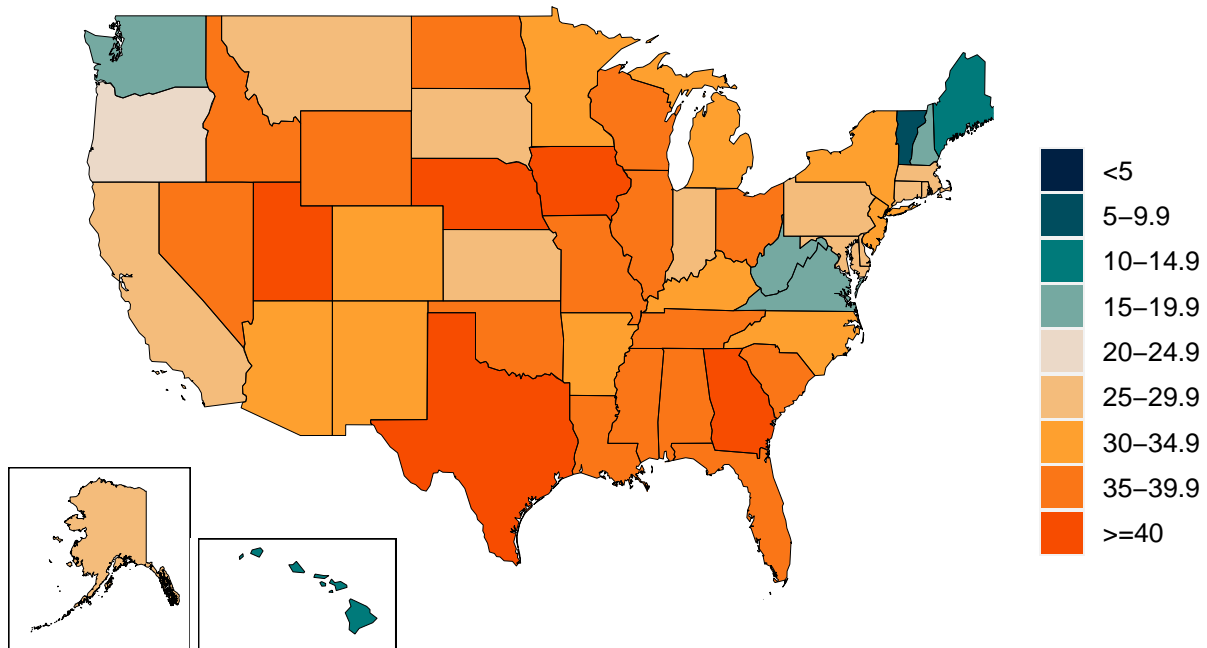


Figure 7. Mean effective R on August 19, 2021. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.

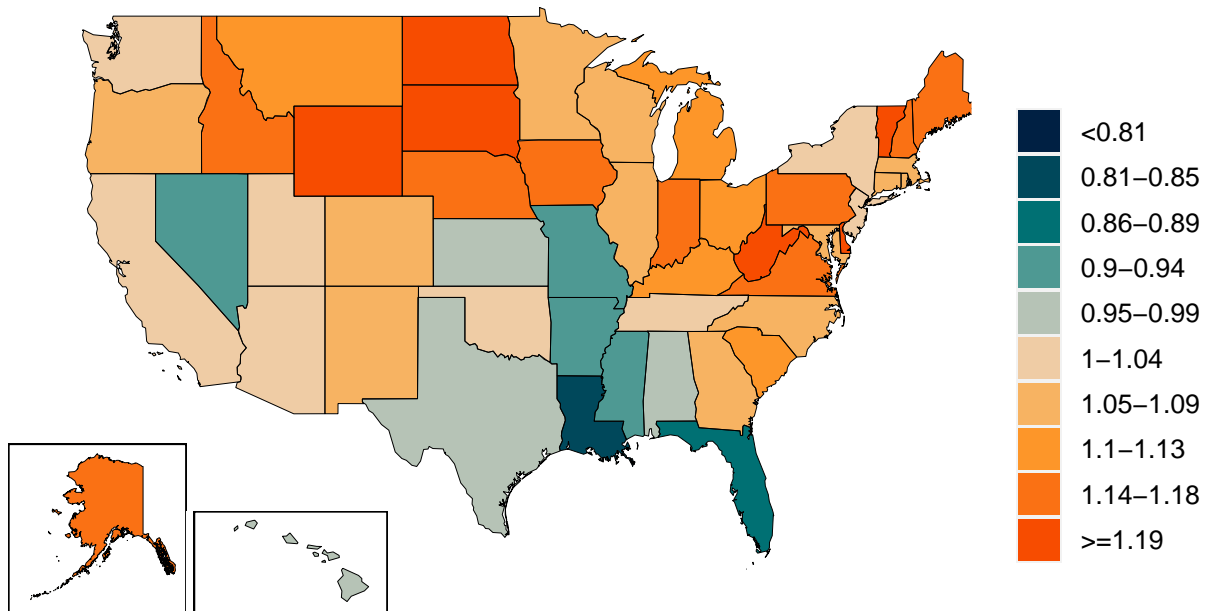


Figure 8. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100% at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

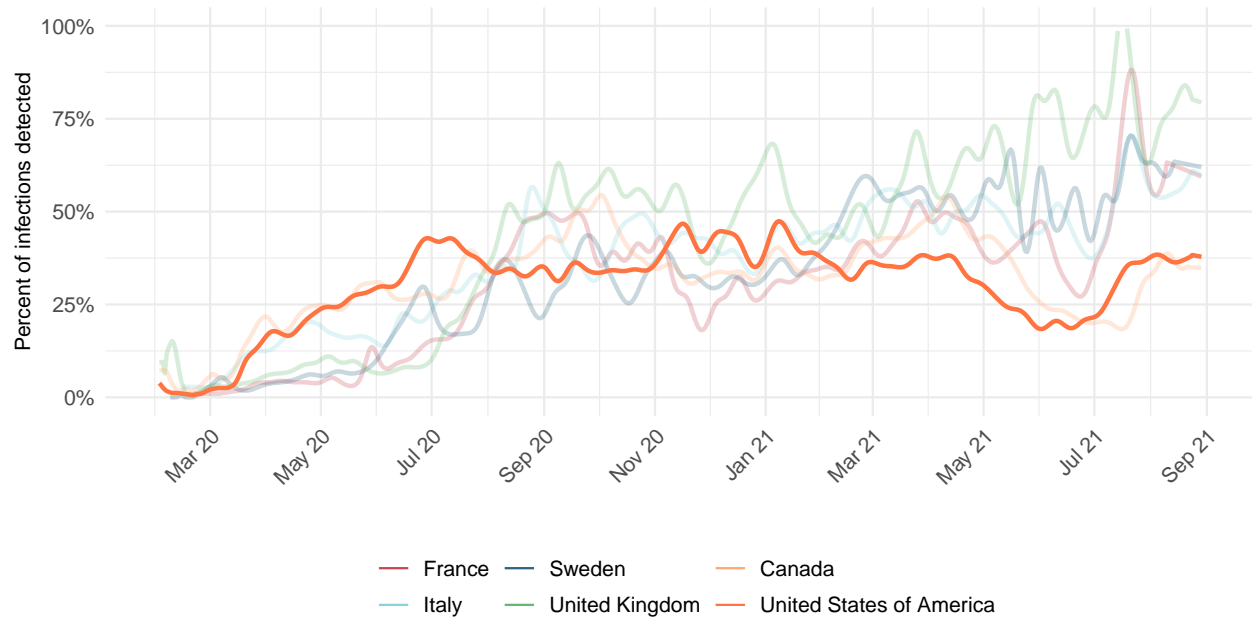
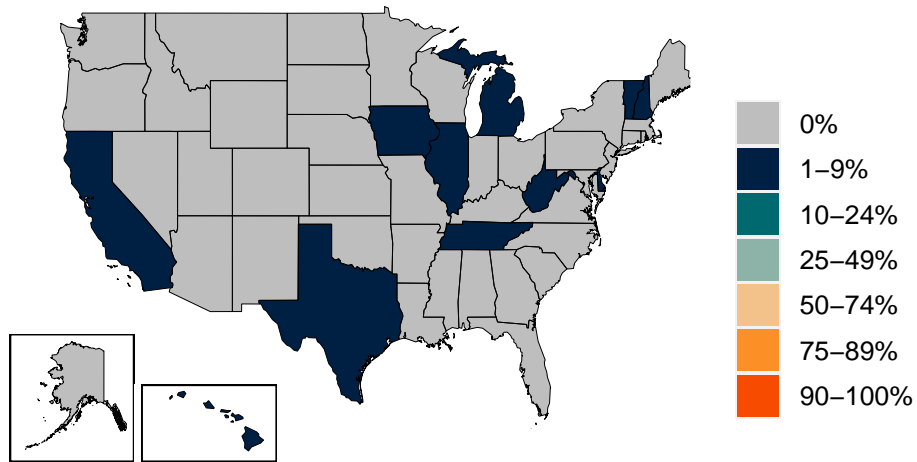
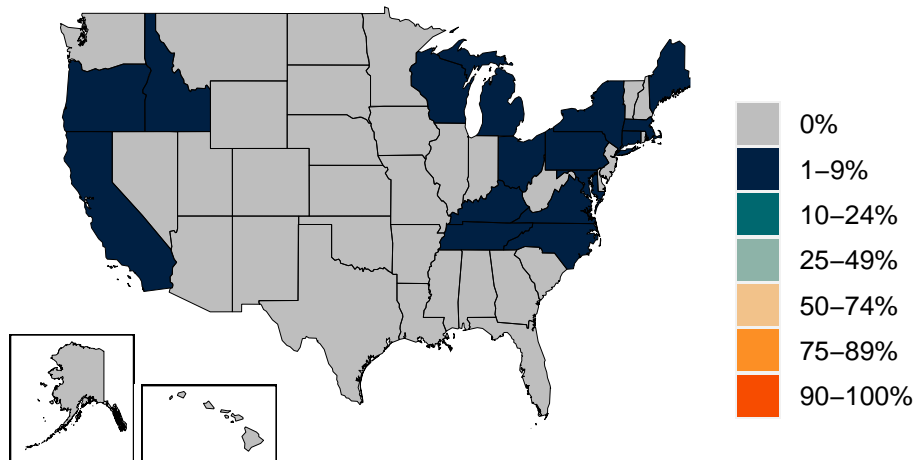


Figure 9. Estimated percent of circulating SARS-CoV-2 for primary variant families on August 30, 2021

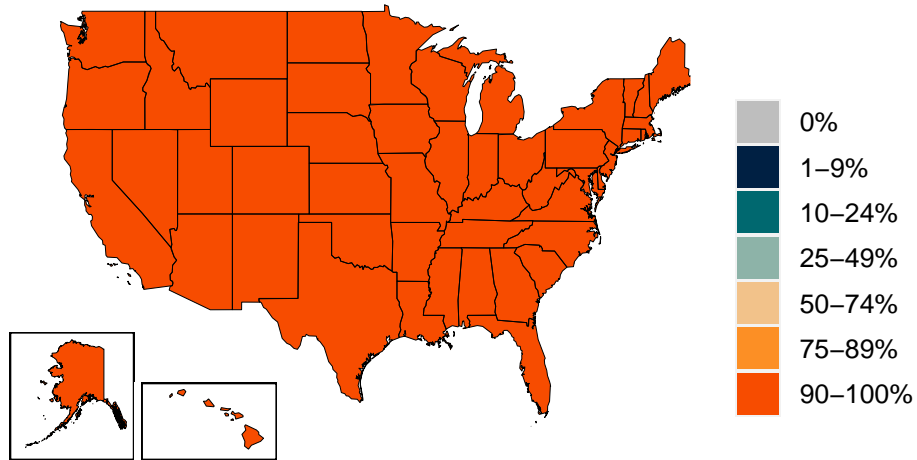
A. Estimated percent Alpha variant



B. Estimated percent Beta variant



C. Estimated percent Delta variant



D. Estimated percent Gamma variant

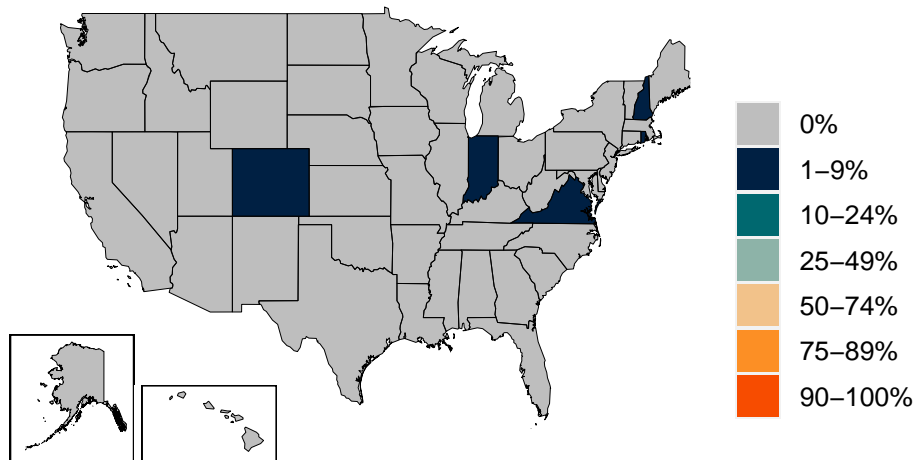
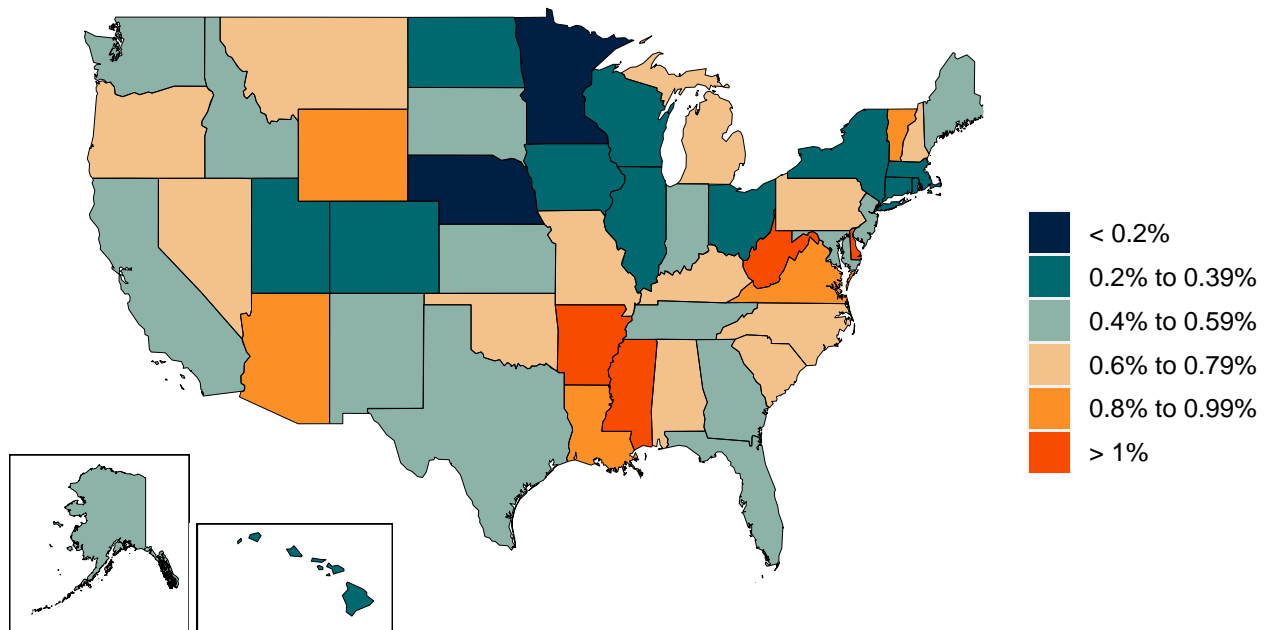


Figure 10. Infection-fatality rate on August 30, 2021. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.



Critical drivers

Table 2. Current mandate implementation

	Primary school closure	Secondary school closure	Higher school closure	Borders closed to any non-resident	Borders closed to all non-residents	Individual movements restricted	Curfew for businesses	Individual curfew	Gathering limit: 6 indoor, 10 outdoor	Gathering limit: 10 indoor, 25 outdoor	Gathering limit: 25 indoor, 50 outdoor	Gathering limit: 50 indoor, 100 outdoor	Gathering limit: 100 indoor, 250 outdoor	Restaurants closed	Bars closed	Restaurants / bars closed	Restaurants / bars curbside only	Gyms, pools, other leisure closed	Non-essential retail closed	Non-essential retail curbside only	Non-essential workplaces closed	Stay home order	Stay home fine	Mask mandate	Mask mandate fine
Alabama																									
Alaska																									
Arizona																									
Arkansas																									
California																									
Colorado																									
Connecticut																									
Delaware																									
District of Columbia																									
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Georgia																									
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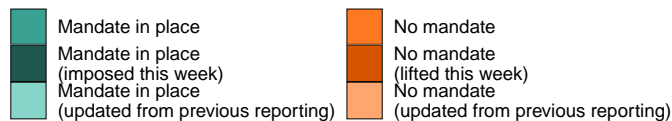


Figure 11. Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

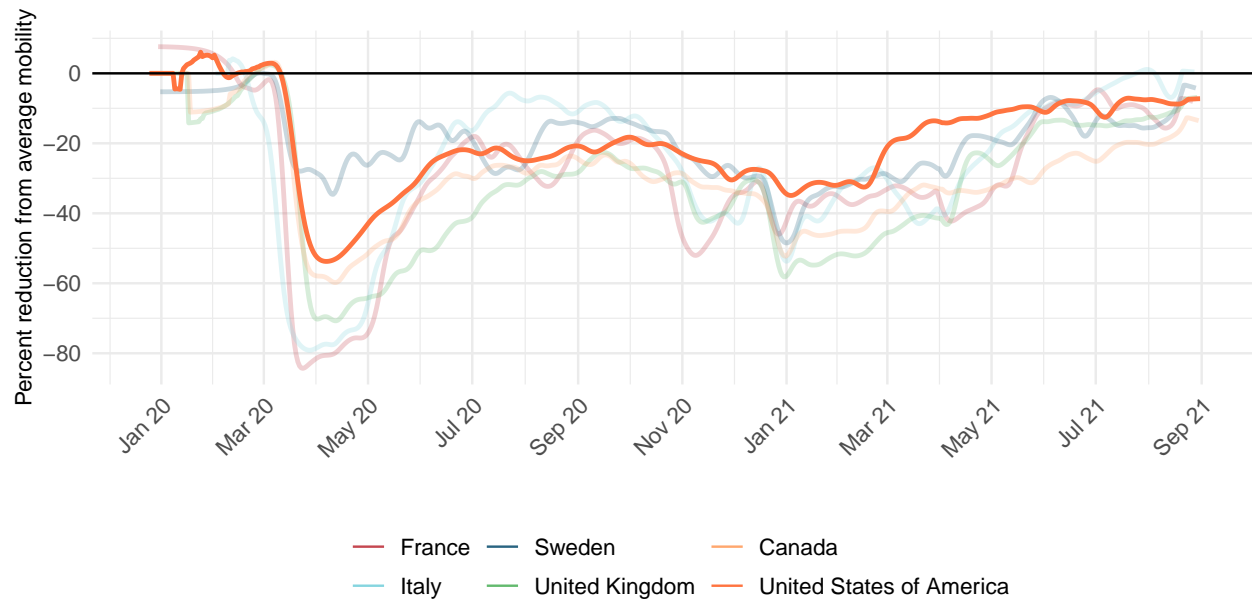


Figure 12. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on August 30, 2021

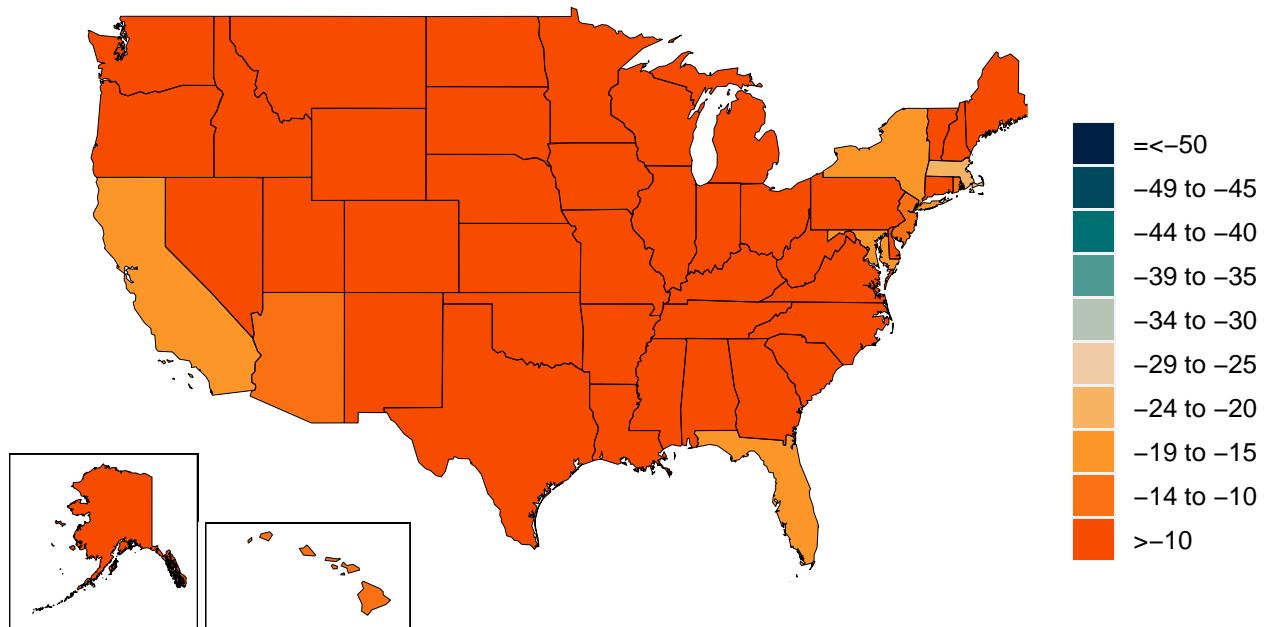


Figure 13. Trend in the proportion of the population reporting always wearing a mask when leaving home

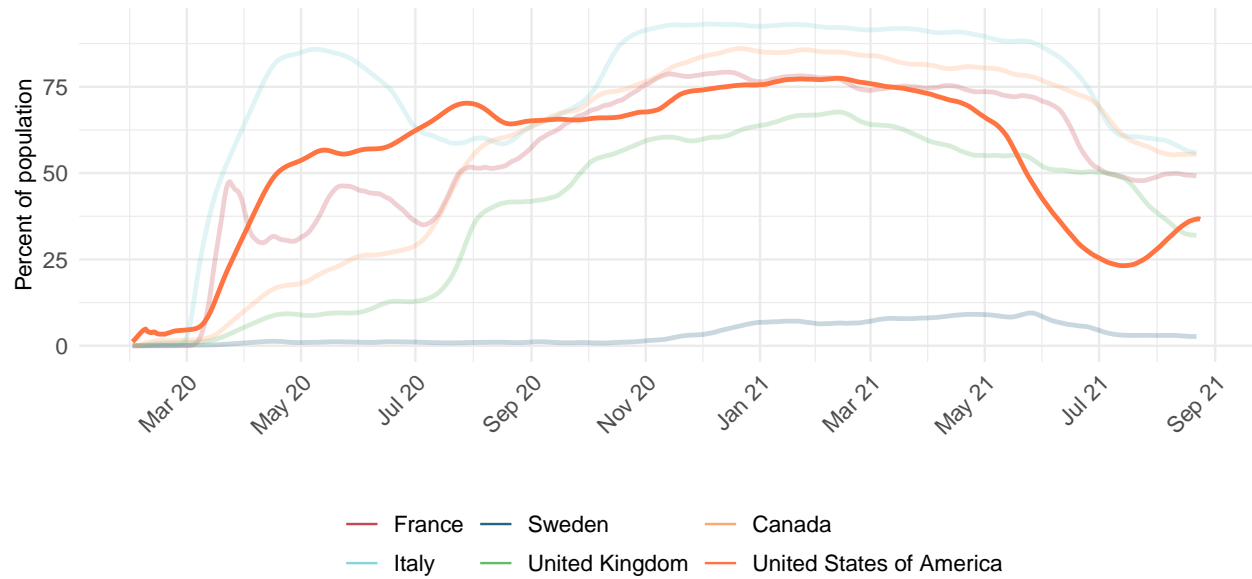


Figure 14. Proportion of the population reporting always wearing a mask when leaving home on August 30, 2021

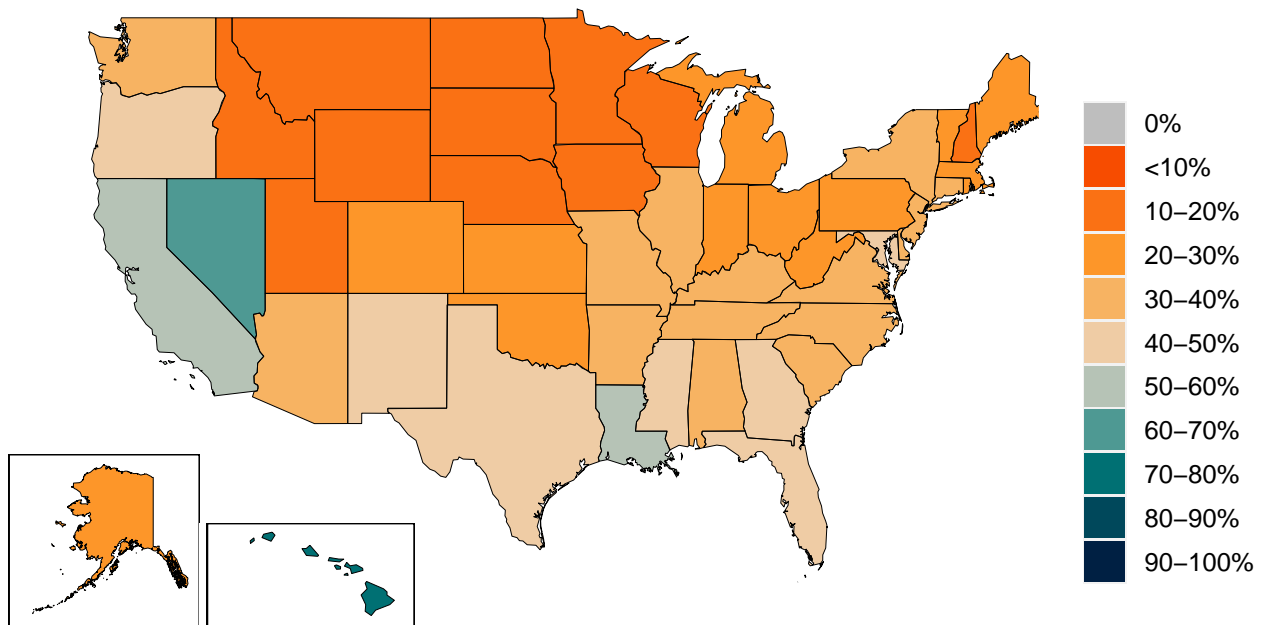


Figure 15. Trend in COVID-19 diagnostic tests per 100,000 people

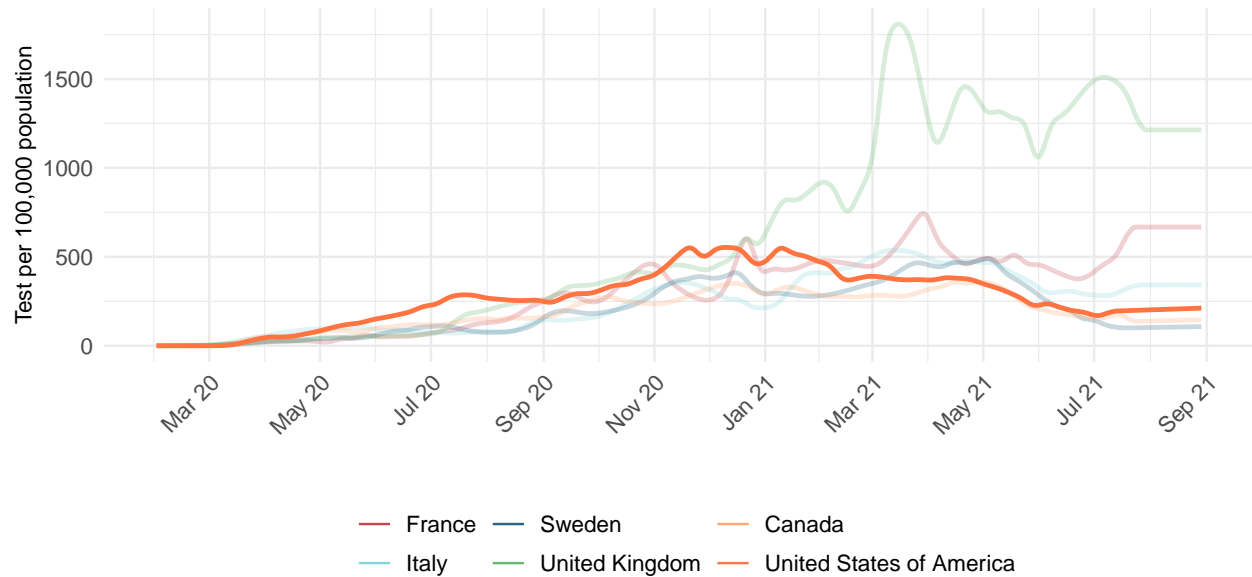


Figure 16. COVID-19 diagnostic tests per 100,000 people on August 30, 2021

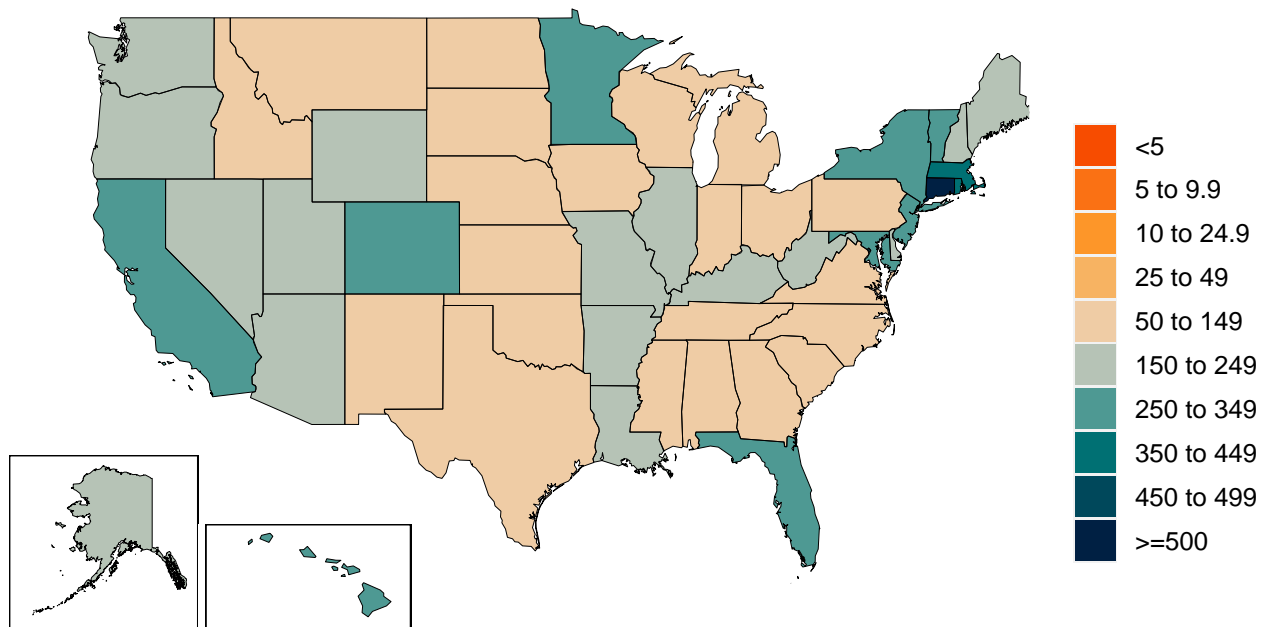


Table 3. Estimates of vaccine efficacy for specific vaccines used in the model at preventing disease and infection. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available, 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	85%	52%	83%	57%
CoronaVac	50%	44%	43%	38%
Covaxin	78%	69%	68%	60%
Johnson & Johnson	86%	72%	85%	56%
Moderna	94%	89%	93%	80%
Novavax	89%	79%	79%	69%
Pfizer/BioNTech	92%	86%	90%	78%
Sinopharm	73%	65%	63%	56%
Sputnik-V	92%	81%	80%	70%
Tianjin	66%	58%	57%	50%
CanSino				
Other vaccines	75%	66%	65%	57%
Other vaccines (mRNA)	91%	86%	89%	78%

A. Percent of the population having received one dose of a COVID-19 vaccine

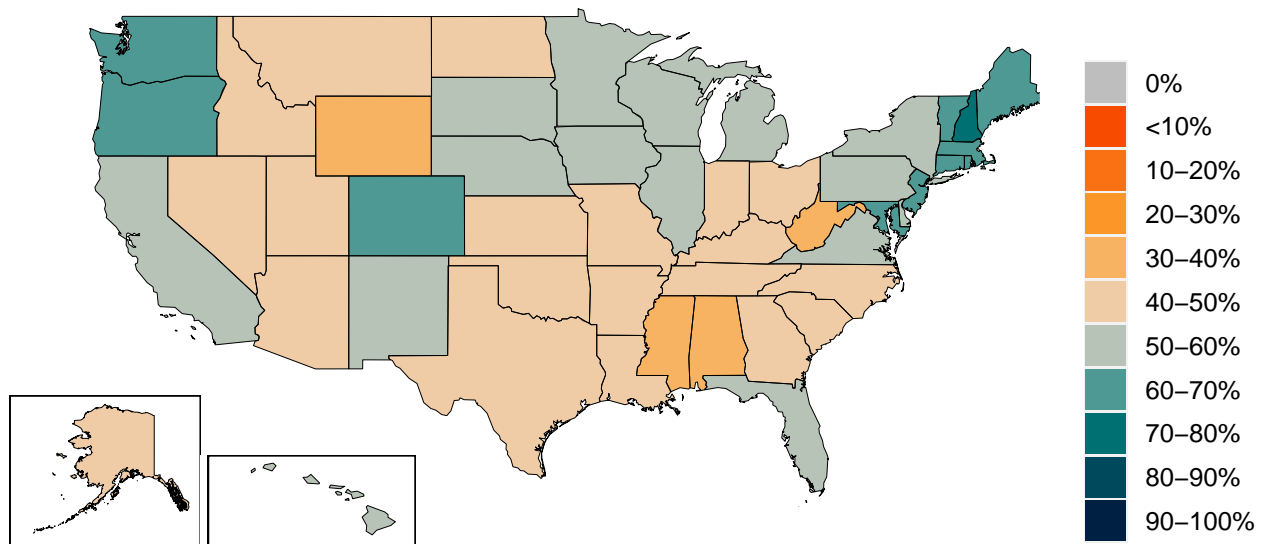
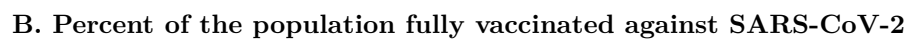


Figure 18. Trend in the estimated proportion of the adult (18+) population that have been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

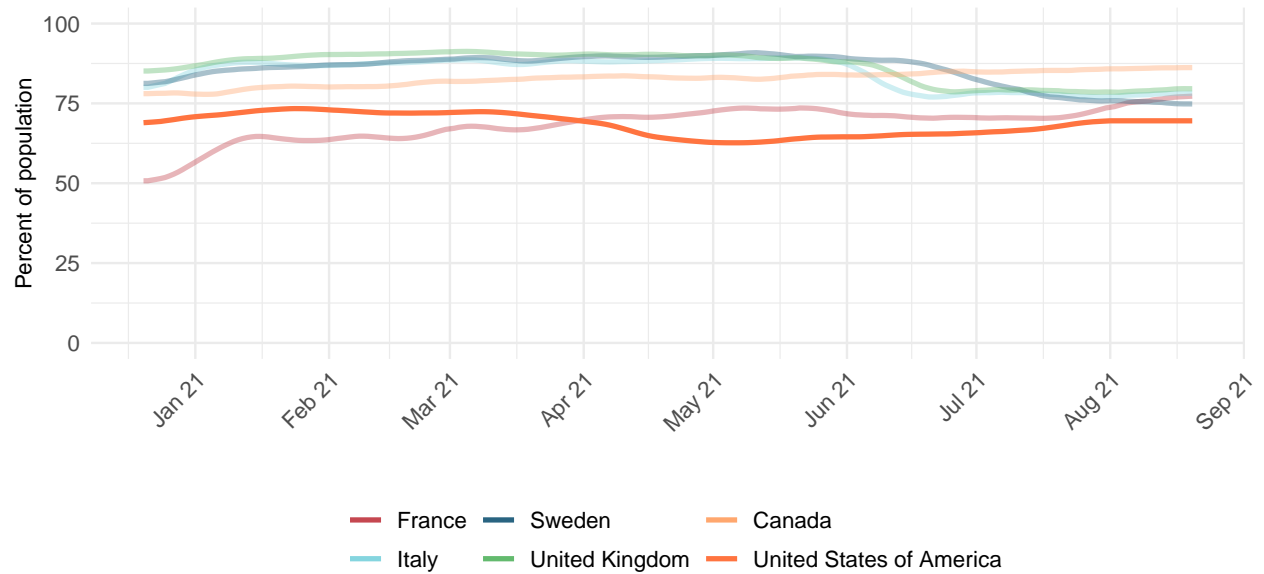


Figure 19. This figure shows the estimated proportion of the adult (18+) population that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

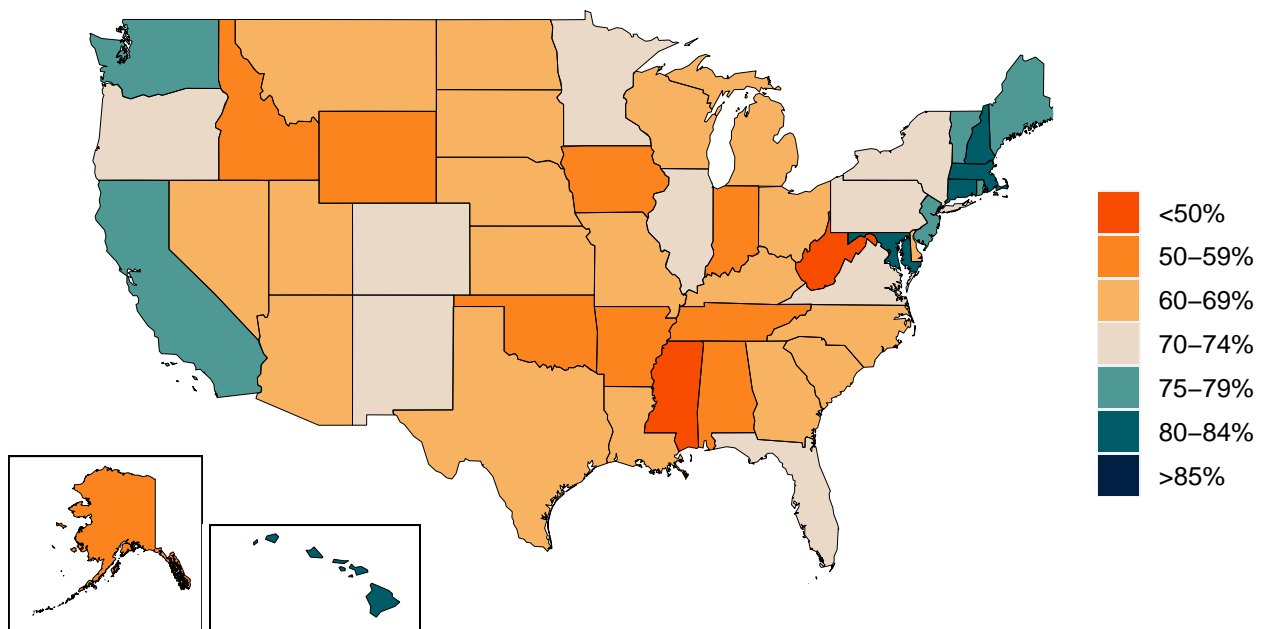


Figure 20. Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated

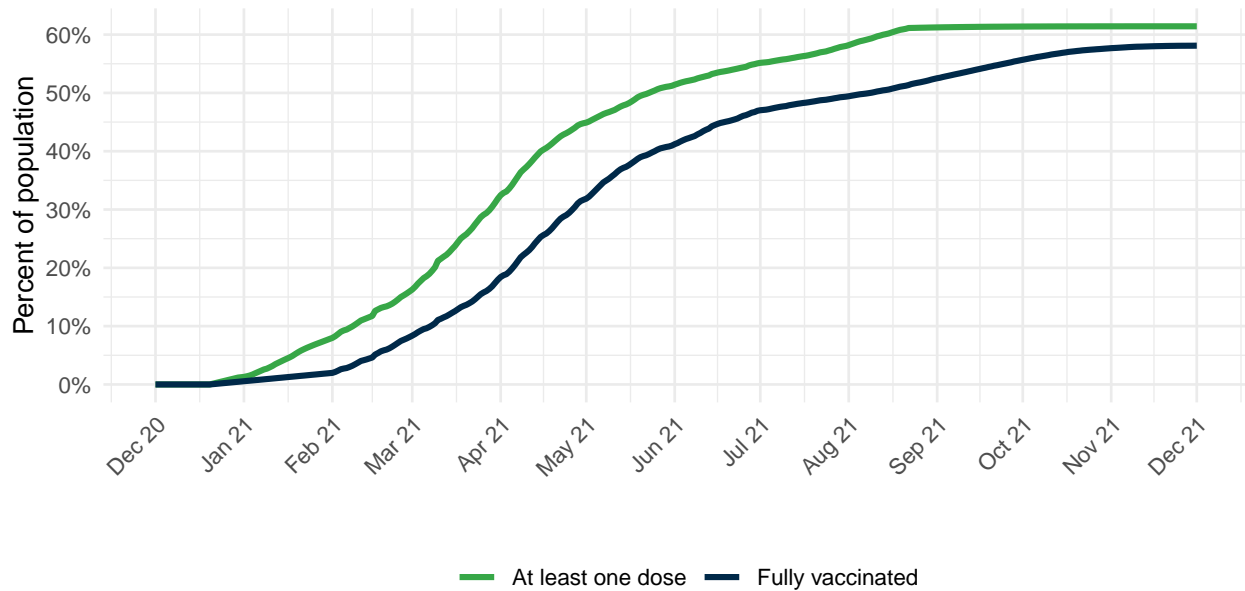
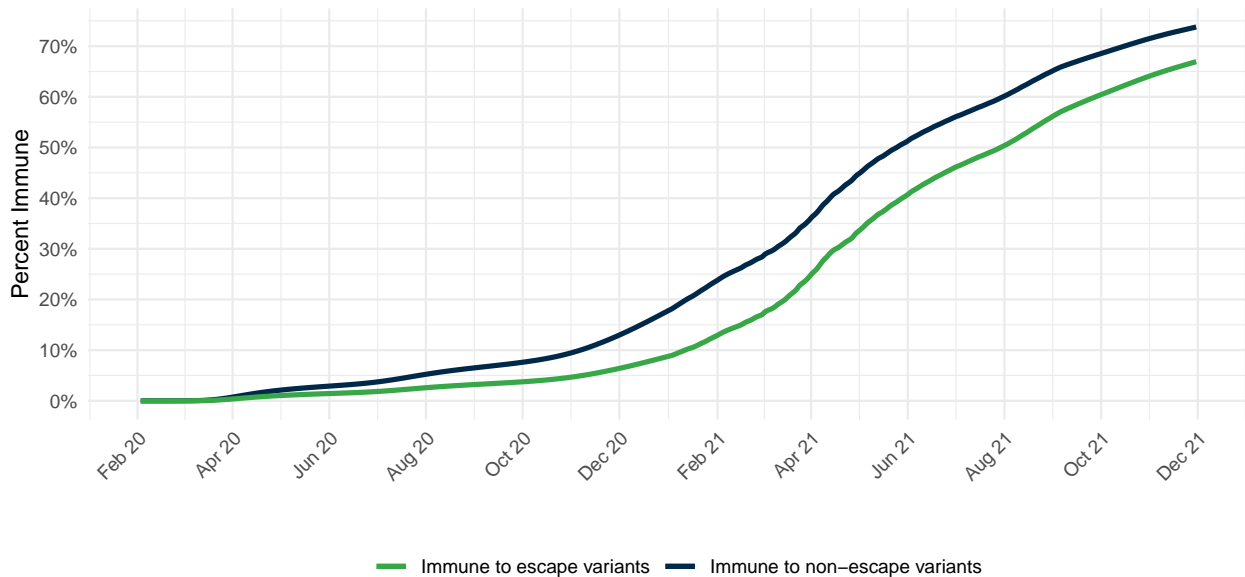


Figure 21. Percentage of people who are immune to non-escape variants and the percentage of people who are immune to escape variants



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.

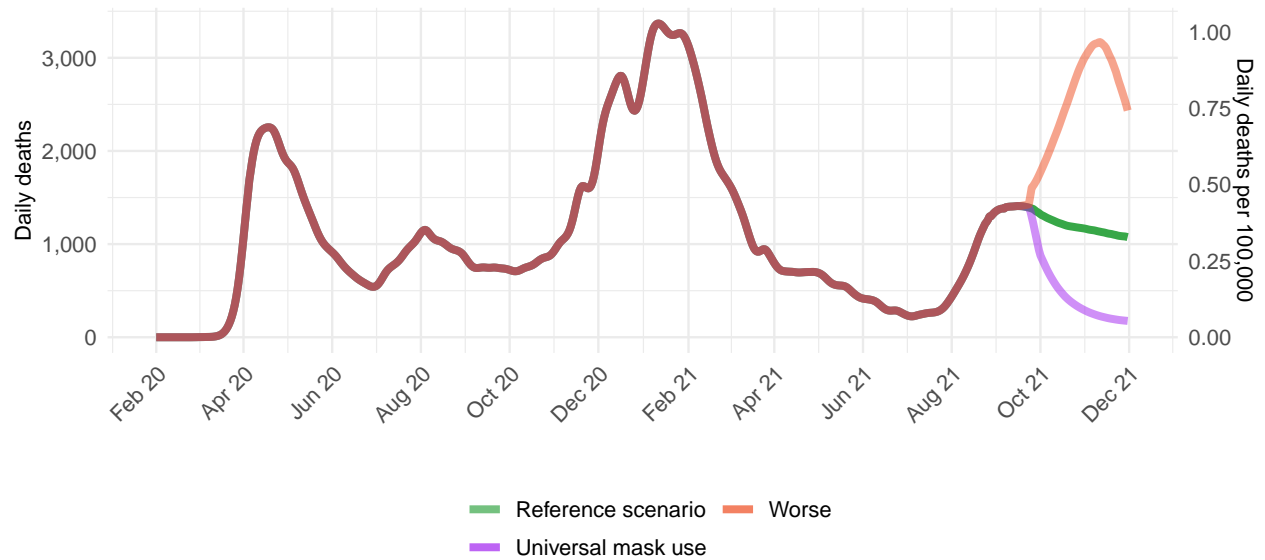
The **worse scenario** modifies the reference scenario assumption in four ways:

- 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 December 01, 2021 for three scenarios

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



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

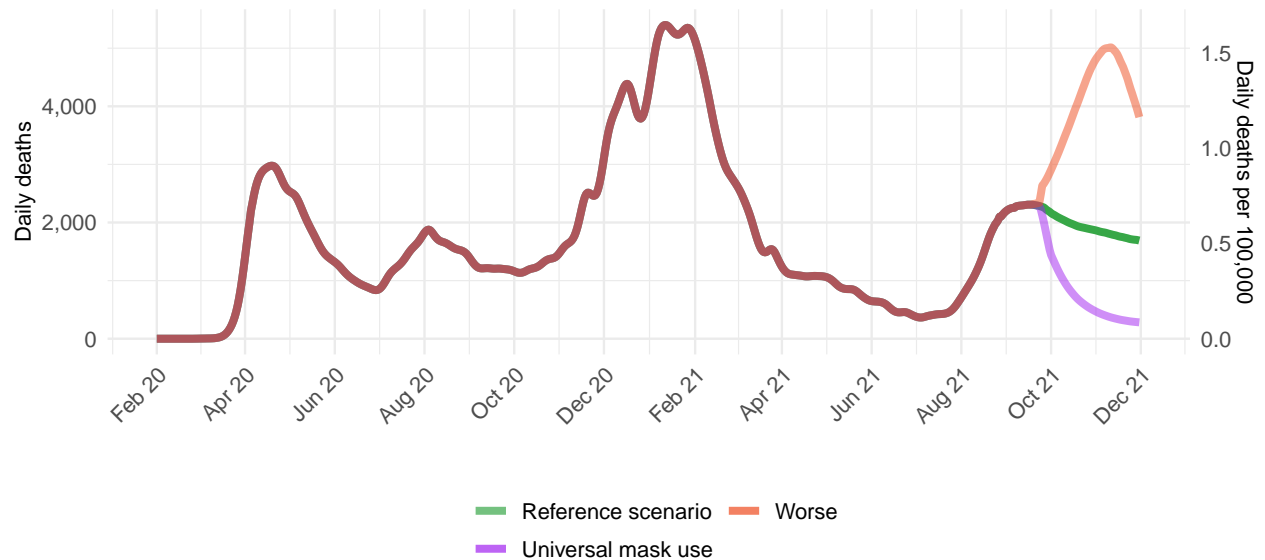


Figure 23. Daily COVID-19 infections until December 01, 2021 for three scenarios

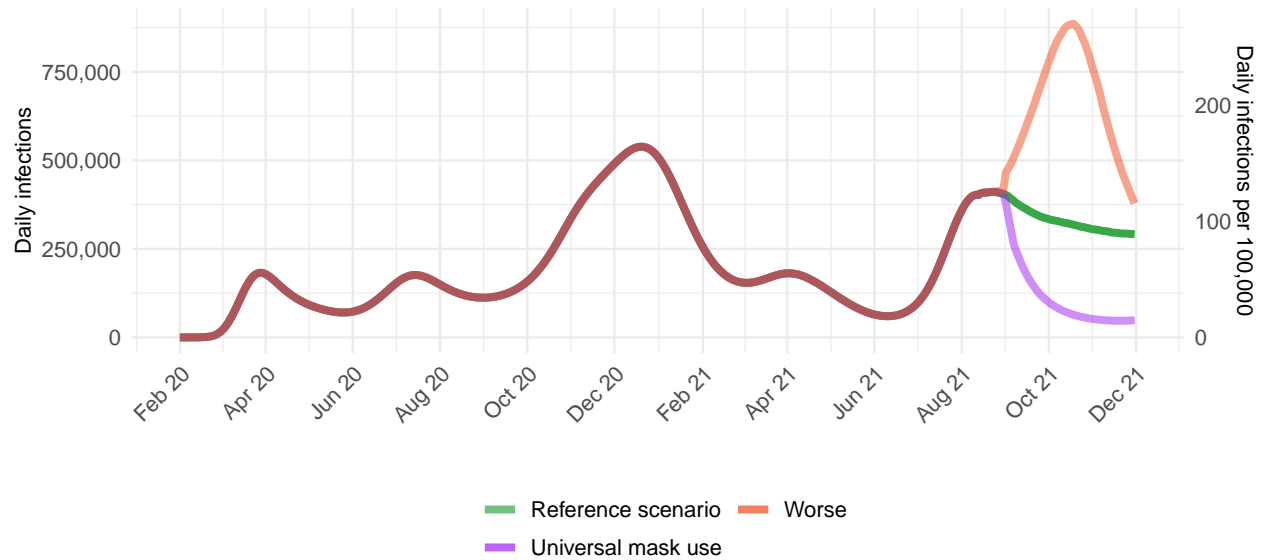


Figure 24. Daily COVID-19 reported cases until December 01, 2021 for three scenarios

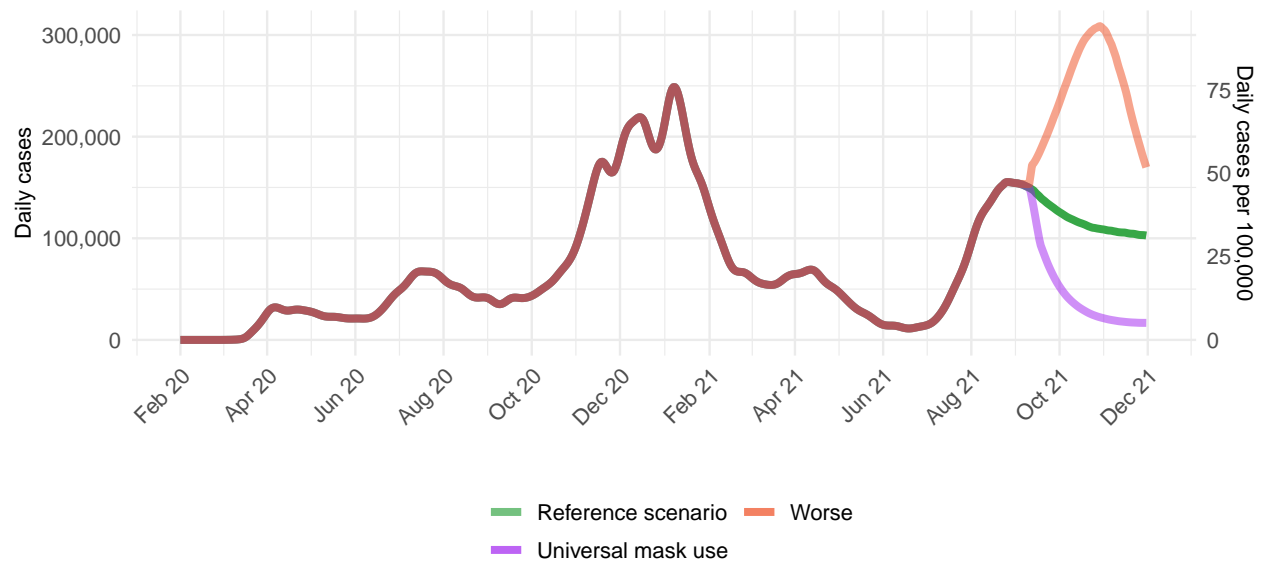


Figure 25. Daily COVID-19 hospital census until December 01, 2021 for three scenarios

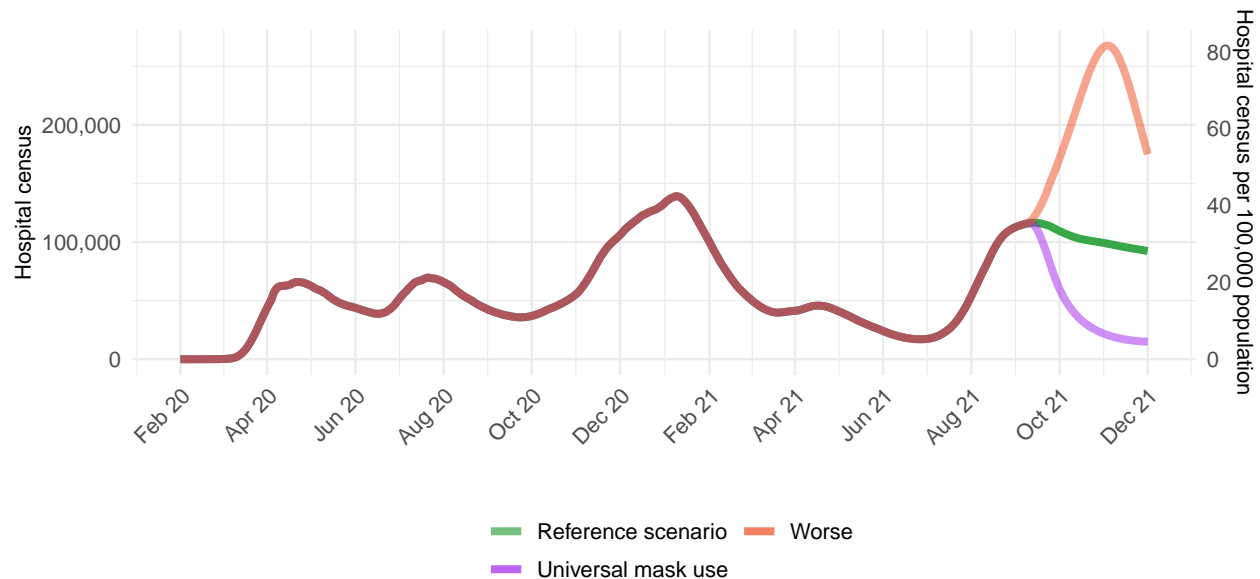


Figure 26. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachusetts Institute of Technology ([Delphi](#)), Imperial College London ([Imperial](#)), The Los Alamos National Laboratory ([LANL](#)), the SI-KJalpha model from the University of Southern California ([SIKJalpha](#)), and the CDC Ensemble Model ([CDC](#)). Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from available locations in that region.

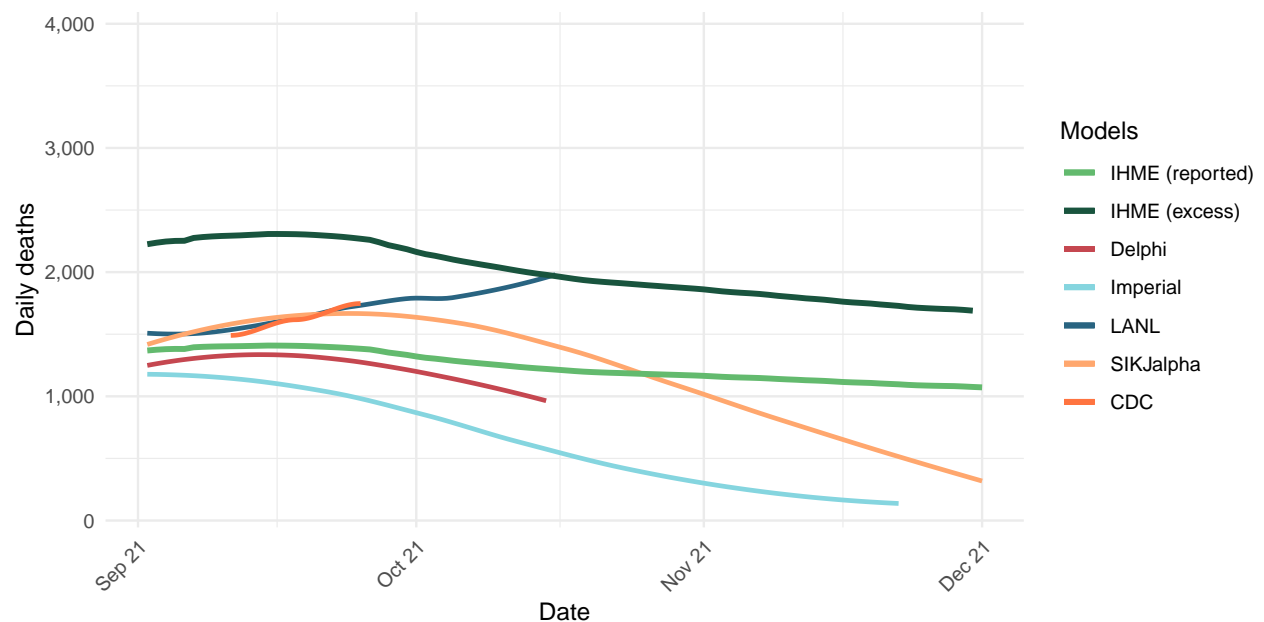


Figure 27. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate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

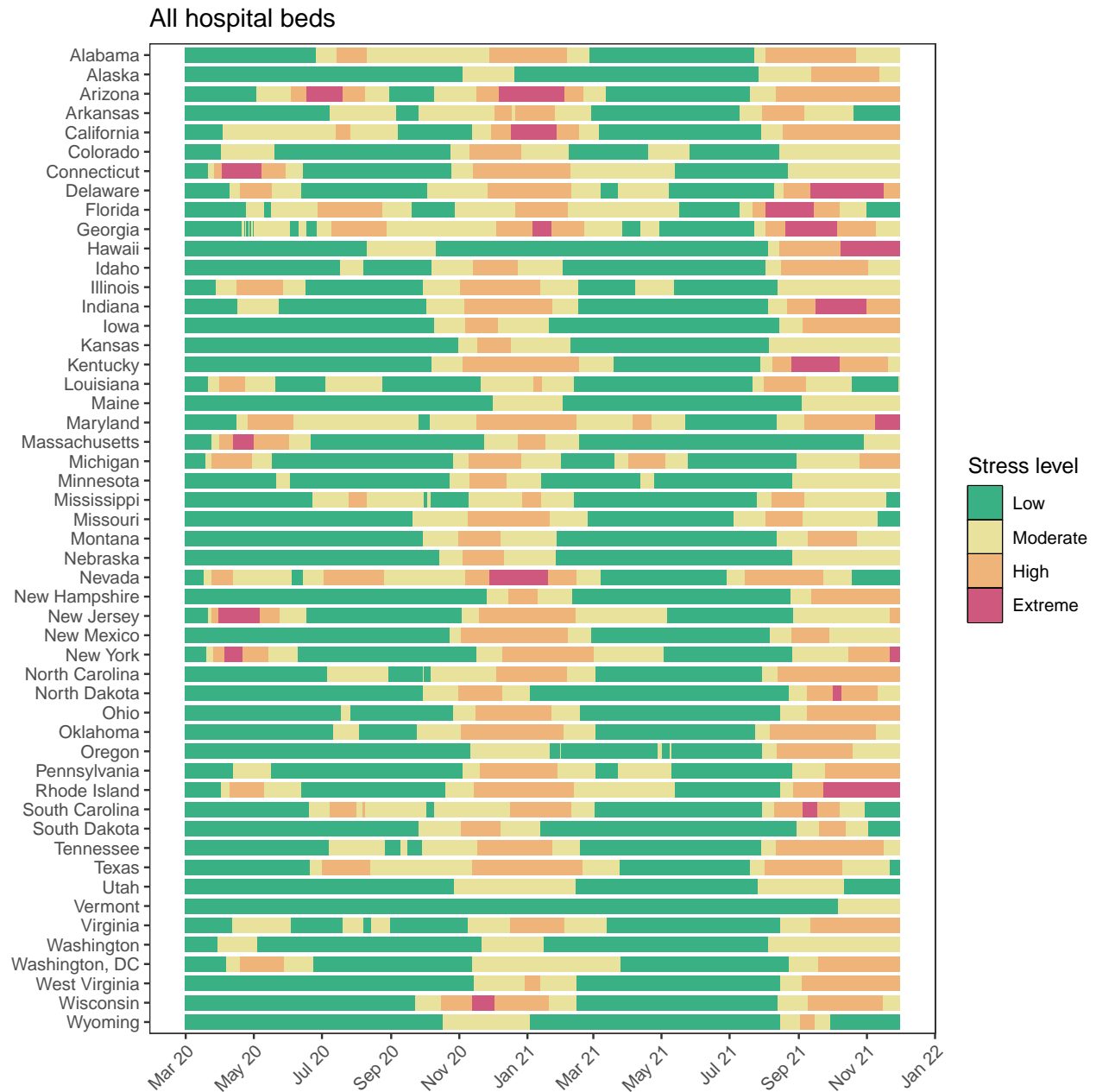
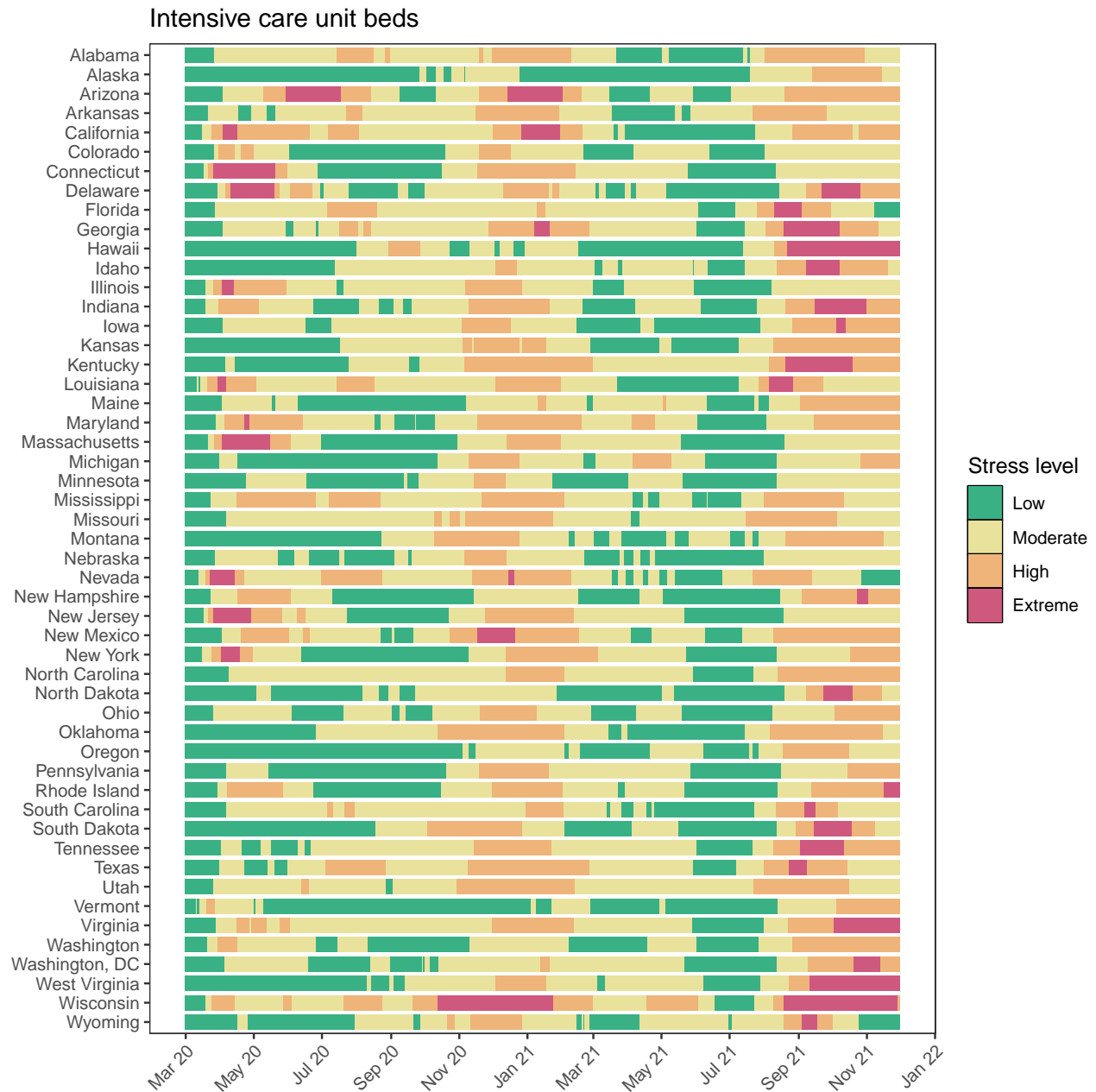


Figure 28. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered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