COVID-19 Results Briefing

The United States of America

July 28, 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 July 27, 2021, with data through July 26, 2021.

Due to the Delta variant spread, combined with reduced mask use and increased mobility, transmission is increasing in all states and the District of Columbia. The substantial summer surge in reported cases and in hospitalizations has so far not been associated with an increase in daily deaths at the national level. Notable increases in daily deaths in Arkansas, Louisiana, Nevada, and Maine suggest that eventually national daily deaths will begin to increase as well. Despite 50% of the population fully vaccinated and 39% with prior infection, based on estimated vaccine effectiveness for preventing infection and cross-variant immunity for natural infection, we estimate that only 52% are currently immune to Delta variant infection. Recent reports from Israel on waning immunity after Pfizer vaccination may mean that the estimate of 52% immunity to Delta is optimistic. In our reference scenario, we forecast daily deaths to increase to 1,000 by mid-September. The change this week in mask guidance from CDC may mean that mask use will increase again after months of decline, which would blunt some of this forecasted increase. While direct evidence of the secondary attack rate from infections in the vaccinated is not available, our evaluation of the transmission dynamics suggests that the vaccinated play a role in transmission. The main strategies to manage the epidemic in this phase include 1) community outreach and messaging to increase vaccination in local communities with high vaccine hesitancy; 2) implementation of vaccination mandates by employers and schools; 3) re-imposition of mask mandates for all in settings with rapid increases in transmission; 4) reporting of cases, hospitalizations, and deaths by vaccination status and time since vaccination to help assess vaccine effectiveness and how it changes over time; and 5) long-term planning of resources for the likely heavy demand for hospitalization due to COVID-19 and flu in the winter.

Current situation

- Daily reported cases in the last week (through July 26) increased to 51,800 per day on average compared to 37,600 the week before (Figure 1).
- Reported deaths due to COVID-19 in the last week decreased to 240 per day on average compared to 250 the week before (Figure 2).
- Excess deaths due to COVID-19 in the last week decreased to 390 per day on average compared to 410 the week before (Figure 2). This makes COVID-19 the number 6 cause of death in the United States of America this week (Table 1). Estimated excess daily deaths due to COVID-19 were 1.5 times larger than the reported number of deaths.
- No locations had daily reported COVID-19 death rates greater than 4 per million (Figure 3).

- The daily rate of excess deaths due to COVID-19 is greater than 4 per million in Arkansas and Nevada (Figure 3).
- We estimated that 39% of people in the US have been infected as of July 26 (Figure 5).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in all 50 states and the District of Columbia (Figure 6).
- The infection-detection rate in the US was close to 25% on July 26 (Figure 7).
- Based on the GISAID and various national databases, combined with our variant spread model, we estimate the current prevalence of variants of concern (Figure 8). We estimate that the Beta variant (B.1.351) is circulating in 12 states, that the Delta variant (B.1.617.2) is circulating in all 50 states and DC, and that the Gamma variant (P.1) is circulating in 17 states. The Delta variant is the dominant variant in all states.

Trends in drivers of transmission

- While some states have changed recommendations this week for mask wearing, there are few mandates still in place in the US, with the exception of some gathering restrictions in five states and some business curfews in five states (Table 2).
- Mobility last week was 7% lower than the pre-COVID-19 baseline (Figure 10). Mobility was near baseline (within 10%) in 43 states. Mobility was lower than 30% of baseline in no locations.
- As of July 26, in the COVID-19 Trends and Impact Survey, 23% of people self-report that they always wore a mask when leaving their home (Figure 12).
- There were 331 diagnostic tests per 100,000 people on July 26 (Figure 14).
- In the US, 74.2% of people say they would accept or would probably accept a vaccine for COVID-19. This is up by 0.4 percentage points from last week. The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 52% in Mississippi to 90% in Massachusetts (Figure 18).
- In our current reference scenario, we expect that 184 million people will be vaccinated by November 1 (Figure 19).
- Based on estimates of vaccine effectiveness for preventing infection and cross-variant immunity from prior infection, we estimate that 52% are currently immune to the Delta variant. This is expected through increases in vaccination and ongoing Delta transmission to rise to 64% of people by November 1 (Figure 20).

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 683,000 cumulative reported deaths due to COVID-19 on November 1. This represents 76,000 additional deaths from July 26 to November 1. Daily reported deaths will rise to over 1,000 by the middle of September and then decline slightly until November 1 (Figure 21).
- Under our **reference scenario**, our model projects 1,063,000 cumulative excess deaths due to COVID-19 on November 1. This represents 125,000 additional deaths from July 26 to November 1 (Figure 21).
- If **universal mask coverage (95%)** were attained in the next week, our model projects 49,000 fewer cumulative reported deaths compared to the reference scenario on November 1.
- Under our **worse scenario**, our model projects 721,000 cumulative reported deaths on November 1, an additional 38,000 deaths compared to our reference scenario. Daily reported deaths in the worse scenario will rise to nearly 1,700 by mid-October (Figure 21).
- Daily infections in the reference scenario will rise to nearly 450,000 by mid-August and then decline to 300,000 by November 1 (Figure 22). Daily infections in the worse scenario will rise to near 700,000 by mid-September (Figure 22).
- Figure 23 compares our reference scenario forecasts to other publicly archived models. The USC (SIKJalpha model) projects huge increases in daily deaths. The other models, including the CDC ensemble, project small increases until mid-September.
- At some point from July through November 1, 30 states will have high or extreme stress on hospital beds (Figure 24). At some point from July through November 1, 35 states will have high or extreme stress on intensive care unit (ICU) capacity (Figure 25).

Model updates

Our projections of SARS-CoV-2 infections and COVID-19 deaths in the **worse** scenario were updated to account for the possibility that population mobility may continue to increase, irrespective of vaccine coverage or infection levels. Specifically, a new mobility scenario was formulated in which all locations exhibit an 8-week linear increase in mobility to the regional maximum mobility level observed between the period 1/1/2020 and the last day of data. Furthermore, the new projections of mobility for the worse scenario assume that population mobility will remain elevated until COVID-19 mortality reaches a minimum of 15 deaths per million, at which point a location may re-impose all social distancing mandates for a period of six weeks, causing mobility to rapidly decline

Figure 1. Reported daily COVID-19 cases, moving average

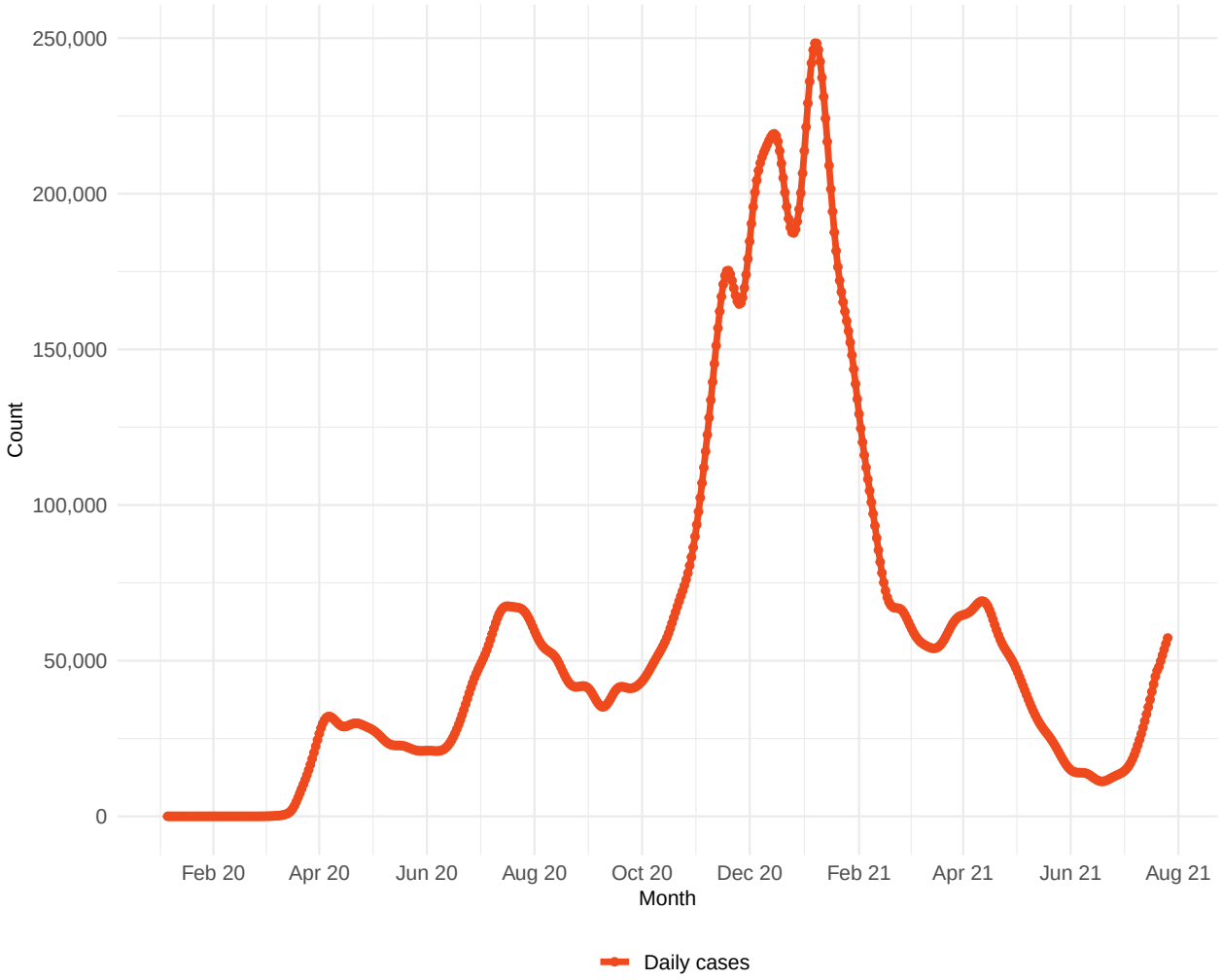


Table 1. Ranking of excess deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	10,724	1
Tracheal, bronchus, and lung cancer	3,965	2
Chronic obstructive pulmonary disease	3,766	3
Stroke	3,643	4
Alzheimer's disease and other dementias	2,768	5
COVID-19	2,736	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 2. Smoothed trend estimate of reported daily COVID-19 deaths (blue) and excess daily deaths due to COVID-19 (orange)

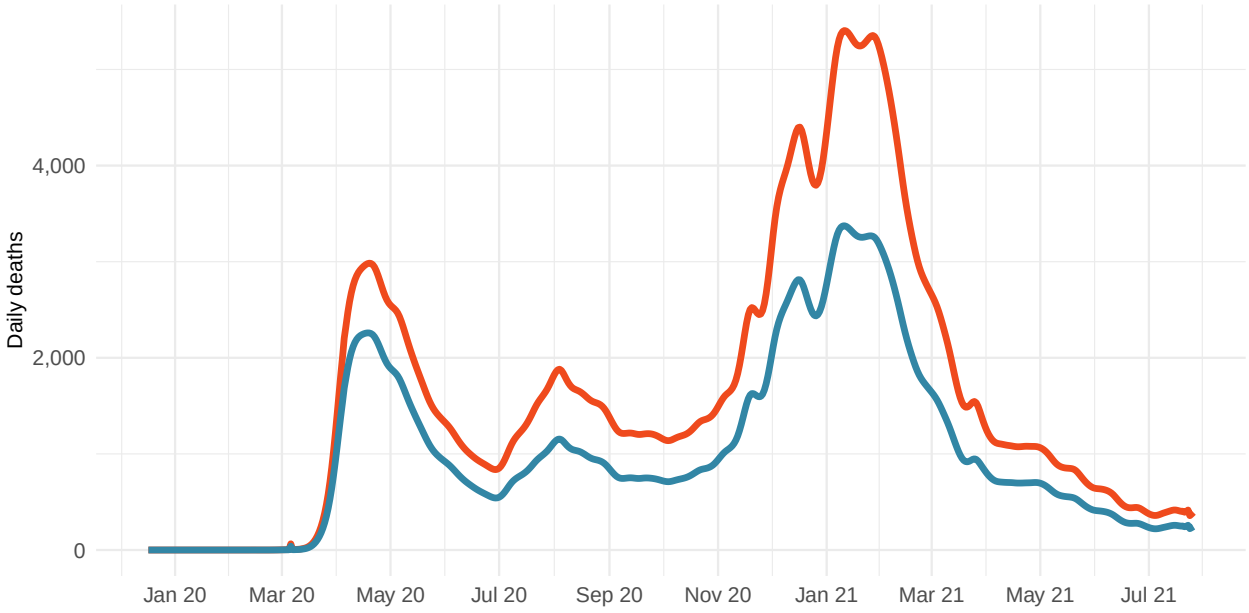
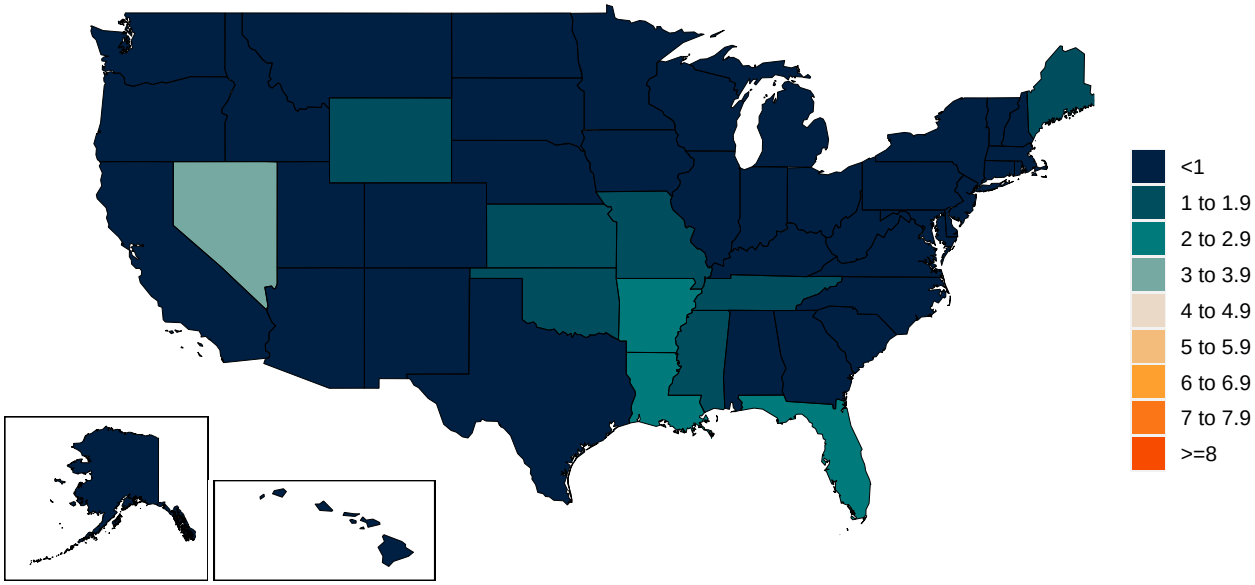


Figure 3. Daily COVID-19 death rate per 1 million on July 26, 2021

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



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

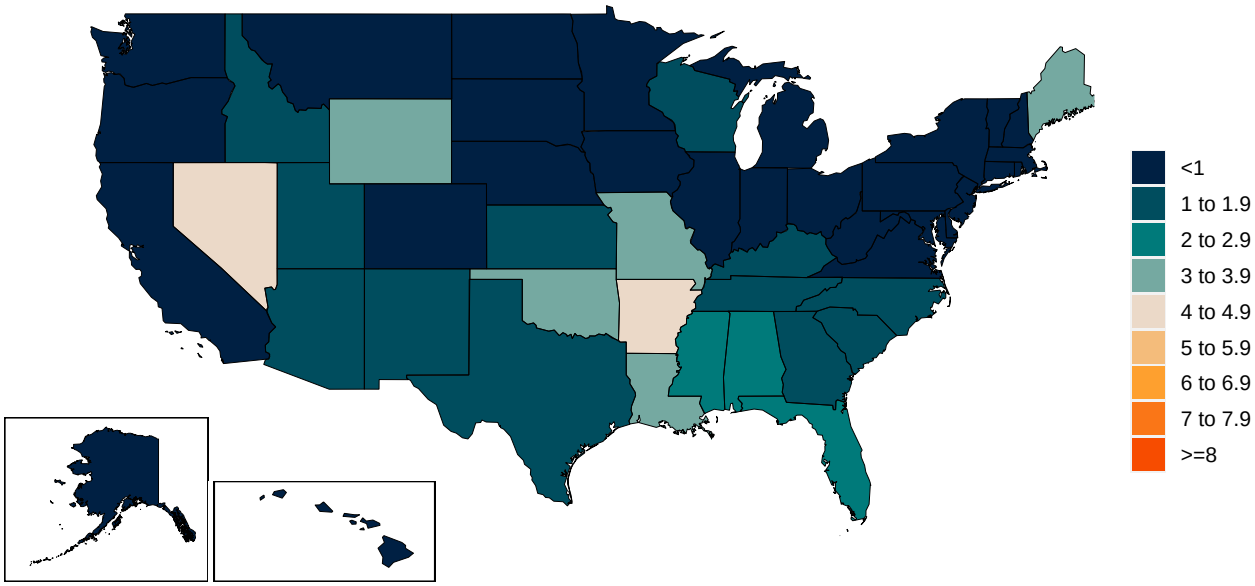
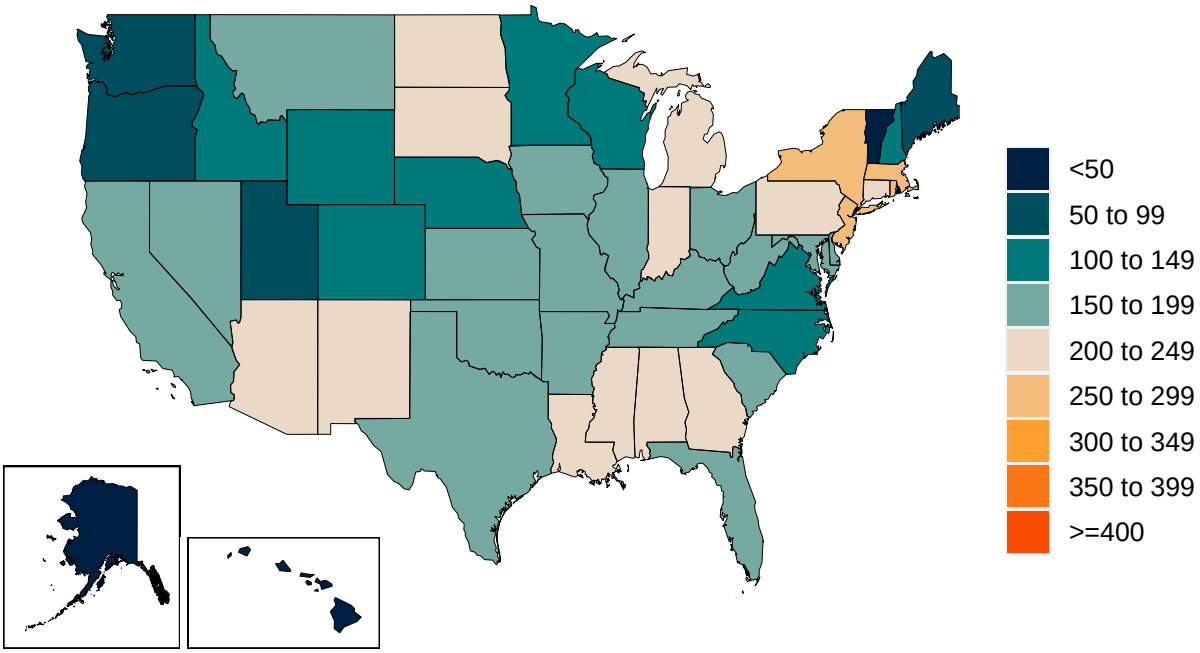


Figure 4. Cumulative COVID-19 deaths per 100,000 on July 26, 2021

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



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

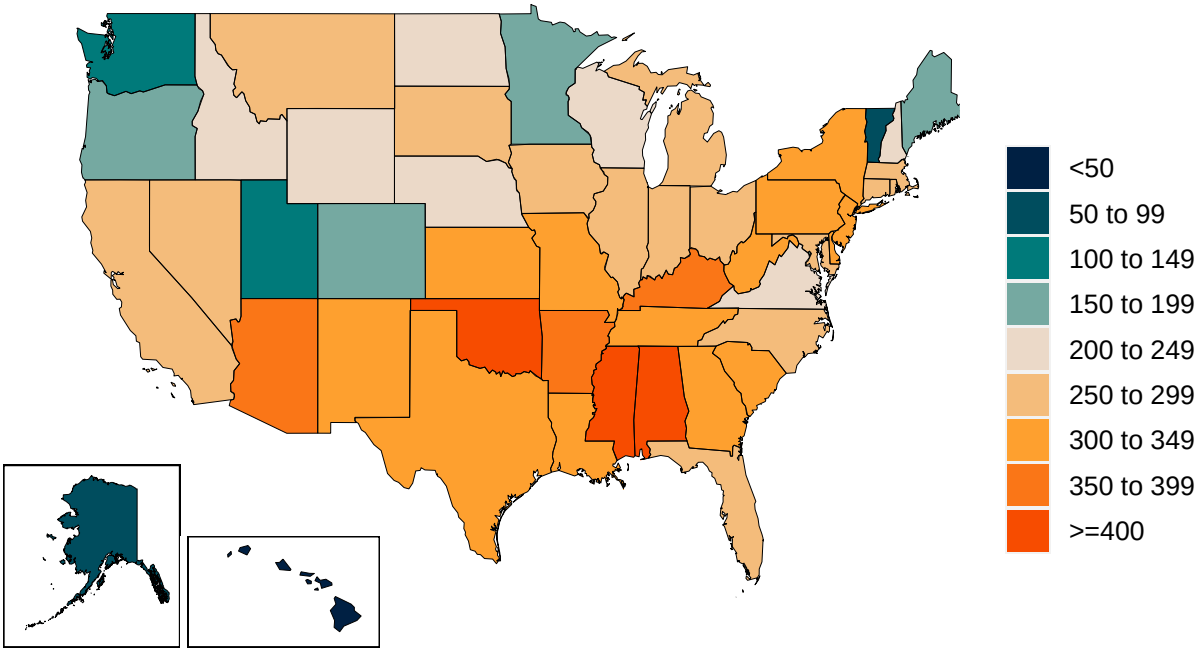


Figure 5. Estimated percent of the population infected with COVID-19 on July 26, 2021

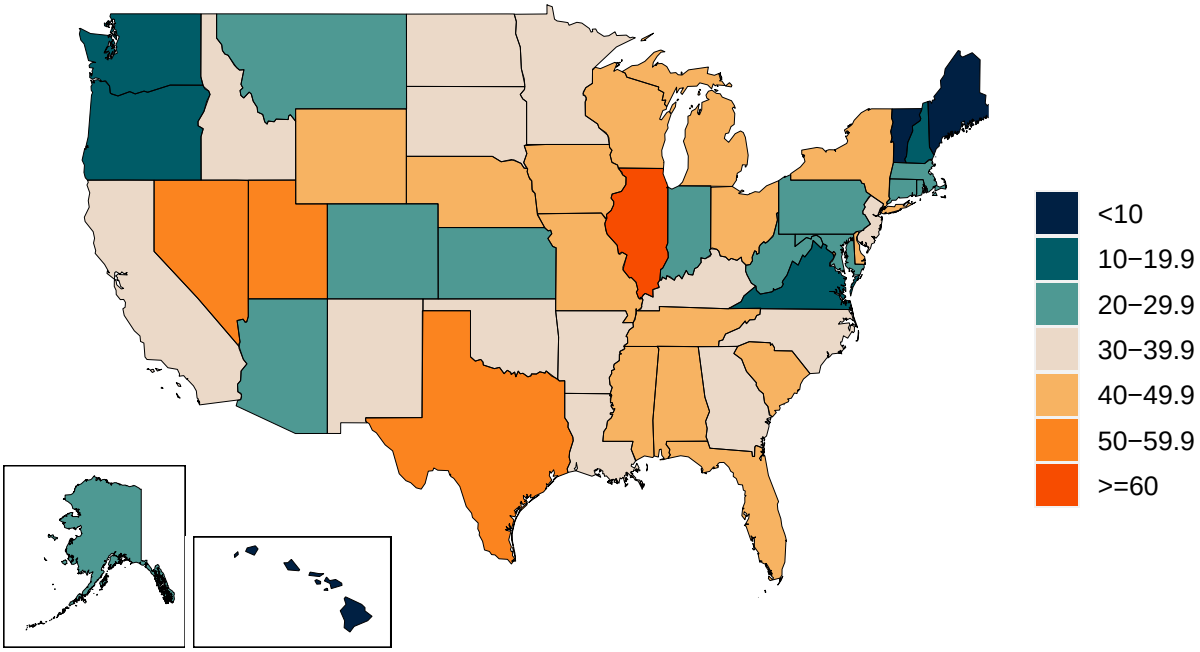


Figure 6. Mean effective R on July 15, 2021. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline, all other things being held the same.

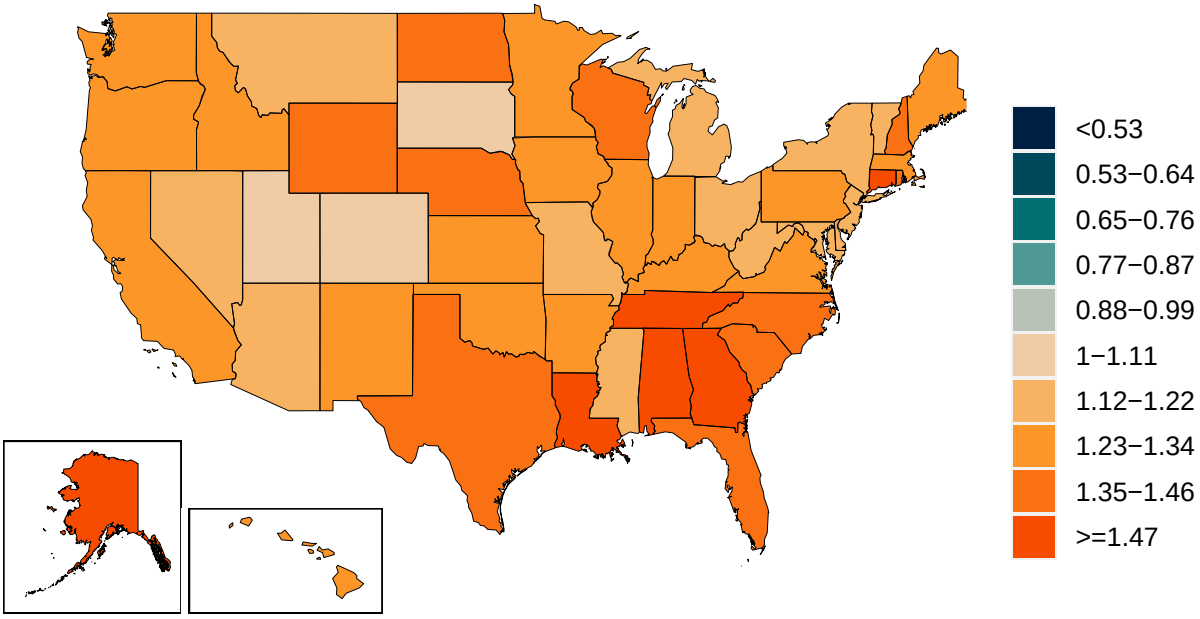


Figure 7. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100% at particular points in time.

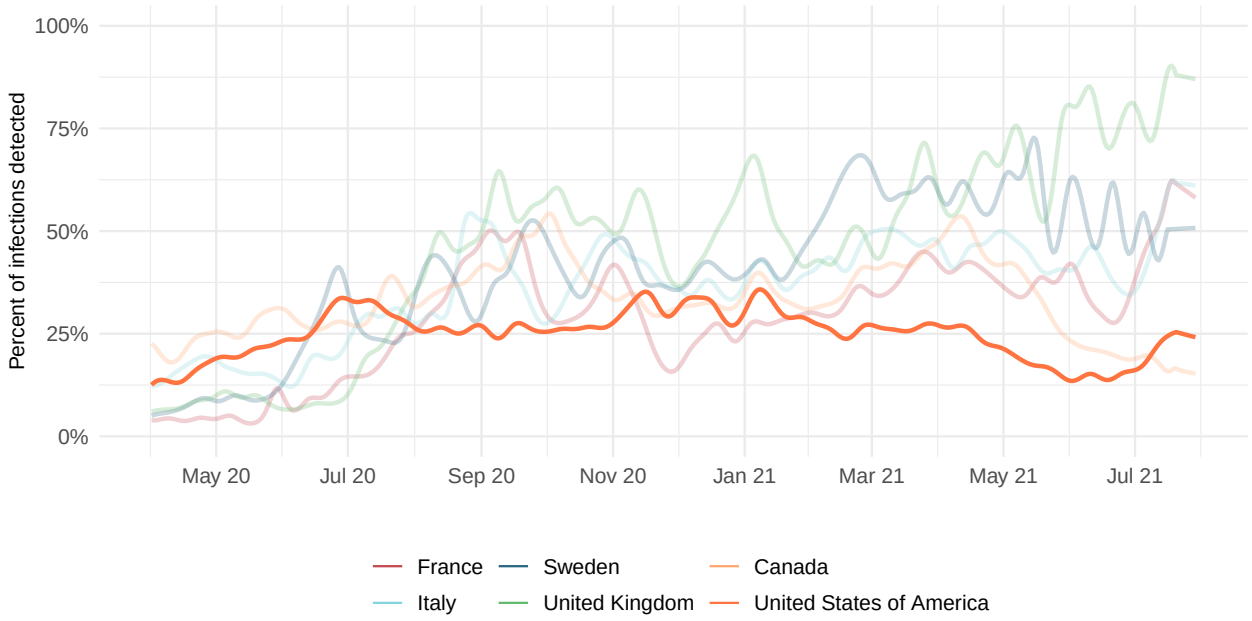
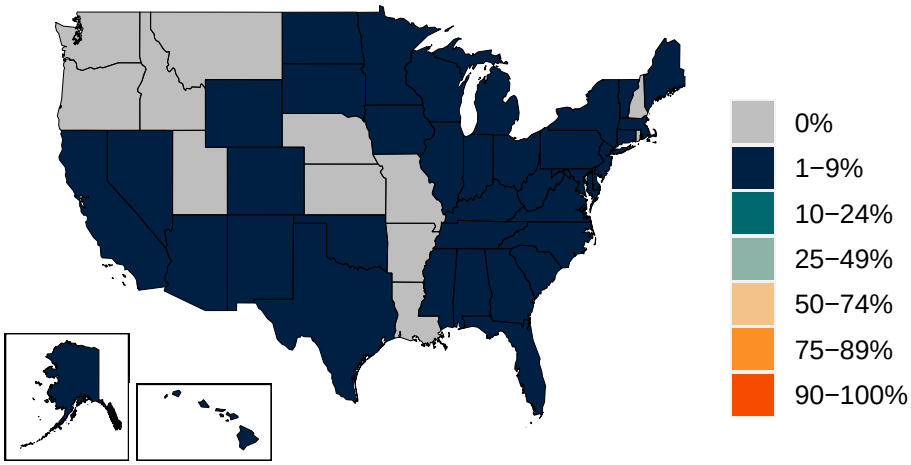
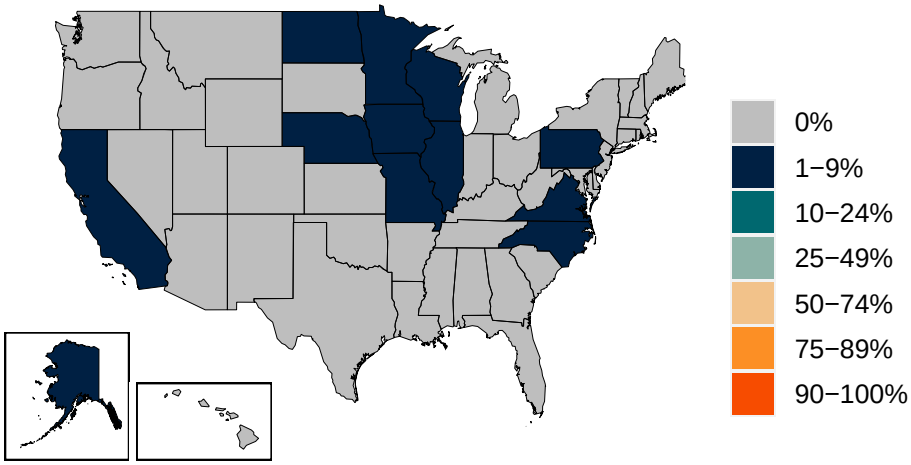


Figure 8. Estimated percent of circulating SARS-CoV-2 for primary variant families on July 26, 2021

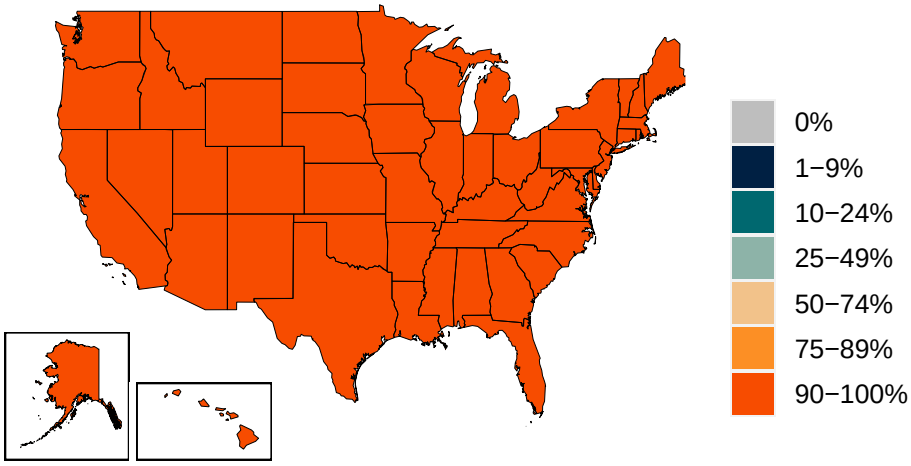
A. Estimated percent B.1.1.7 variant



B. Estimated percent B.1.351 variant



C. Estimated percent B.1.617 variant



D. Estimated percent P.1 variant

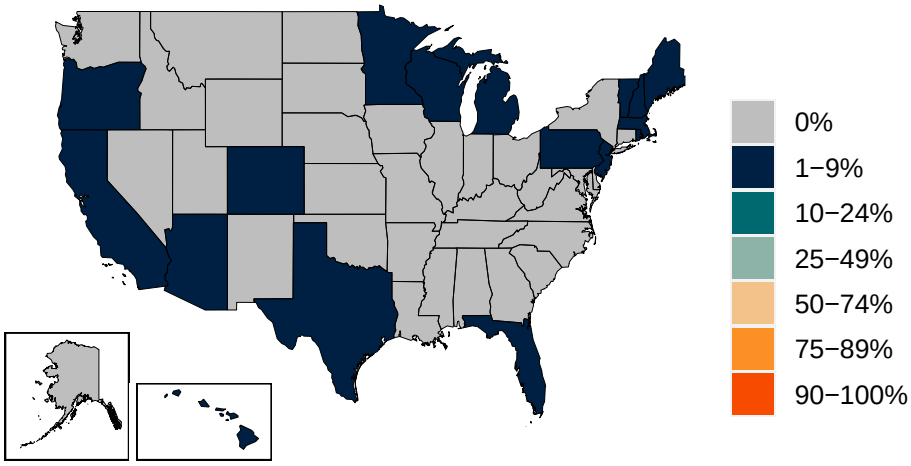
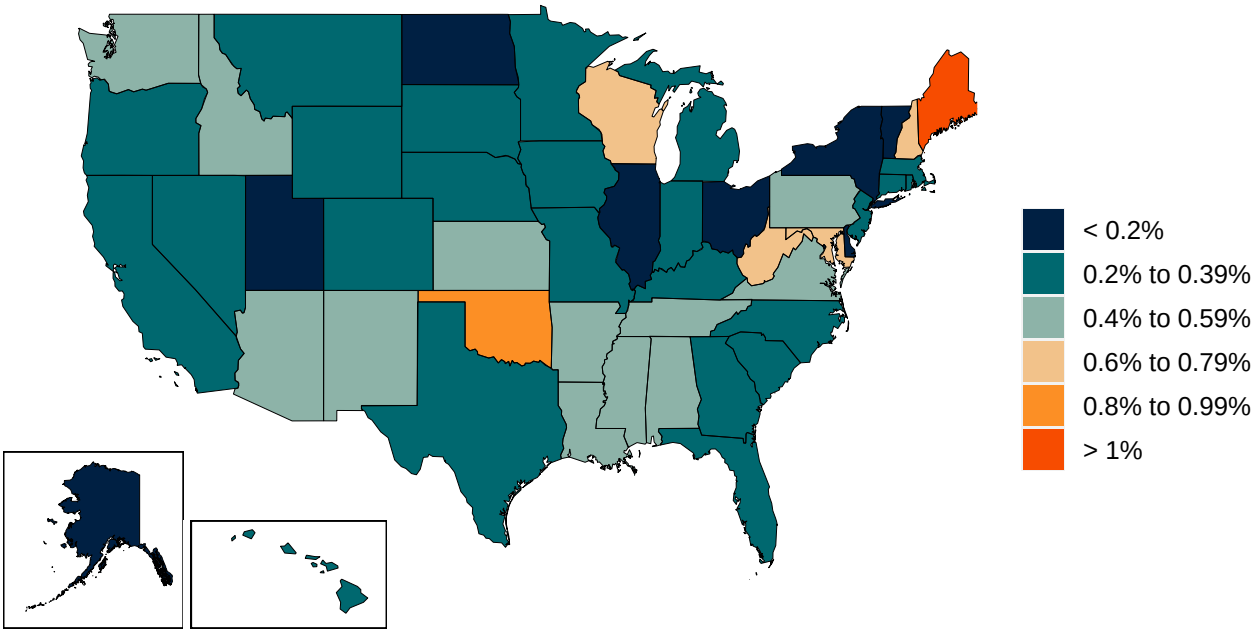


Figure 9. Infection-fatality ratio on July 26, 2021



Critical drivers

Table 2. Current mandate implementation

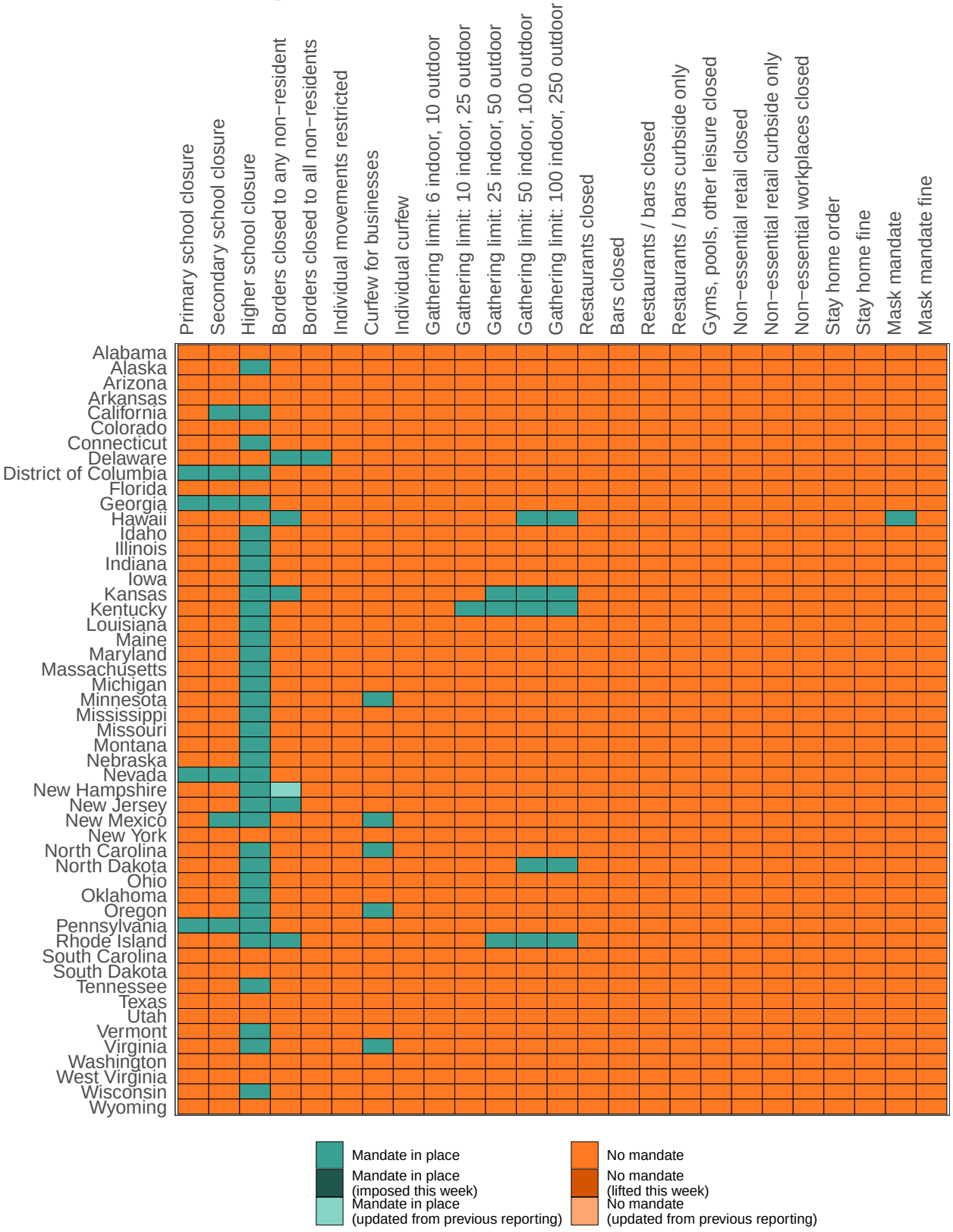


Figure 10. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

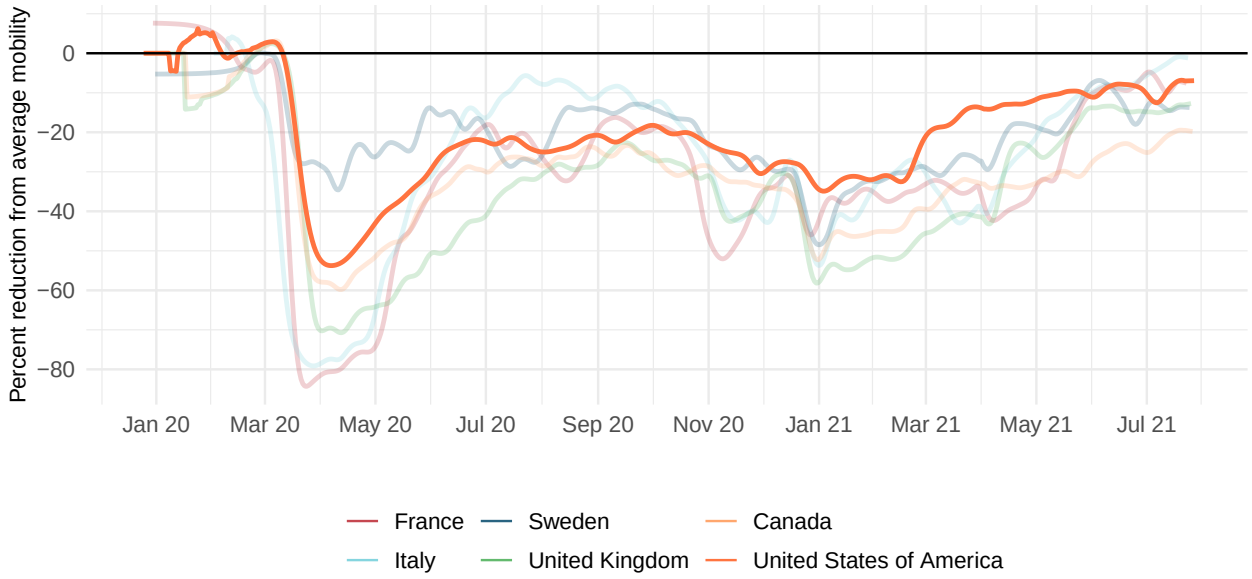


Figure 11. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on July 26, 2021

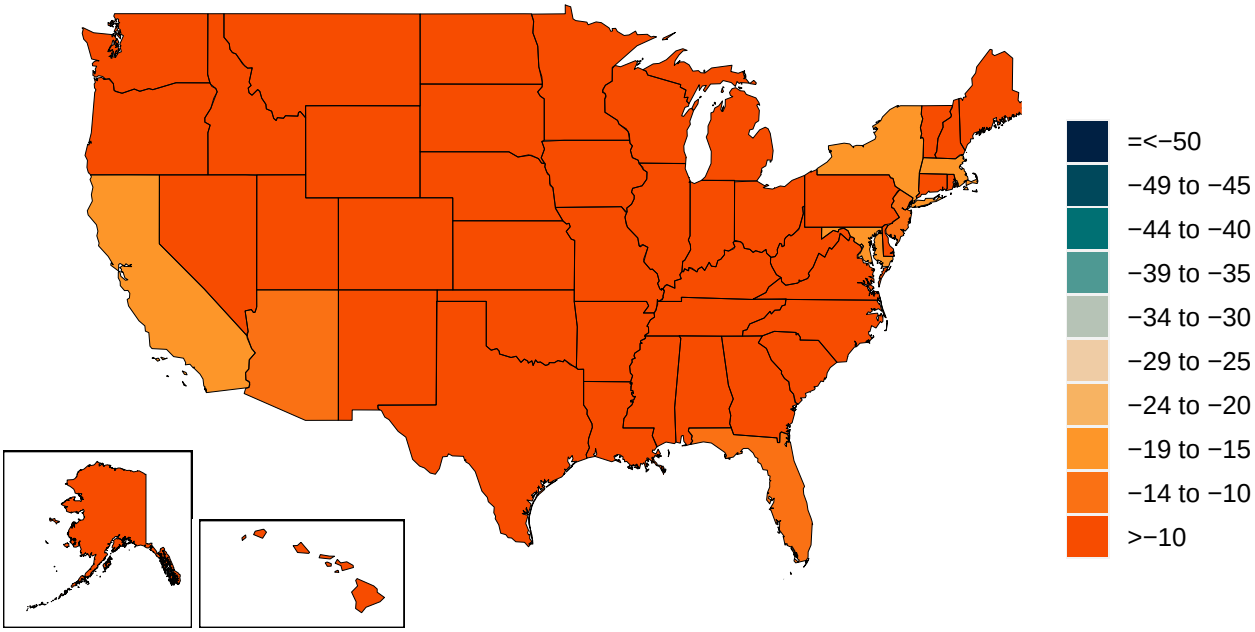


Figure 12. Trend in the proportion of the population reporting always wearing a mask when leaving home

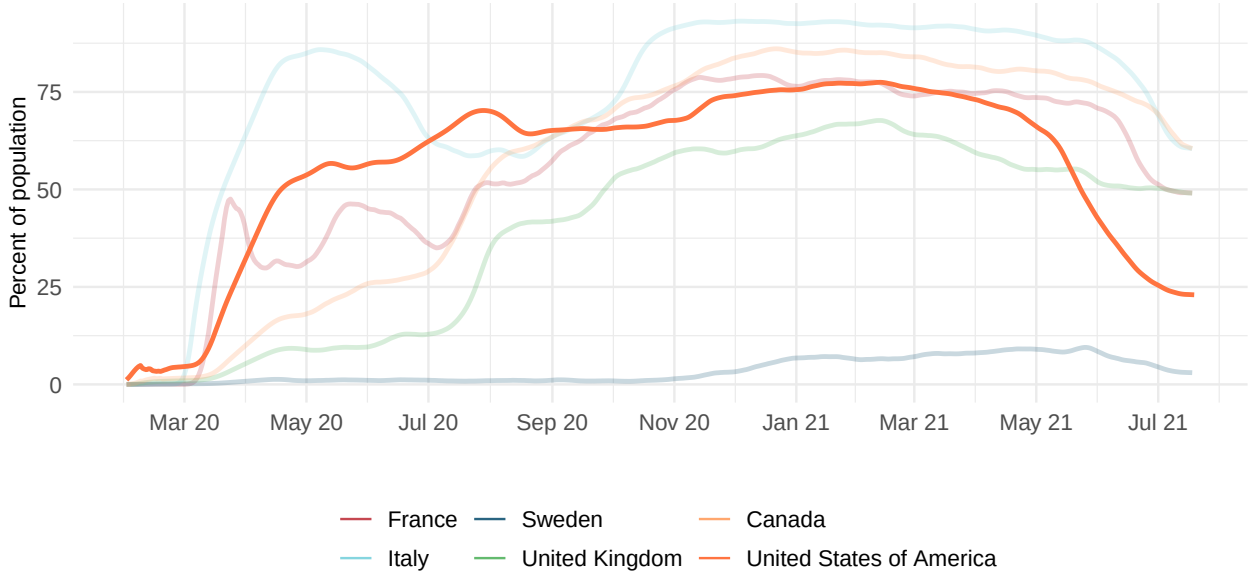


Figure 13. Proportion of the population reporting always wearing a mask when leaving home on July 26, 2021

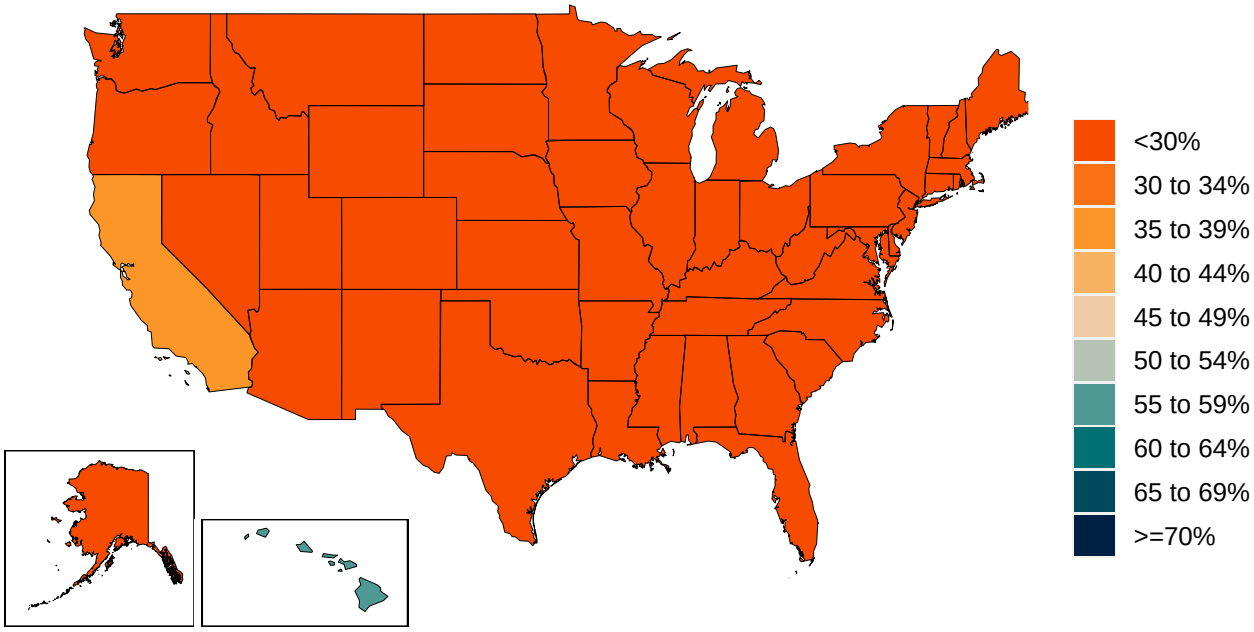


Figure 14. Trend in COVID-19 diagnostic tests per 100,000 people

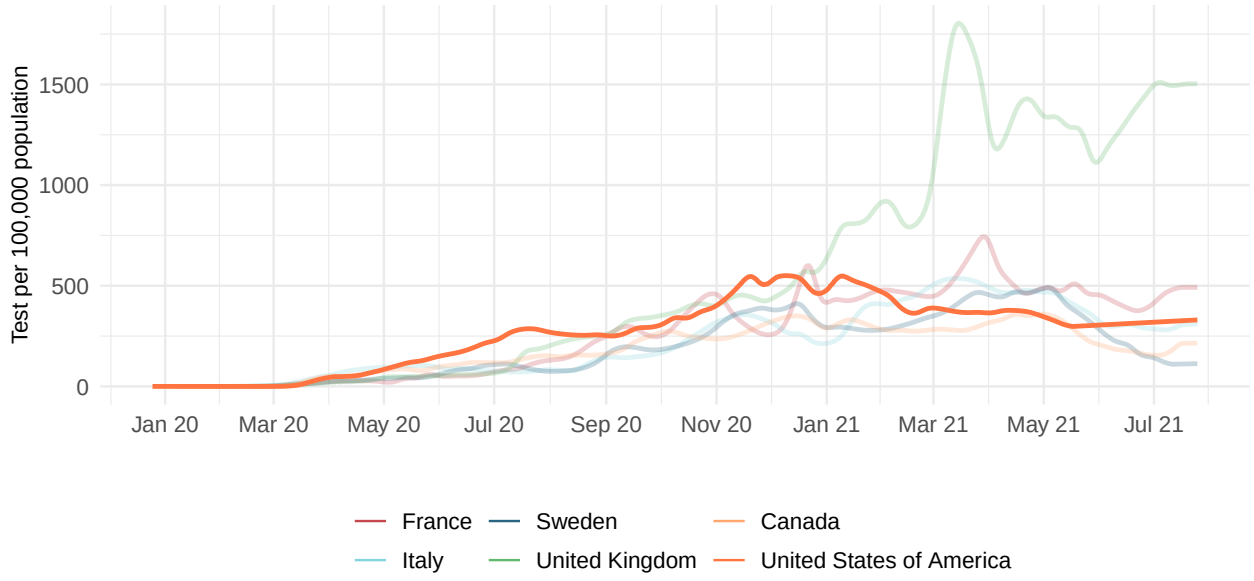


Figure 15. COVID-19 diagnostic tests per 100,000 people on July 26, 2021

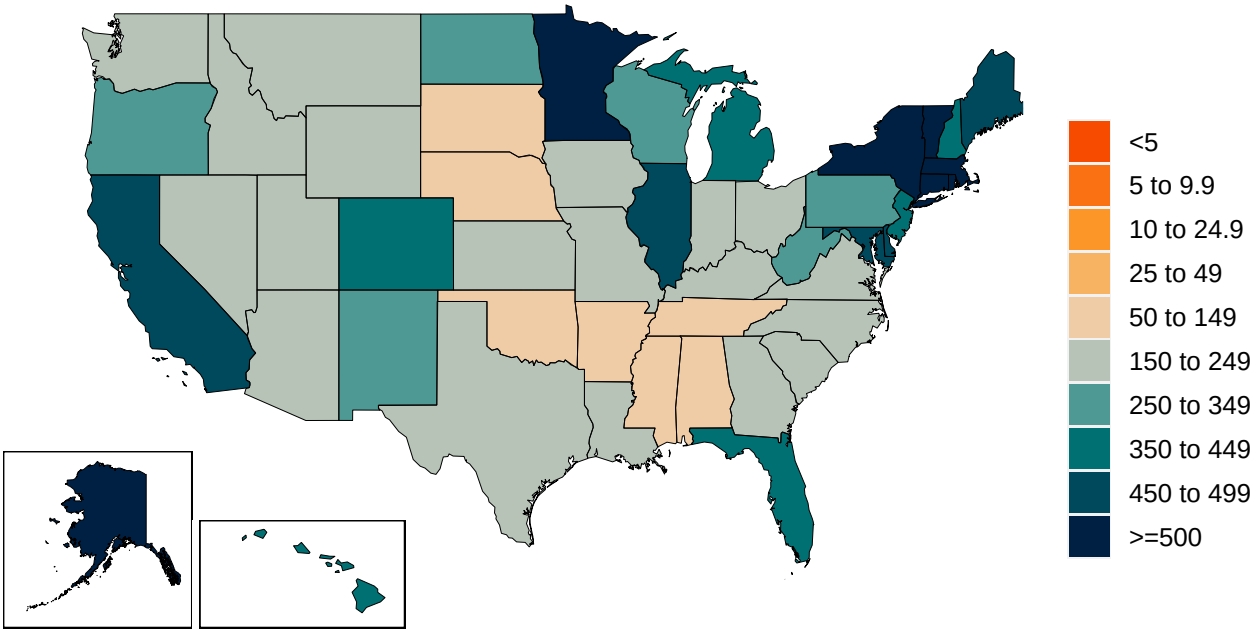


Figure 16. Increase in the risk of death due to pneumonia on February 1 compared to August 1

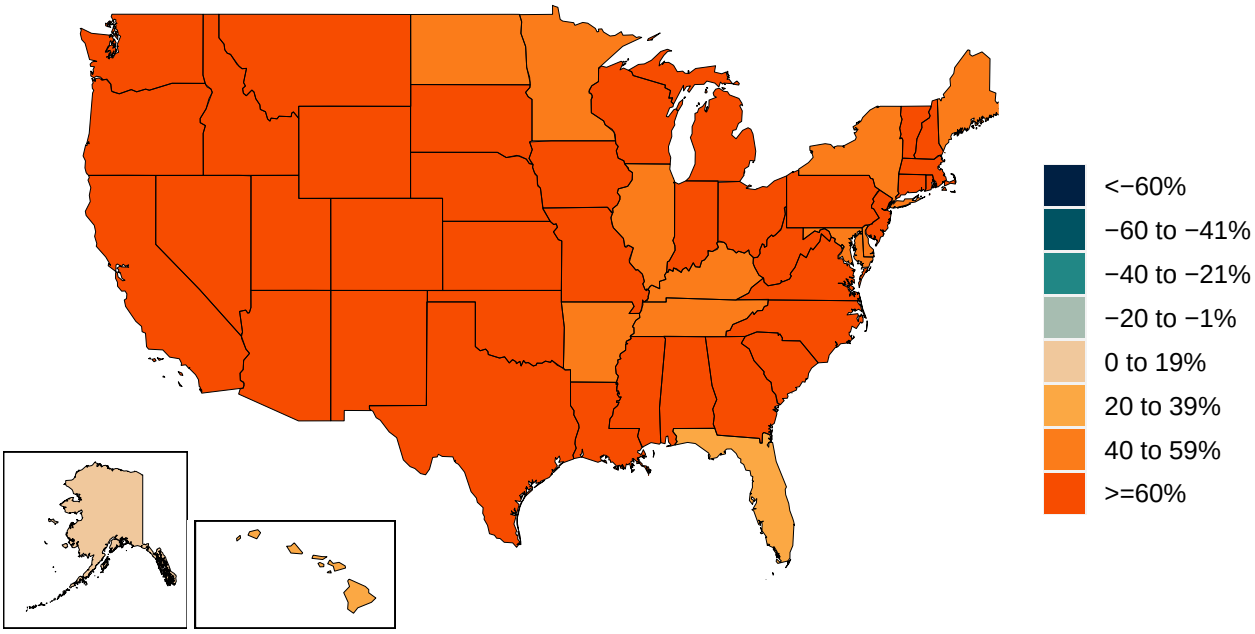


Table 3. Estimates of vaccine efficacy for specific vaccines used in the model at preventing disease and infection. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available,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

Vaccine	Efficacy at preventing disease: D614G & B.1.1.7	Efficacy at preventing infection: D614G & B.1.1.7	Efficacy at preventing disease: B.1.351, B.1.617, & P.1	Efficacy at preventing infection: B.1.351, B.1.617, & P.1
AstraZeneca	74%	52%	53%	47%
CoronaVac	50%	44%	40%	35%
Covaxin	78%	69%	62%	55%
Janssen	72%	72%	64%	56%
Moderna	94%	89%	83%	79%
Novavax	89%	79%	73%	64%
Pfizer/BioNTech	91%	86%	81%	77%
Sinopharm	73%	65%	47%	41%
Sputnik-V	92%	81%	73%	65%
Tianjin CanSino	66%	58%	53%	47%
Other vaccines	75%	66%	60%	53%
Other vaccines (mRNA)	91%	86%	81%	77%

Figure 17. 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

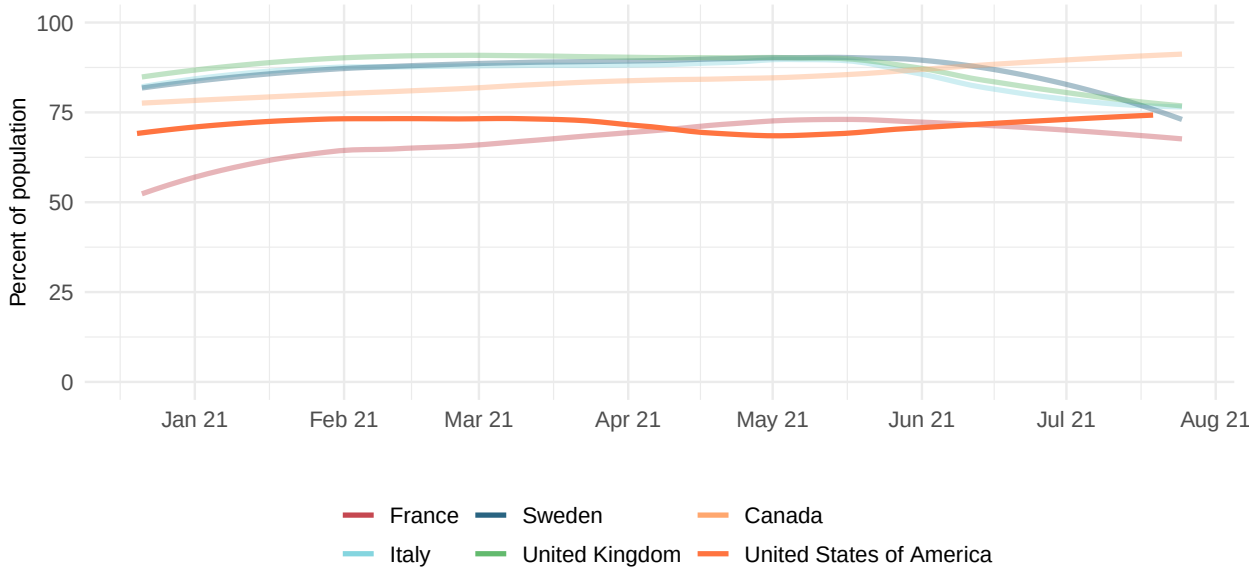


Figure 18. This figure shows the estimated proportion of the adult (18+) population that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

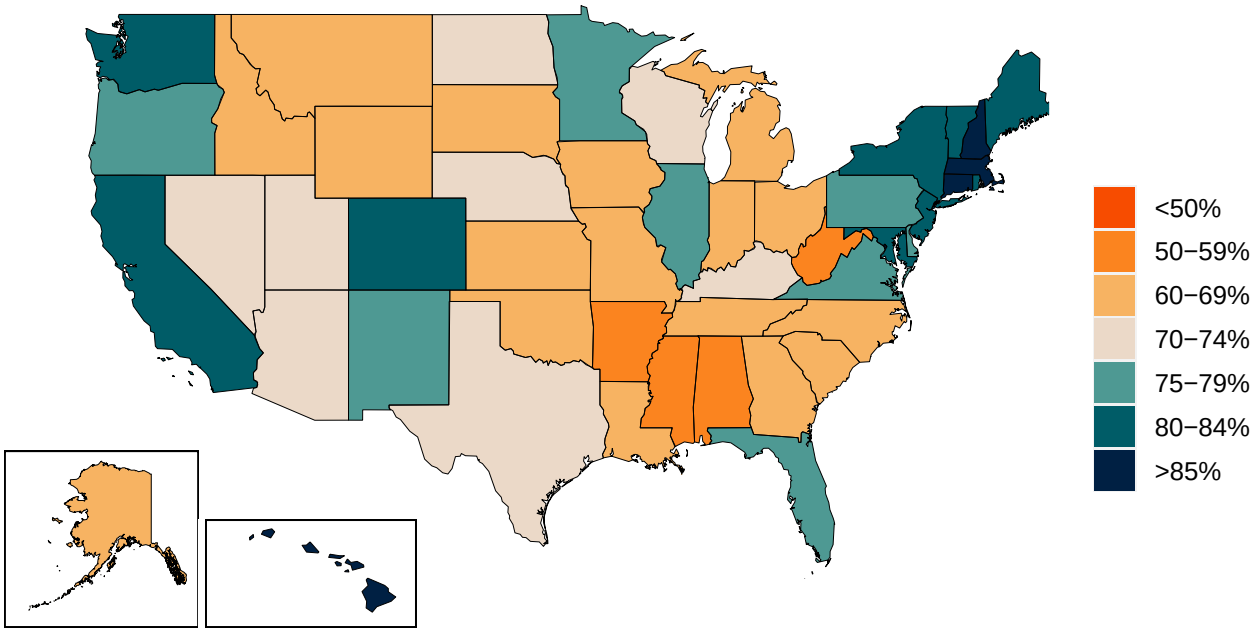


Figure 19. Number of people who receive any vaccine and those who are effectively vaccinated and protected against disease, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses

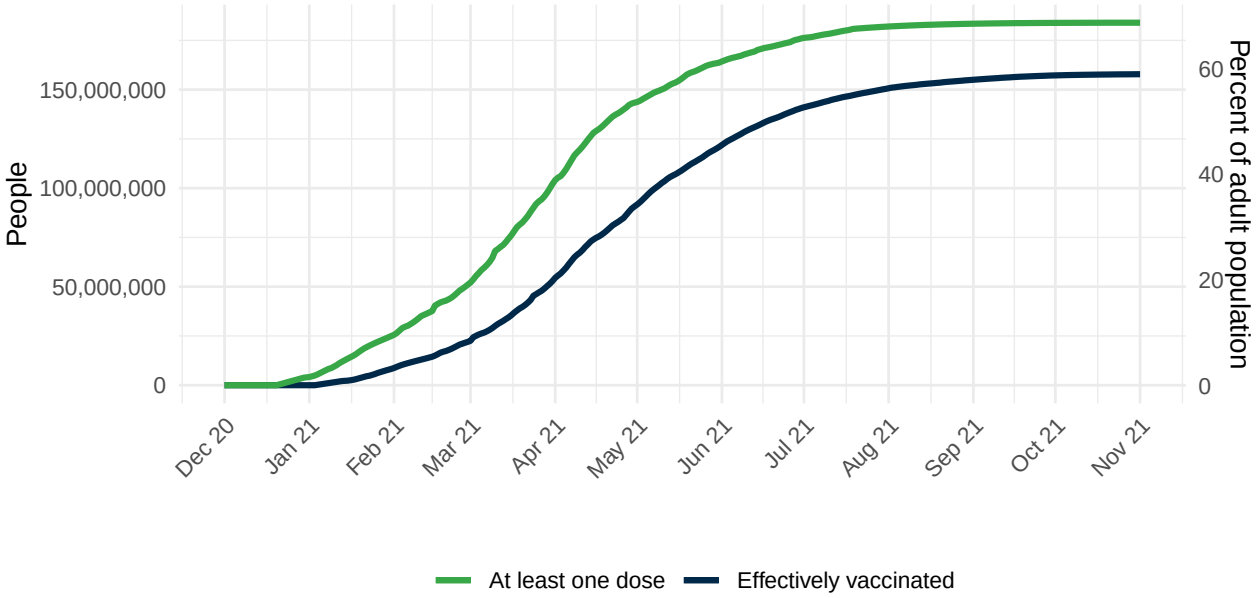
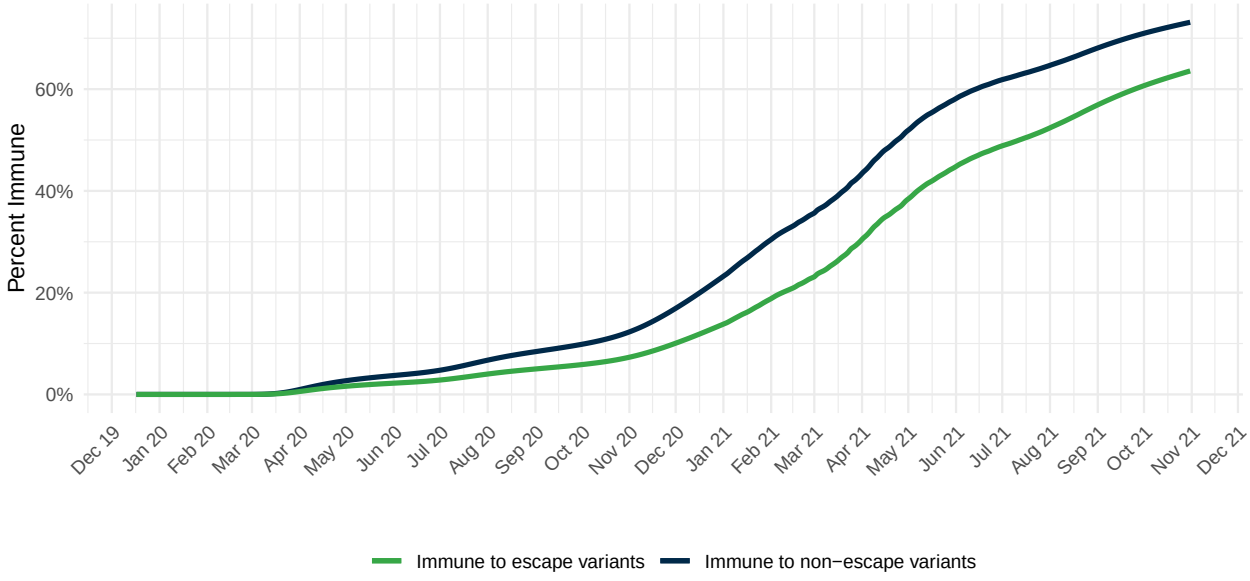


Figure 20. Percentage of people who are immune to non-escape variants and the percentage of people who are immune to escape variants



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.
- 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 scenario assumes that mandates are re-imposed when daily deaths reach 15 per million.
- Variants B.1.1.7 (first identified in the UK), B.1.351 (first identified in South Africa), and P1 (first identified in Brazil) continue to spread from locations with (a) more than 5 sequenced variants, and (b) reports of community transmission, to adjacent locations following the speed of variant scale-up observed in the regions of the United Kingdom.

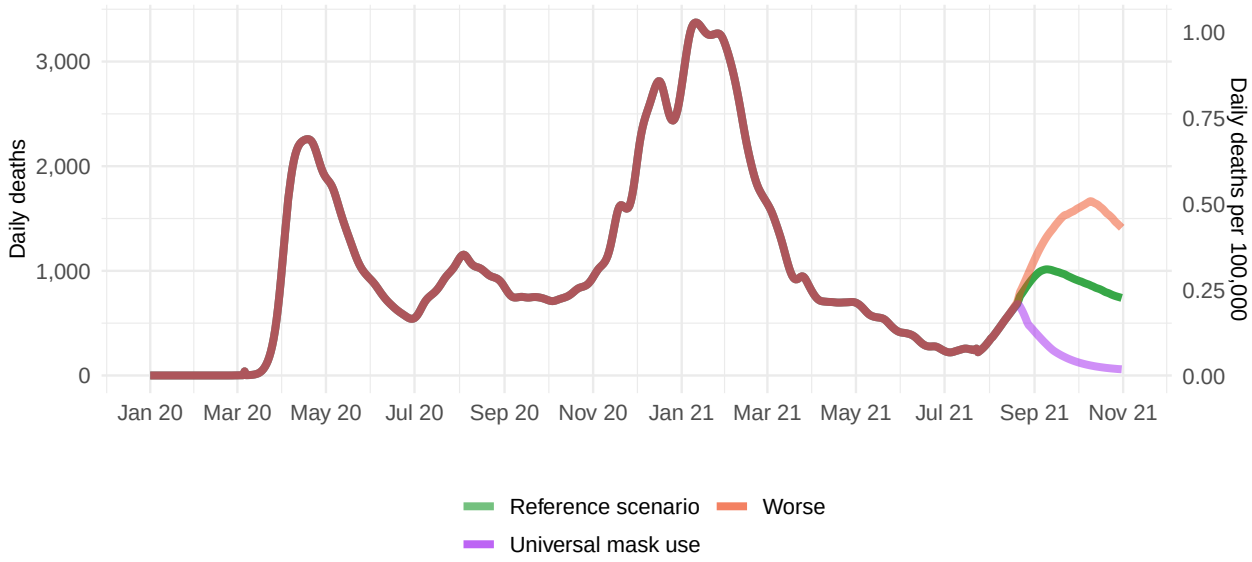
The **worse scenario** modifies the reference scenario assumptions in two ways:

- First, it assumes that variants B.1.351 or P.1 begin to spread within three weeks in adjacent locations that do not already have B.1.351 or P.1 community transmission.
- Second, it assumes that all those vaccinated increase their mobility toward pre-COVID-19 levels.

The **universal masks scenario** makes all the same assumptions as the reference scenario but also assumes 95% of the population wear masks in public in every location.

Figure 21. Daily COVID-19 deaths until November 01, 2021 for three scenarios

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



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

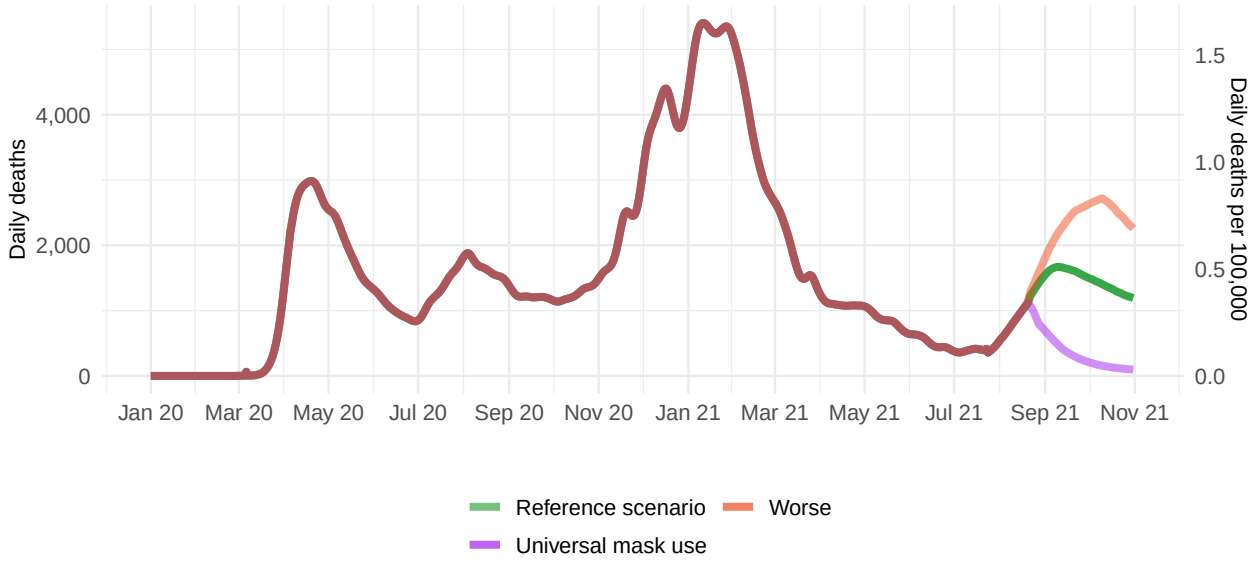


Figure 22. Daily COVID-19 infections until November 01, 2021 for three scenarios

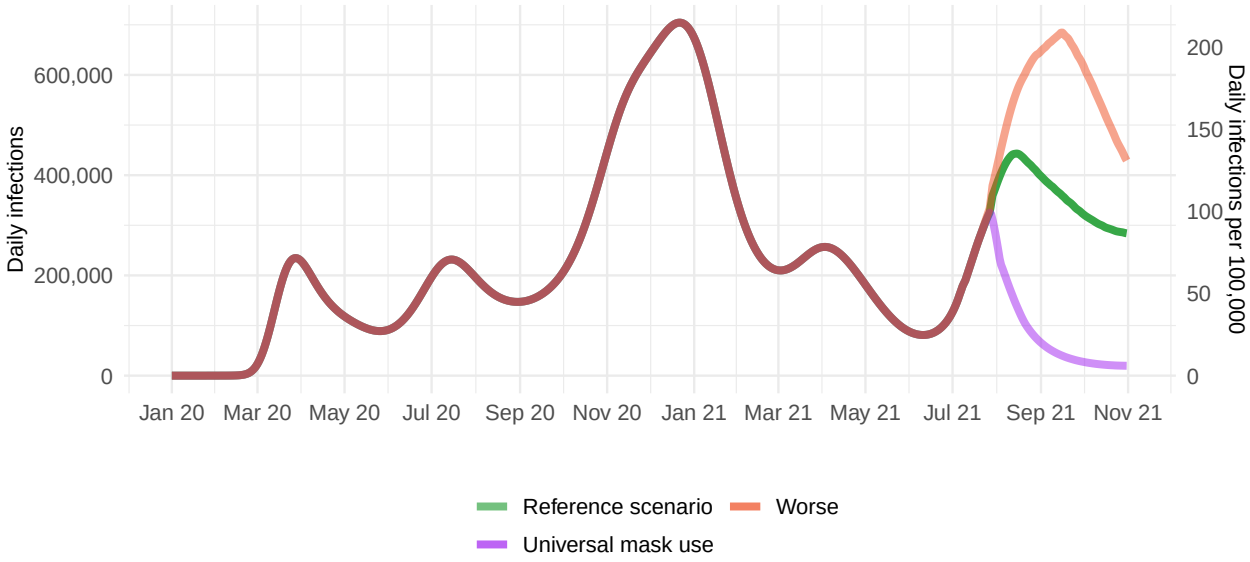


Figure 23. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachusetts Institute of Technology (Delphi), Imperial College London (Imperial), 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.

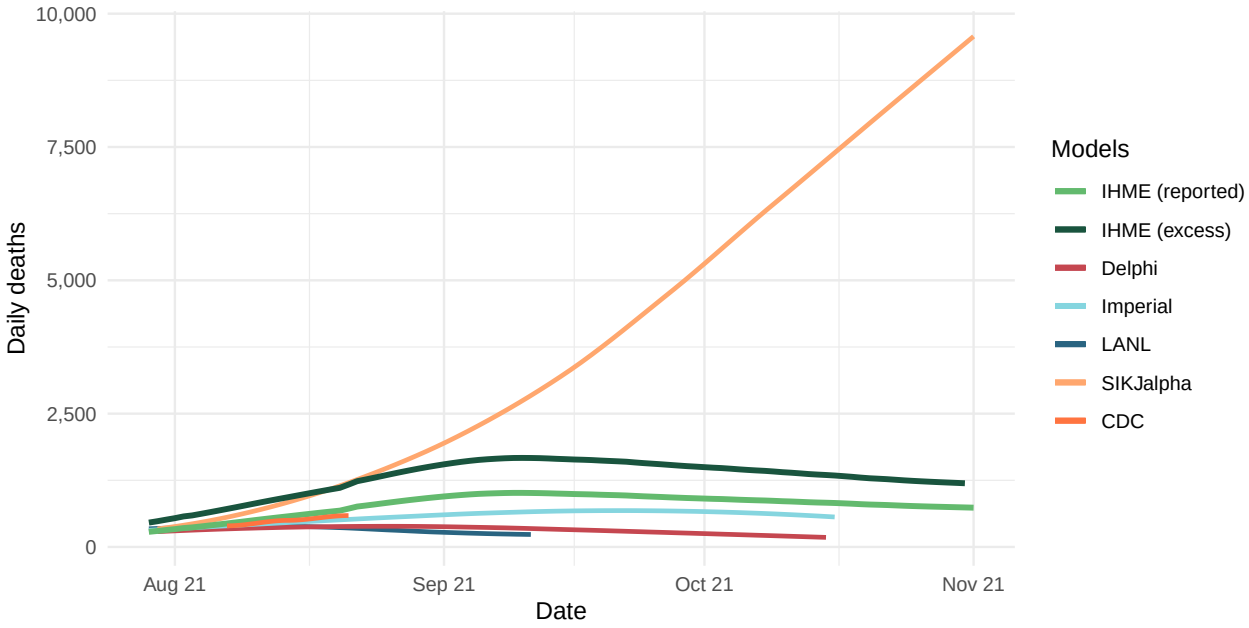


Figure 24. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and 20% or greater is considered *extreme stress*.

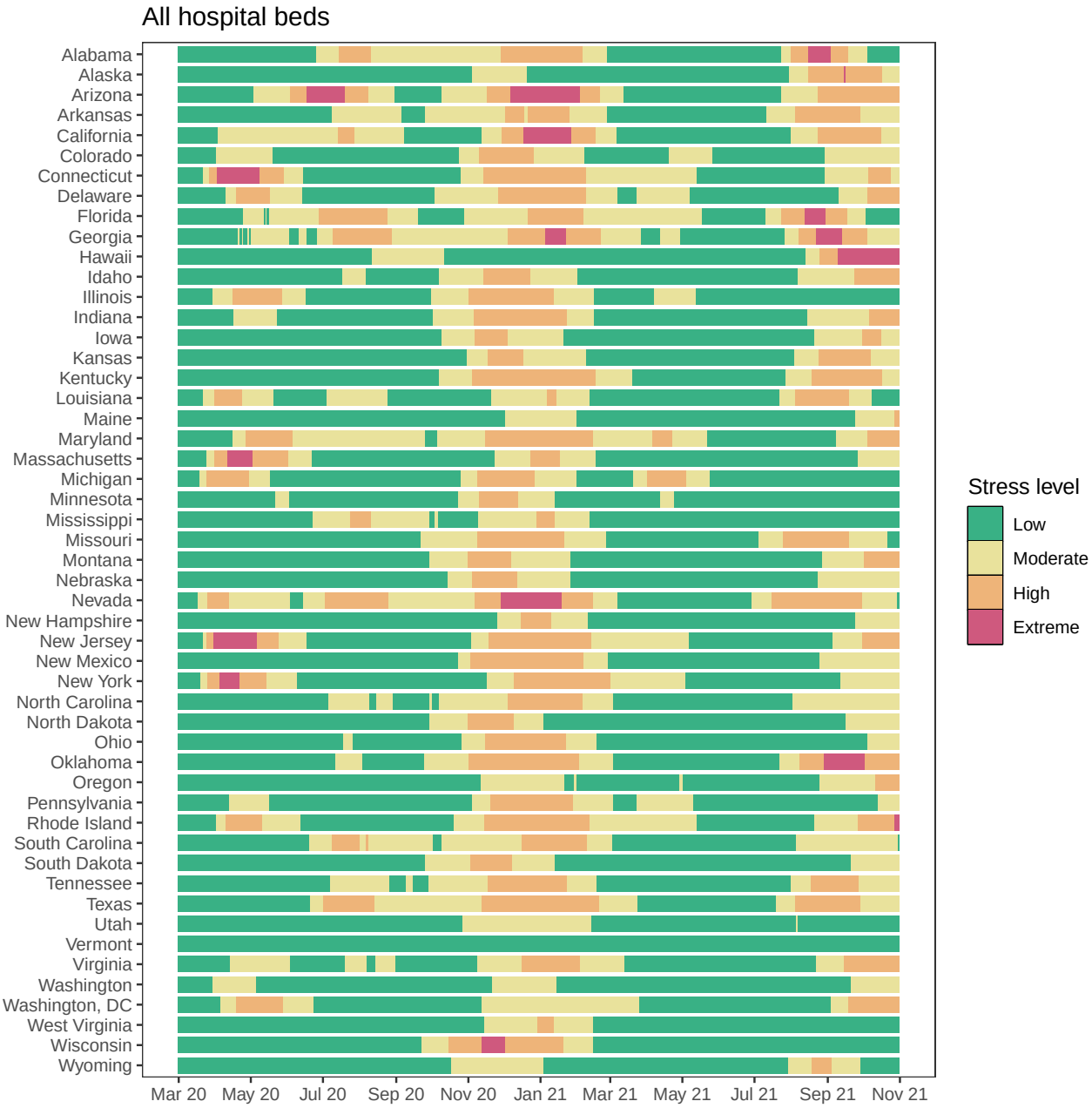


Figure 25. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *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.

Questions? Requests? Feedback? Please contact us at https://www.healthdata.org/covid/contact-us.