

COVID-19 Results Briefing

The United States of America

February 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 February 3, 2021, with data through February 1, 2021.

Cases, hospitalizations, and deaths continue to decline in the United States. The balance between new variant spread and associated increased transmission and the scale-up of vaccination in our most likely scenario suggests continued declines in daily deaths through to June 1. The fraction of the adult population willing to take the vaccine has increased in the last week from 54% to 66%. We expect 190,000 further deaths over that period. If mobility rebounds toward normal in the vaccinated, 17 states could see rising daily deaths again in April and May. The US global death toll from now until June 1 would increase to 262,000. Increasing mask use from current levels of 77% to 95% can save 44,000 lives by June 1. The Novavax Phase III trial in South Africa placebo arm found that prior infection provided no protection from variant B.1.351. The implication of this finding is that herd immunity is only variant-specific; if this finding is confirmed in the Johnson & Johnson placebo arm data, our worse scenario is likely too optimistic. Many more than 17 states could have an April/May surge. The best strategies to manage this period of the pandemic are rapid scale-up of vaccination, continued and expanded mask-wearing, and concerted efforts to avoid rebound mobility in the vaccinated. Some states are lifting mandates rapidly, which poses a real risk of increased transmission as new variants spread and vaccination rates remain comparatively low.

Current situation

- Daily reported cases in the last week decreased to 153,100 per day on average compared to 180,400 the week before (Figure 1).
- Daily deaths in the last week decreased slightly to 3,060 per day on average compared to 3,100 the week before (Figure 2). COVID-19 remains the number 1 cause of death in the US this week (Table 1).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 only in Vermont (Figure 3).
- We estimated that 17% of people in the US have been infected as of February 1 (Figure 4).
- The daily death rate is greater than 4 per million in 41 states (Figure 5).

Trends in drivers of transmission

- Mobility last week was 27% lower than the pre-COVID-19 baseline (Figure 6). Mobility was near baseline (within 10%) in South Dakota and Wyoming. Mobility was lower than 30% of baseline in 13 states.

- As of February 1, we estimated that 77% of people always wore a mask when leaving their home (Figure 7). Lowest mask use was in South Dakota and Wyoming.
- There were 503 diagnostic tests per 100,000 people on February 1 (Figure 8).
- In the US, 63.6% of people say they would accept a vaccine for COVID-19, up substantially from 54% last week. A further 19.5% say they are unsure if they would accept one. The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 77% in Louisiana to 91% in Vermont (Figure 10).
- In our current reference scenario, we expect that 174.83 million will be vaccinated by June 1 (Figure 11).

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 631,000 cumulative deaths on June 1, 2021. This represents 190,000 additional deaths from February 1 to June 1 (Figure 12). Daily deaths have peaked and are declining (Figure 13).
- By June 1, 2021, we project that 123,600 lives will be saved by the projected vaccine rollout.
- If **universal mask coverage (95%)** were attained in the next week, our model projects 44,000 fewer cumulative deaths compared to the reference scenario on June 1, 2021 (Figure 12).
- In the **rapid spread of variants scenario**, daily deaths would remain above 920 on June 1, 2021. Cumulative deaths on June 1, 2021, would be 654,000 (Figure 12).
- Under our **worst case scenario**, our model projects 703,000 cumulative deaths on June 1, 2021 (Figure 12). April and May increases in daily deaths could occur in Arizona, California, Connecticut, Delaware, DC, Florida, Hawaii, Maine, Massachusetts, New Mexico, New York, North Carolina, Oregon, Rhode Island, Vermont, Virginia, and West Virginia. Daily deaths would be just below 1,500 on June 1.
- Figure 16 compares our reference scenario forecasts to other publicly archived models. Models are broadly consistent except for the Los Alamos National Labs model, which projects a surge beginning in early March.
- At some point from February through June 1, 21 states will have high or extreme stress on hospital beds (Figure 17). At some point from February through June 1, 22 states will have high or extreme stress on ICU capacity (Figure 18).

Model updates

This week we made two important changes to model inputs and assumptions. First, using the GISAID database, we included in the reference scenario the likely scale-up of B.1.1.7 or B.1.351 in any location with community transmission of the variants. We begin the expected scale-up of the new variant based on the first identified isolate in GISAID. The scale-up timing is based on the scale-up observed in London from the time of first isolate. Given very limited sequencing of isolates in many locations, particularly low- and middle-income countries, this is a very imperfect approach to capturing the potential new variant scale-up. Despite these limitations, we have included scale-up in the reference in several new locations, such as Chile and Zambia, which are documented in GISAID.

Second, the release of preliminary Phase III trial results from Novavax and Johnson & Johnson provide some important indications of the potential decline in vaccine efficacy for the B.1.351 variant. In the UK, Novavax saw an efficacy decline of nearly 45%, and in South Africa, Johnson & Johnson saw a smaller efficacy decline. Both estimates of efficacy for B.1.351 had wide uncertainty intervals. We have revised our estimates of all vaccine efficacy for B.1.351 based on the average reduction seen in the two trials. This leads to the following assumptions by vaccine for wild type mild-to-severe disease and efficacy for infection and the same for B.1.351. The only trial to report on infection through tracking weekly nasal swabs is Astra Zeneca, so we used the relative efficacy for infection compared to mild-to-severe disease and applied it to all vaccines. The table below summarizes our current assumptions on vaccine efficacy.

Vaccine	Efficacy at preventing disease - wildtype	Efficacy at preventing infection - wildtype	Efficacy at preventing disease - B.1.351 variant	Efficacy at preventing infection - B.1.351 variant
AstraZeneca	70%	49%	46%	32%
CoronaVac	50%	35%	33%	23%
Janssen	72%	50%	47%	33%
Moderna	95%	67%	62%	44%
Novavax	89%	62%	58%	40%
Pfizer	95%	67%	62%	44%
Sputnik V	92%	64%	60%	42%
All other vaccines	75%	53%	49%	34%

The Novavax placebo arm in South Africa reported that the B.1.351 attack rate was the same in individuals previously infected with COVID-19 as with those who had not been previously infected. This finding suggests that there may be no cross-variant immunity. Similar findings are present in the longer follow-up data reported on the Pfizer placebo arm. This implies that our SEIR model which assumes that once recovered, one is no longer able to be infected may be wrong. We are actively revising our SEIR model to allow for variant-specific immunity. At present, we should assume that our “worst” scenario may underestimate the potential surge in infections and deaths possible with the spread of B.1.351. The absence of cross-variant protection also raises serious doubts about the idea of reaching herd immunity for COVID-19. At the very least, we should only consider variant-specific herd immunity. For this reason, the figure on immunity levels over time is no longer included in this brief.

Current situation

Figure 1. Reported daily COVID-19 cases

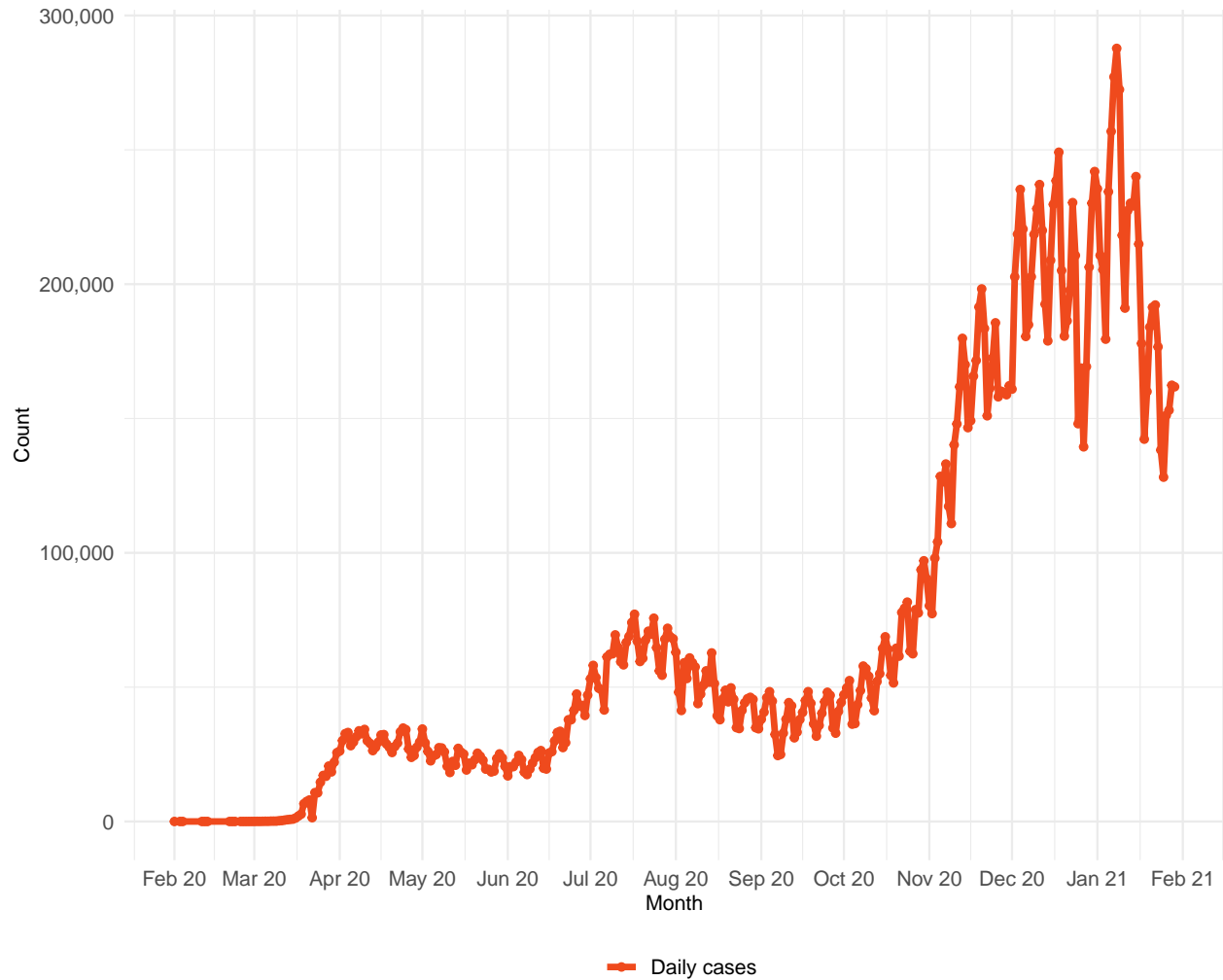


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	21,396	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 2a. Reported daily COVID-19 deaths

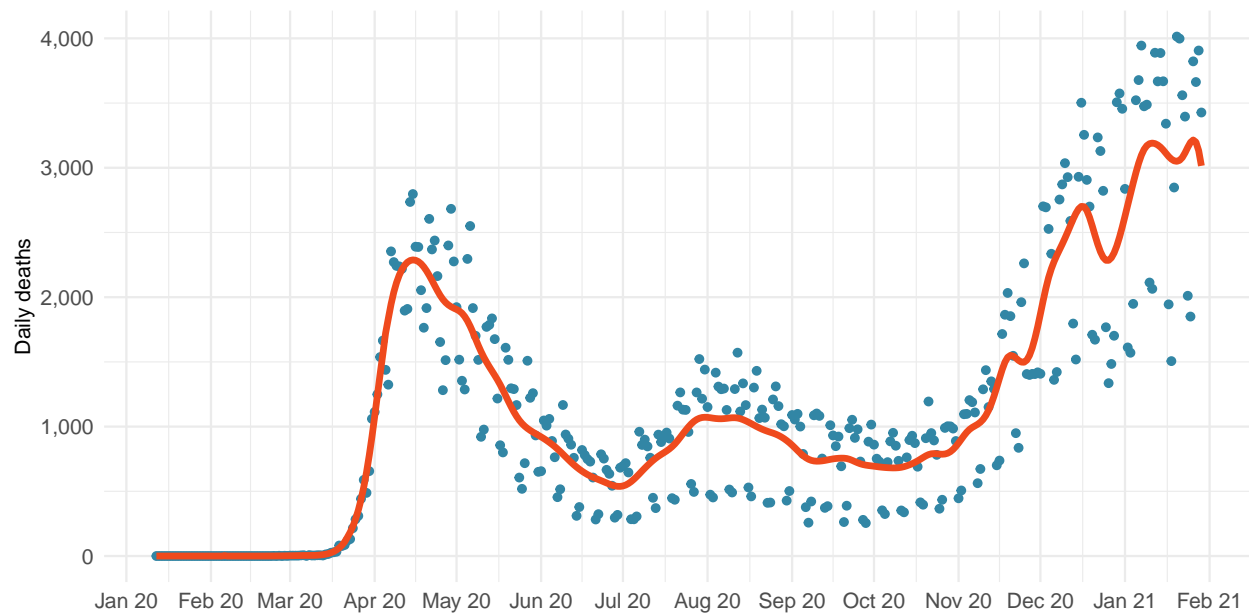


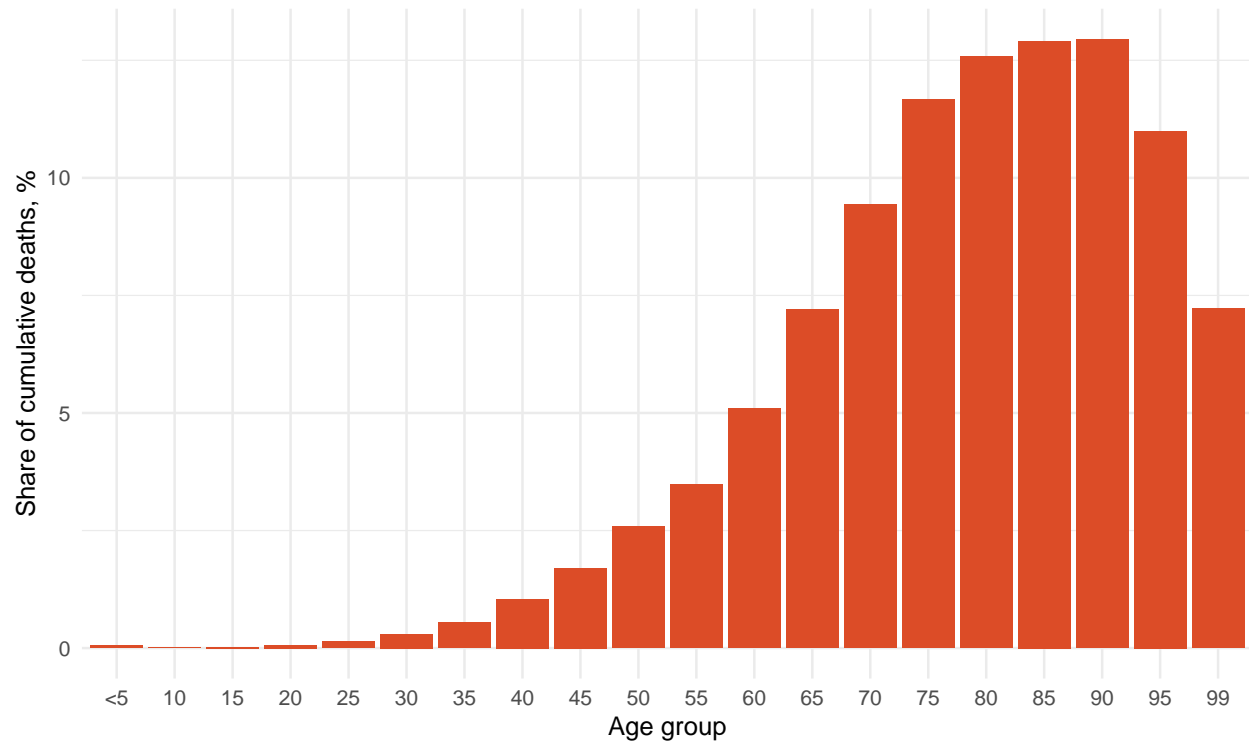
Figure 2b. Estimated cumulative deaths by age group

Figure 3. Mean effective R on January 21, 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.

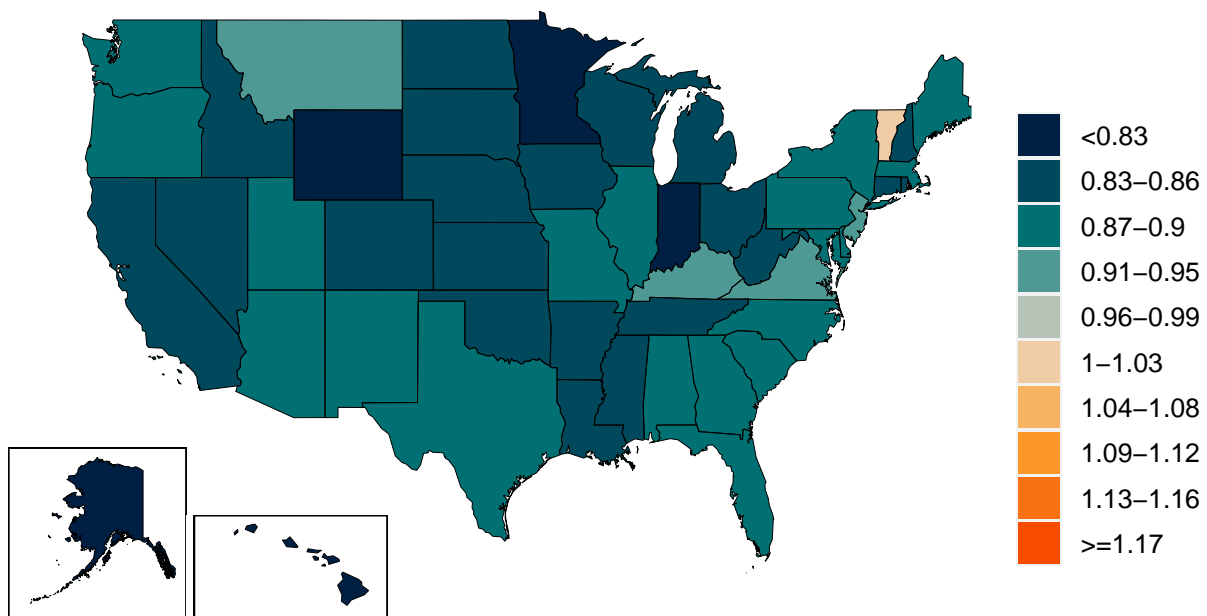


Figure 4. Estimated percent of the population infected with COVID-19 on February 01, 2021

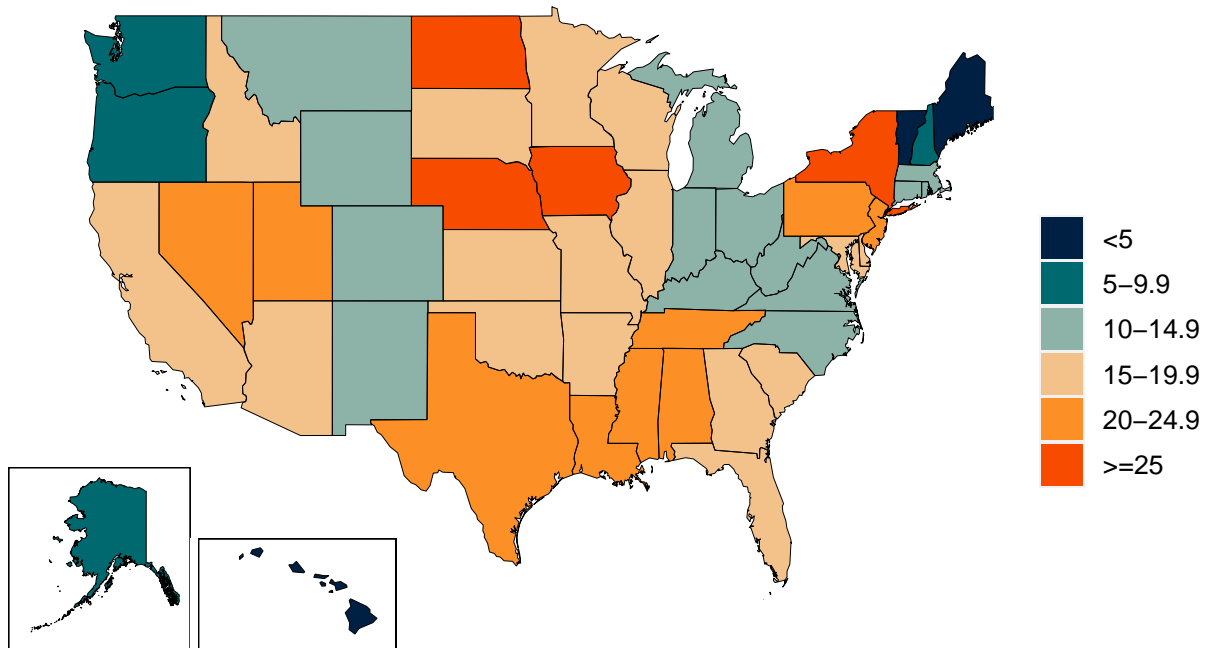
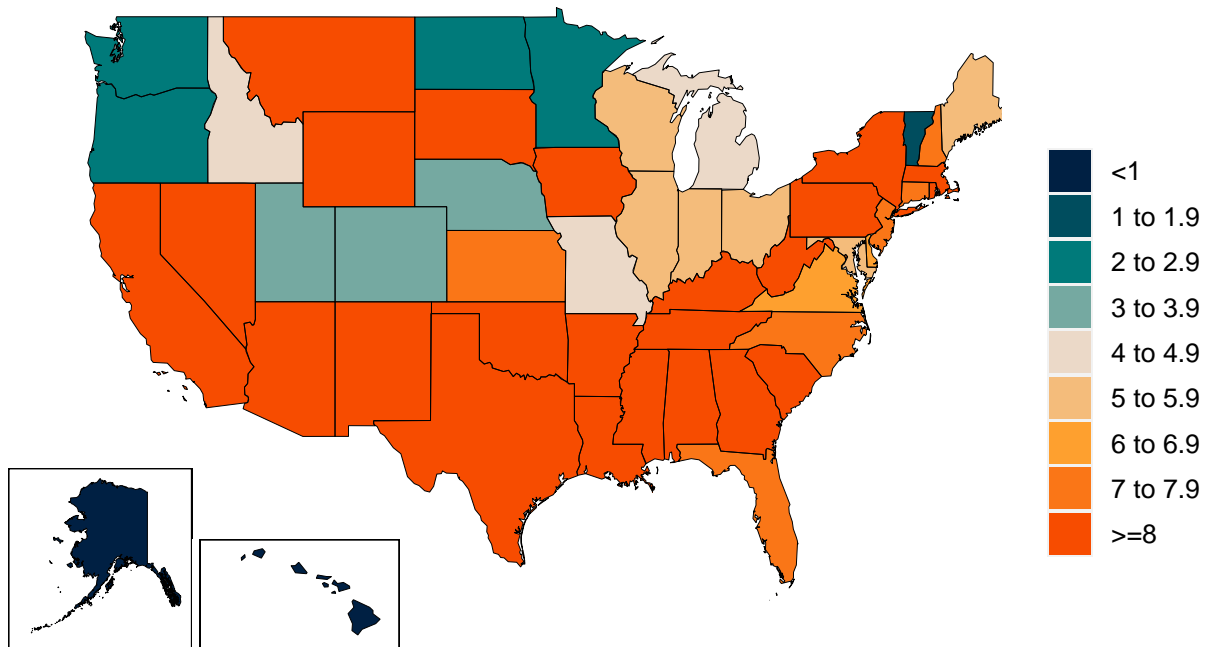
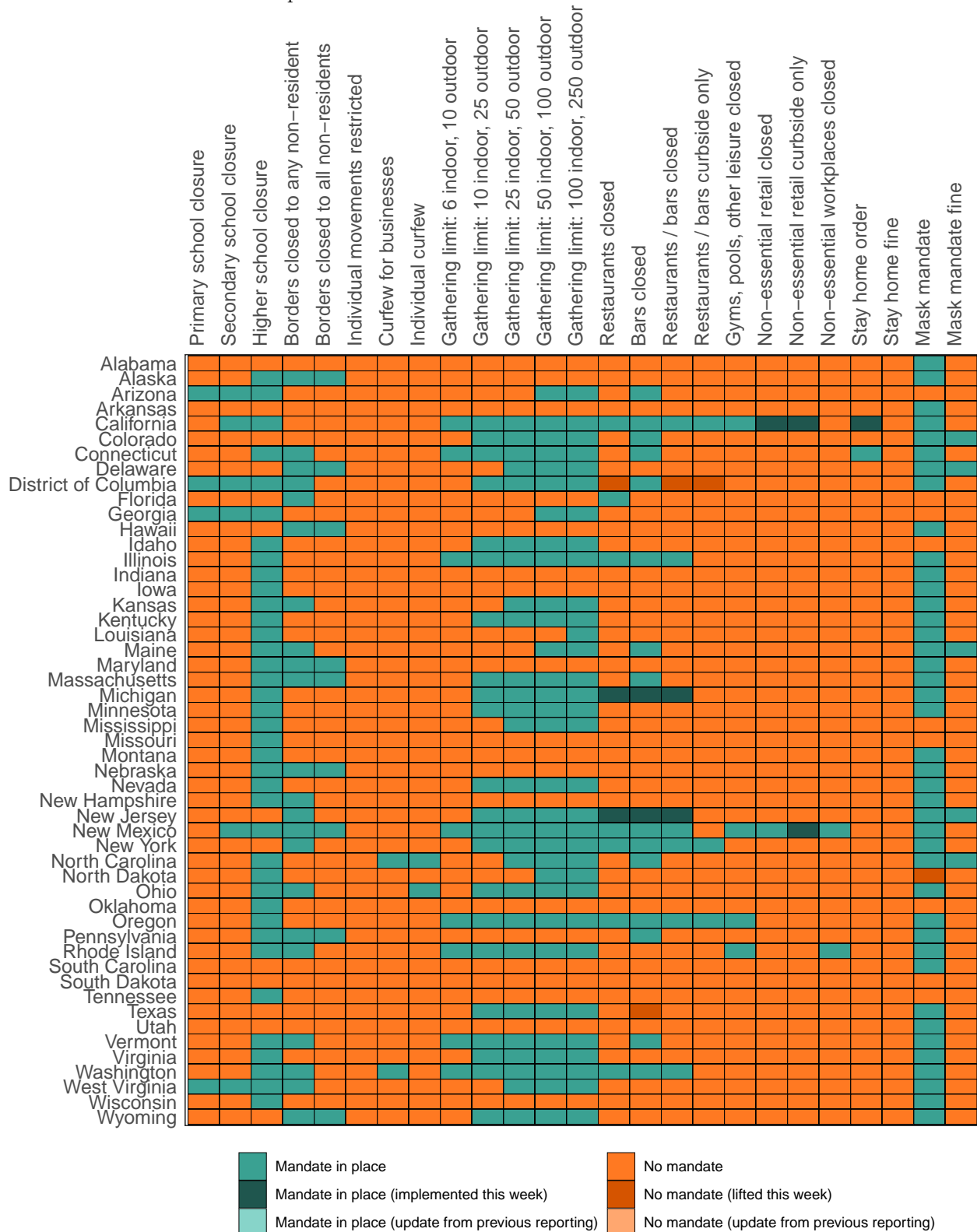


Figure 5. Daily COVID-19 death rate per 1 million on February 01, 2021



Critical drivers

Table 2. Current mandate implementation



*Not all locations are measured at the subnational level.

Figure 6a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

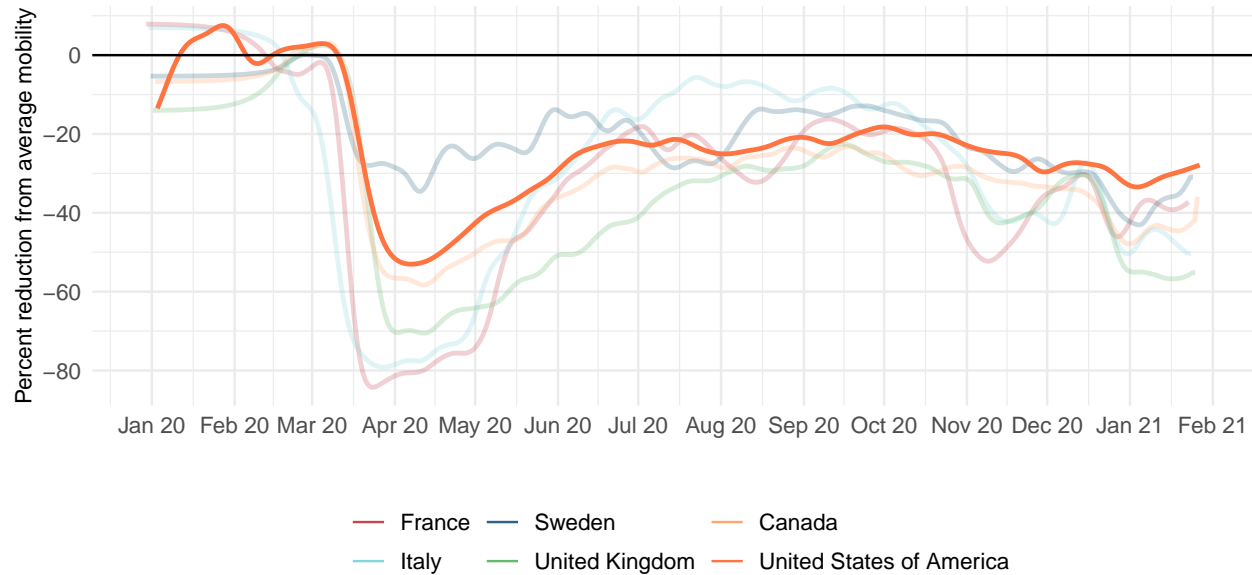


Figure 6b. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on February 01, 2021

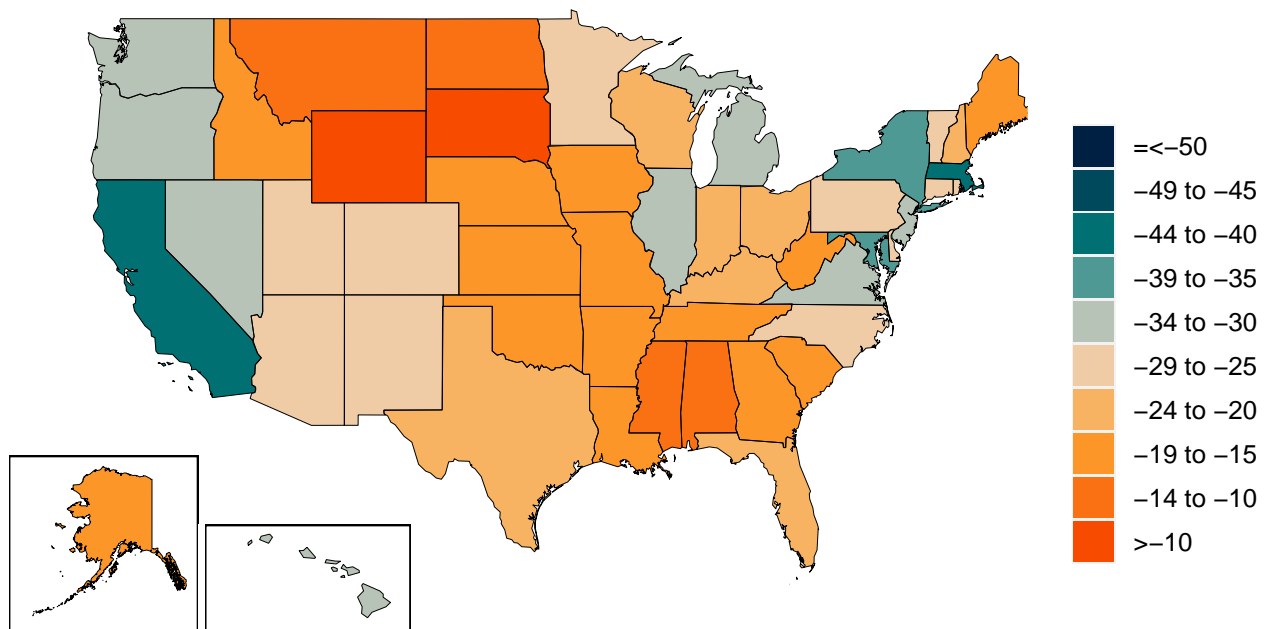


Figure 7a. Trend in the proportion of the population reporting always wearing a mask when leaving home

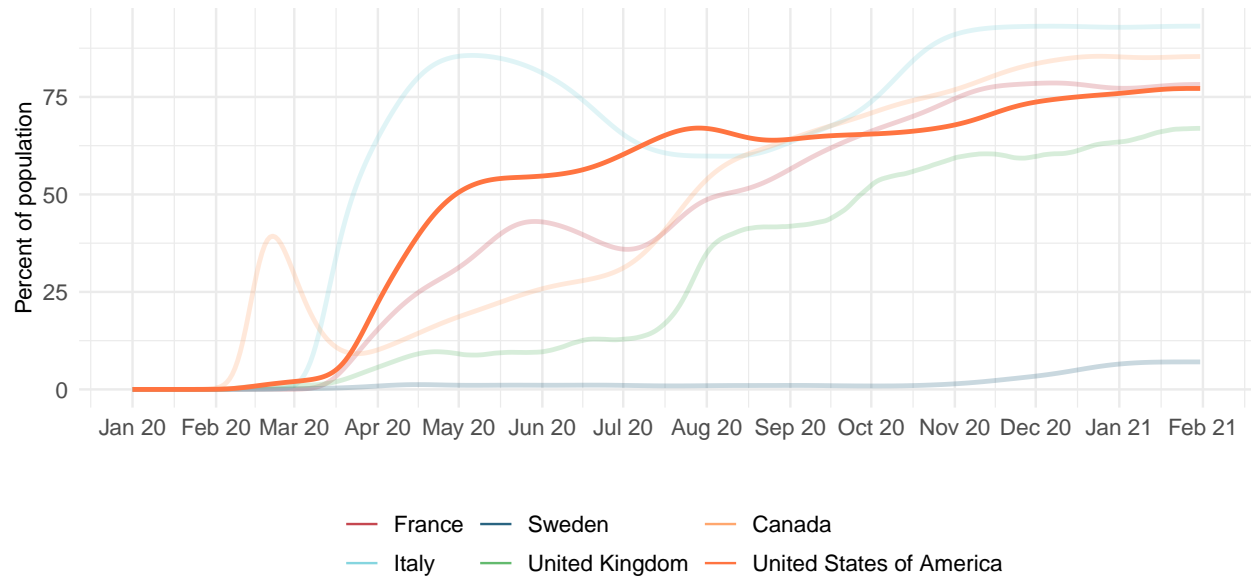


Figure 7b. Proportion of the population reporting always wearing a mask when leaving home on February 01, 2021

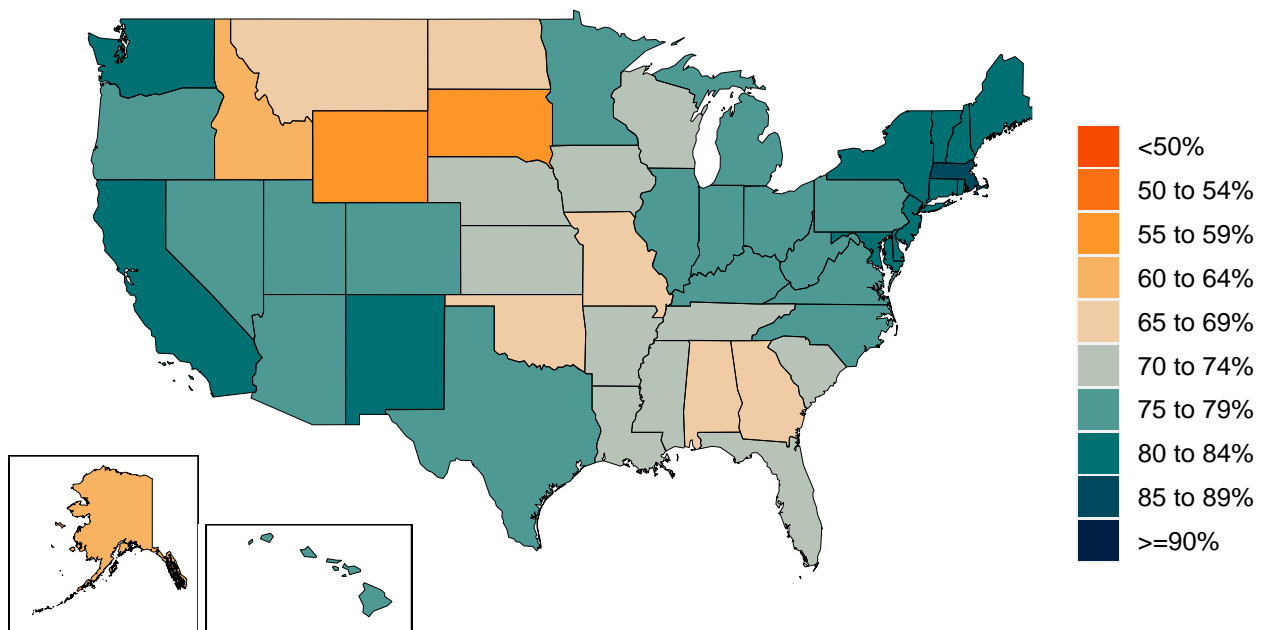


Figure 8a. Trend in COVID-19 diagnostic tests per 100,000 people

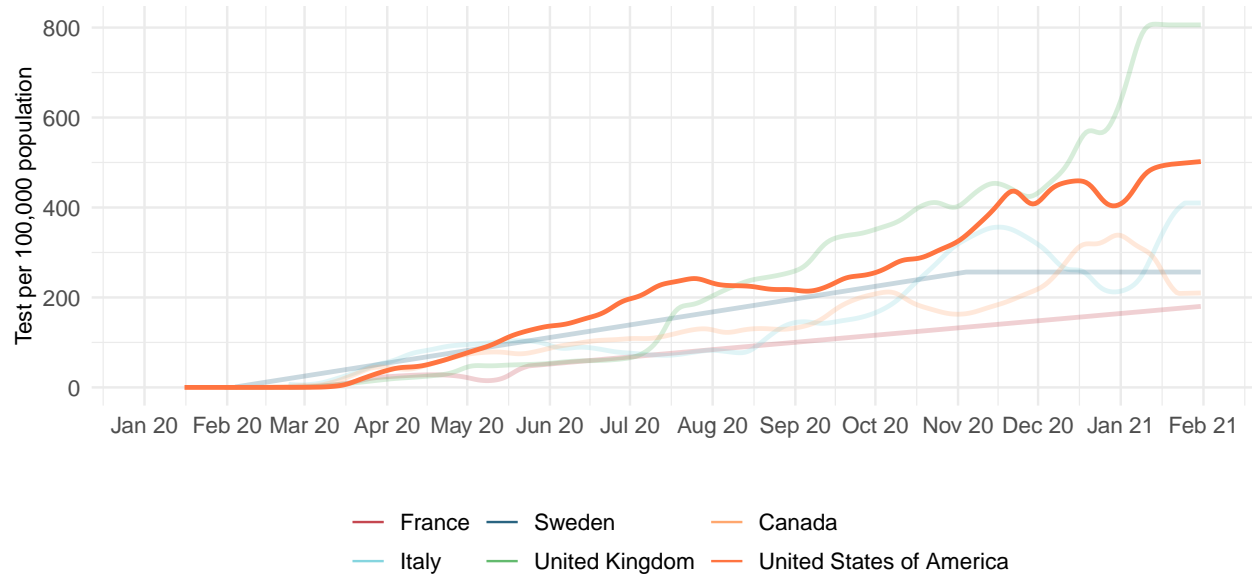


Figure 8b. COVID-19 diagnostic tests per 100,000 people on January 20, 2021

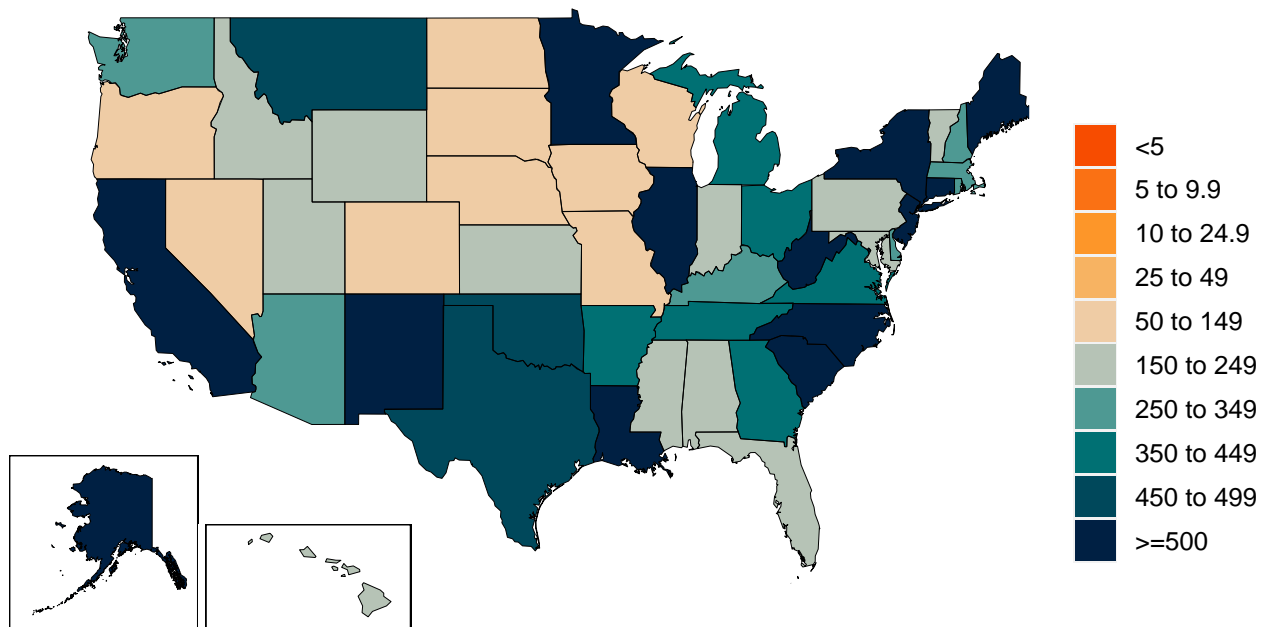


Figure 9. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

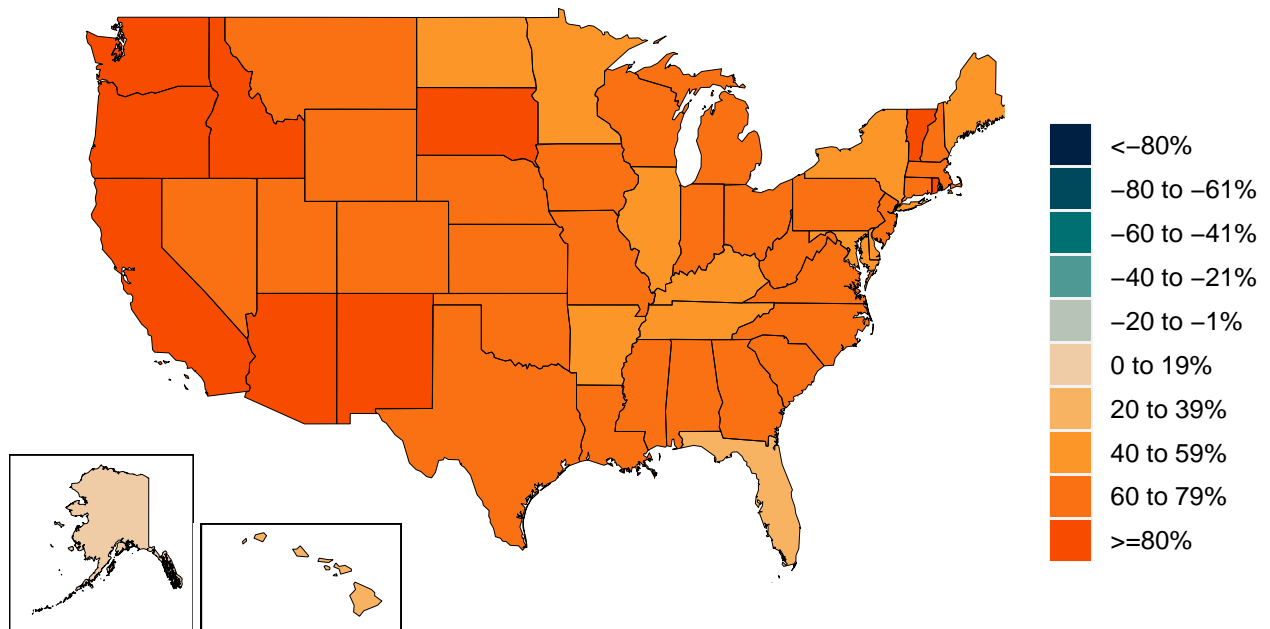


Figure 10. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and unsure).

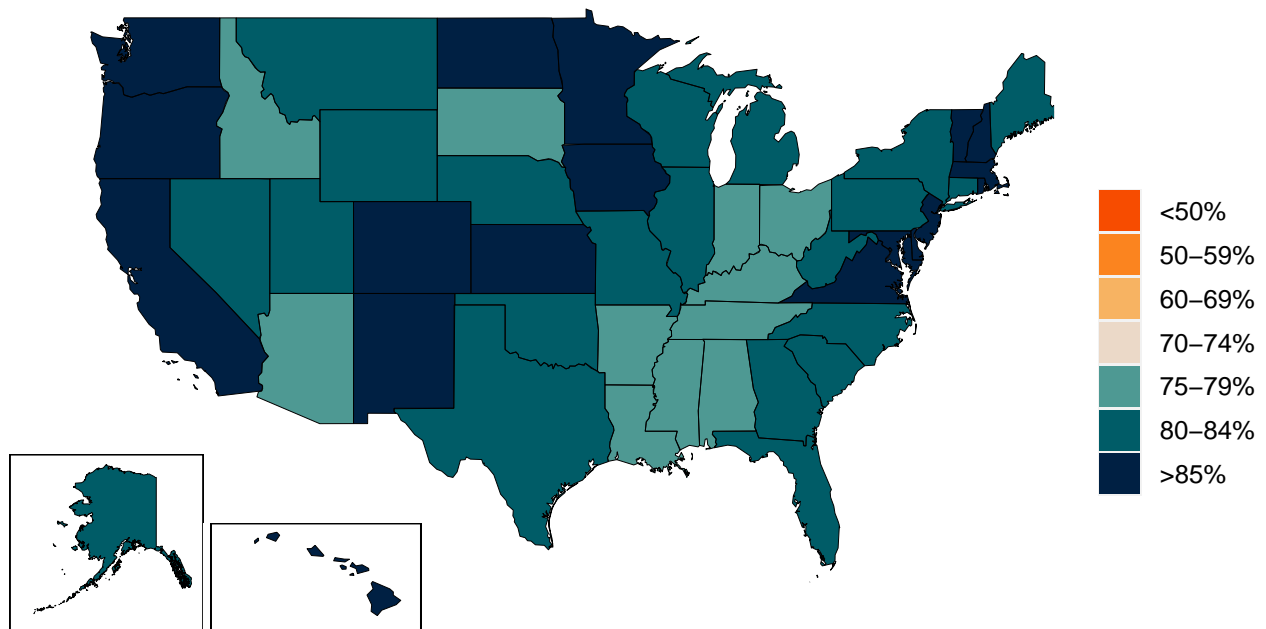
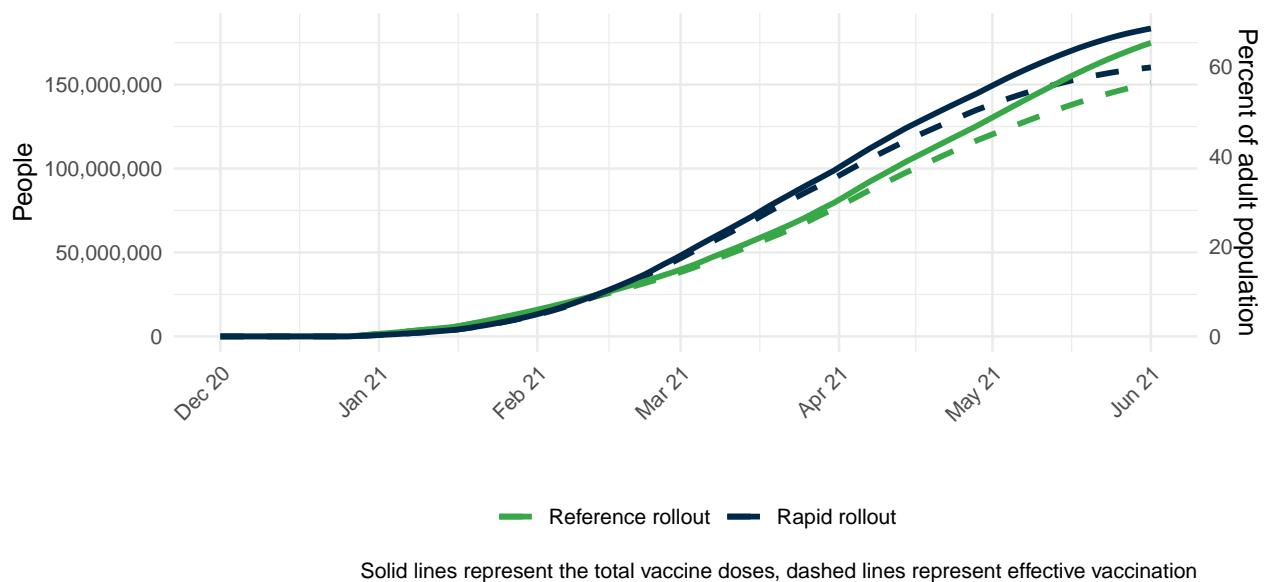


Figure 11. The number of people who receive any vaccine and those who are effectively vaccinated and protected against disease, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses.



Projections and scenarios

We produce four 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 which case mandates are re-imposed when daily deaths reach 15 per million. Variant B.1.1.7 (first identified in the UK) continues to spread in locations where 100 or more isolates have been detected to date.

The rapid variant spread scenario shares assumptions with reference but variant B.1.351 (first identified in South Africa) spreads to everywhere in the world, starting Feb. 1, 2021. Variant B.1.351 spreads at the observed rate that B.1.1.7 spread in London. The variant is assumed to increase the infection-fatality rate by 29% and transmissibility by 25%. This scenario also assumes that those vaccinated are less effectively protected against variant B.1.351: Pfizer, Moderna, Janssen, and Novavax clinical effectiveness is reduced by 20%; all other vaccines clinical effectiveness is reduced by 50%. 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 which case mandates are re-imposed when daily deaths reach 15 per million. Variant B.1.1.7 (first identified in the UK) continues to spread in locations where 100 or more isolates have been detected to date.

The worst case scenario makes the same assumptions as the rapid variant spread scenario but also assumed that in those that are vaccinated mobility moves towards pre-COVID-19 levels.

The universal masks scenario makes all the same assumptions as the reference scenario but also assumes 95% mask usage adopted in public in every location.

Figure 12. Cumulative COVID-19 deaths until June 01, 2021 for four scenarios

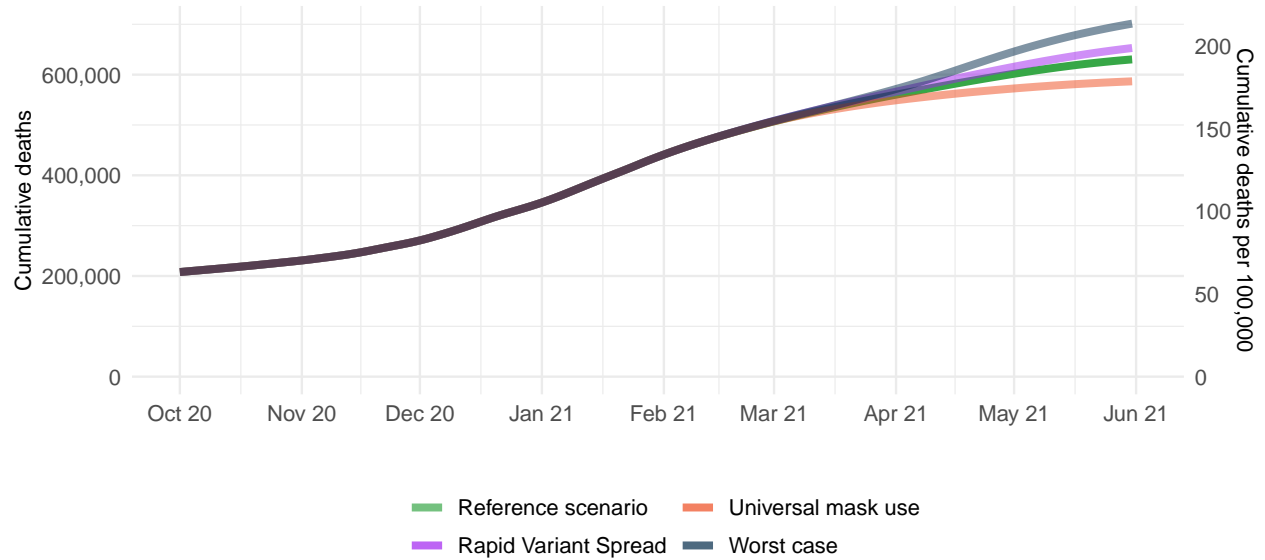


Figure 13. Daily COVID-19 deaths until June 01, 2021 for four scenarios

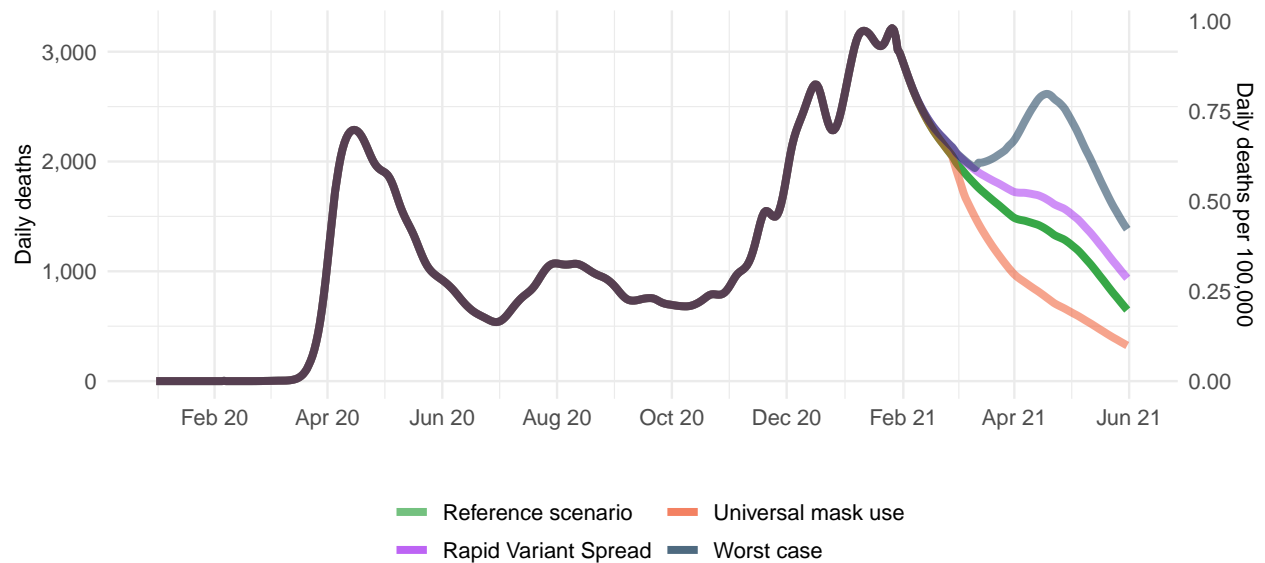


Figure 14. Daily COVID-19 infections until June 01, 2021 for four scenarios

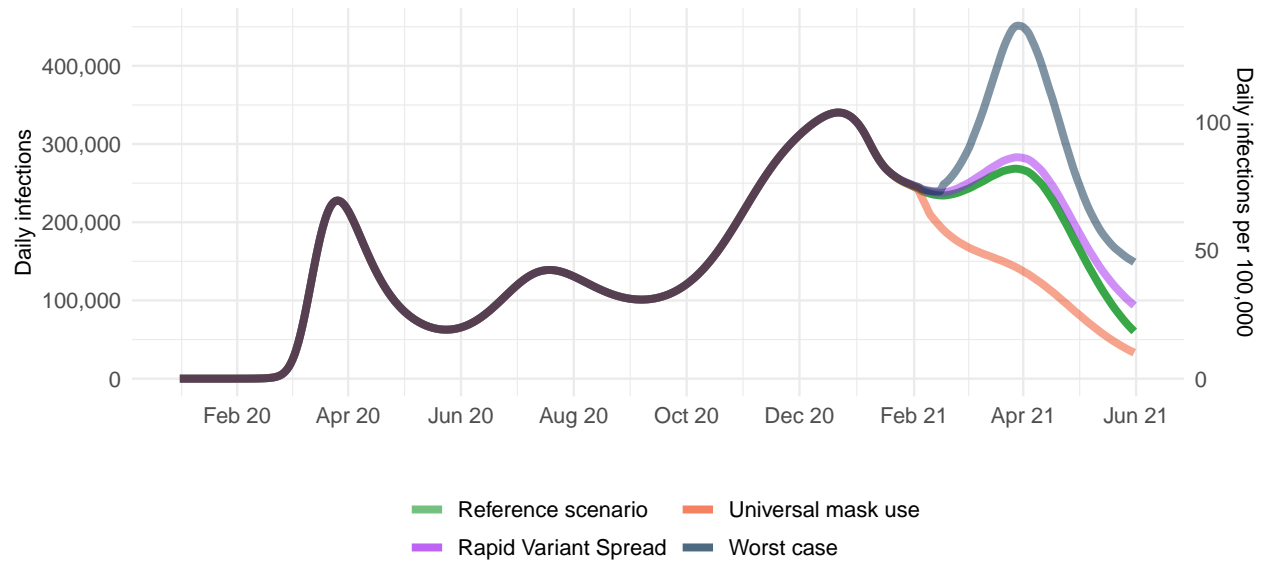


Figure 15. Forecasted percent infected with COVID-19 on June 01, 2021

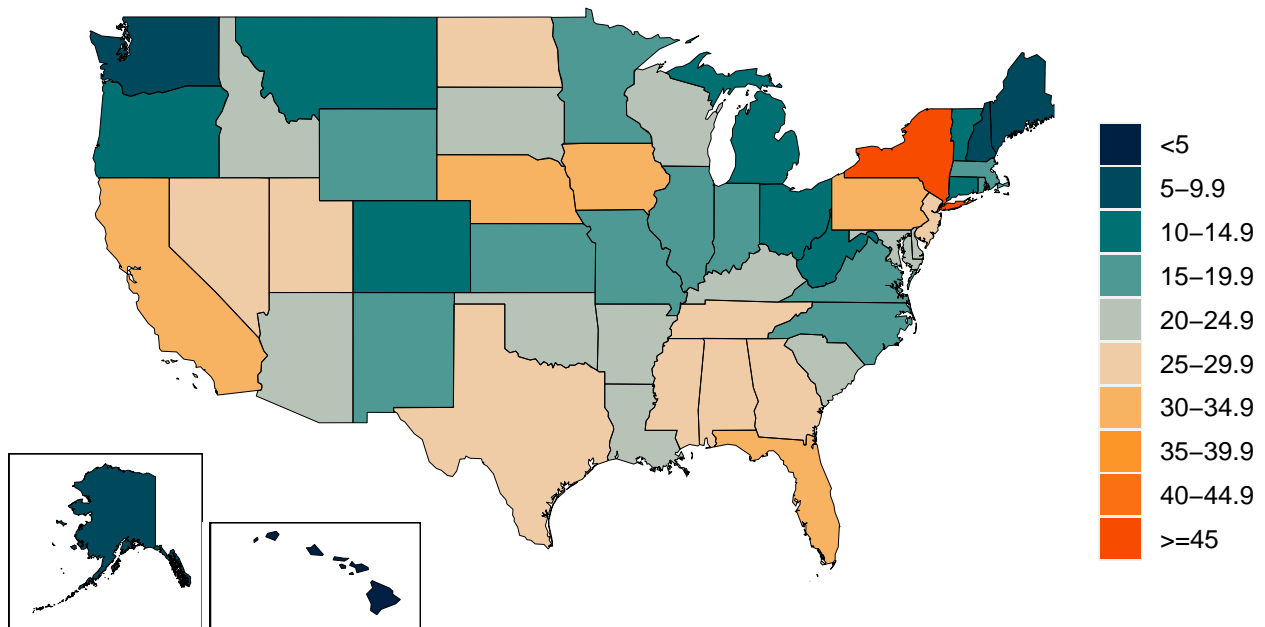


Figure 16. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachusetts Institute of Technology (Delphi; <https://www.covidanalytics.io/home>), Imperial College London (Imperial; <https://www.covidsim.org>), The Los Alamos National Laboratory (LANL; <https://covid-19.bsvgateway.org/>), and the SI-KJalpha model from the University of Southern California (SIKJalpha; <https://github.com/scc-usc/ReCOVER-COVID-19>). Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from available locations in that region.

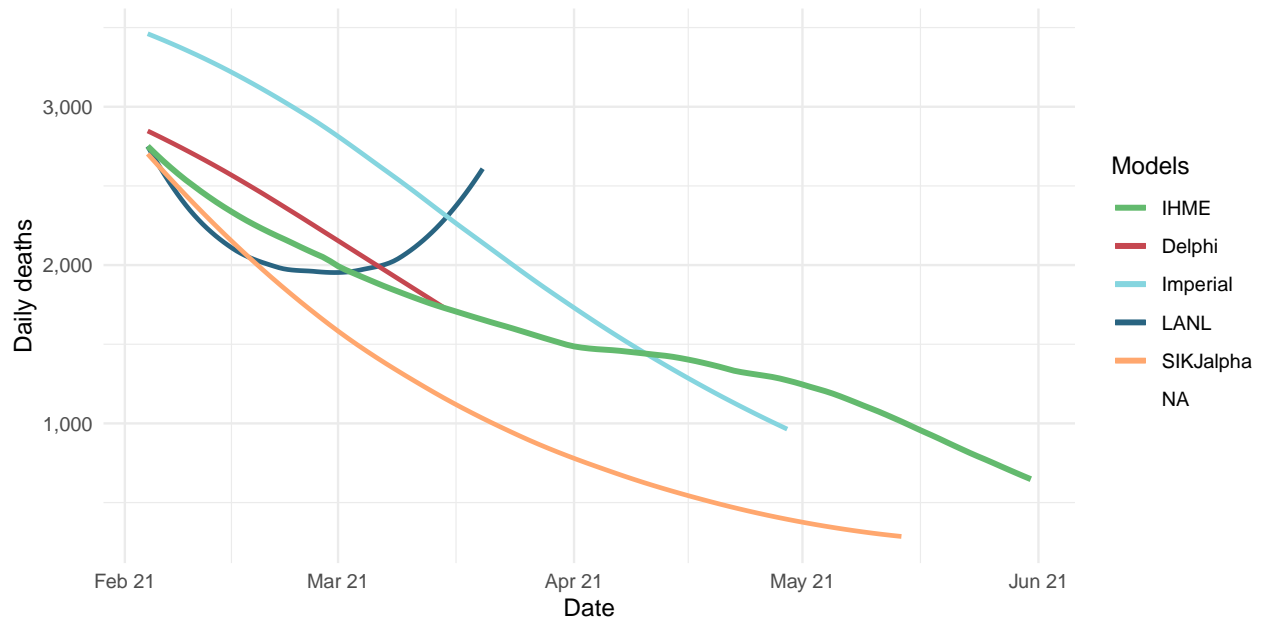


Figure 17. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and greater than 20% is considered *extreme stress*.

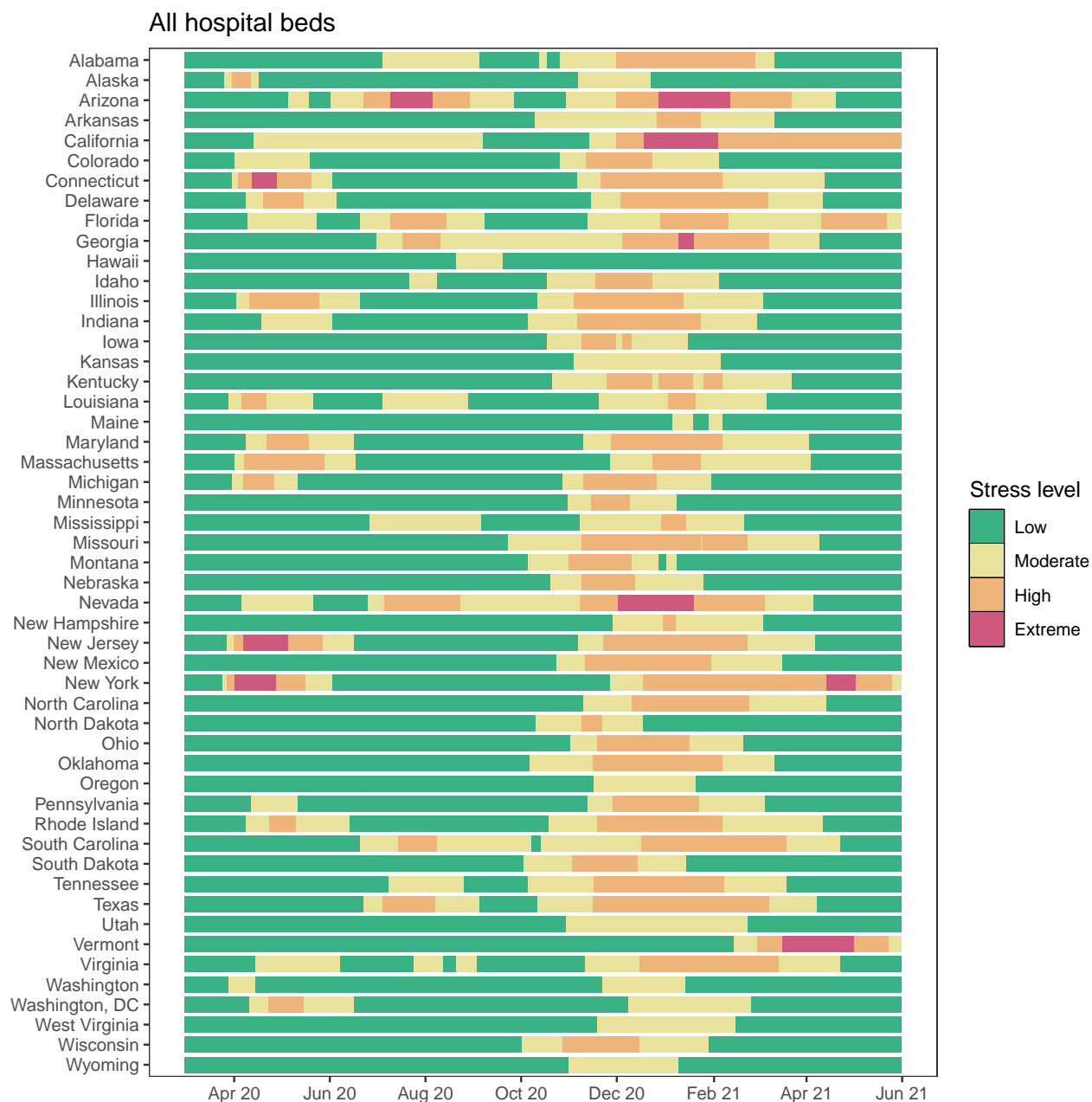
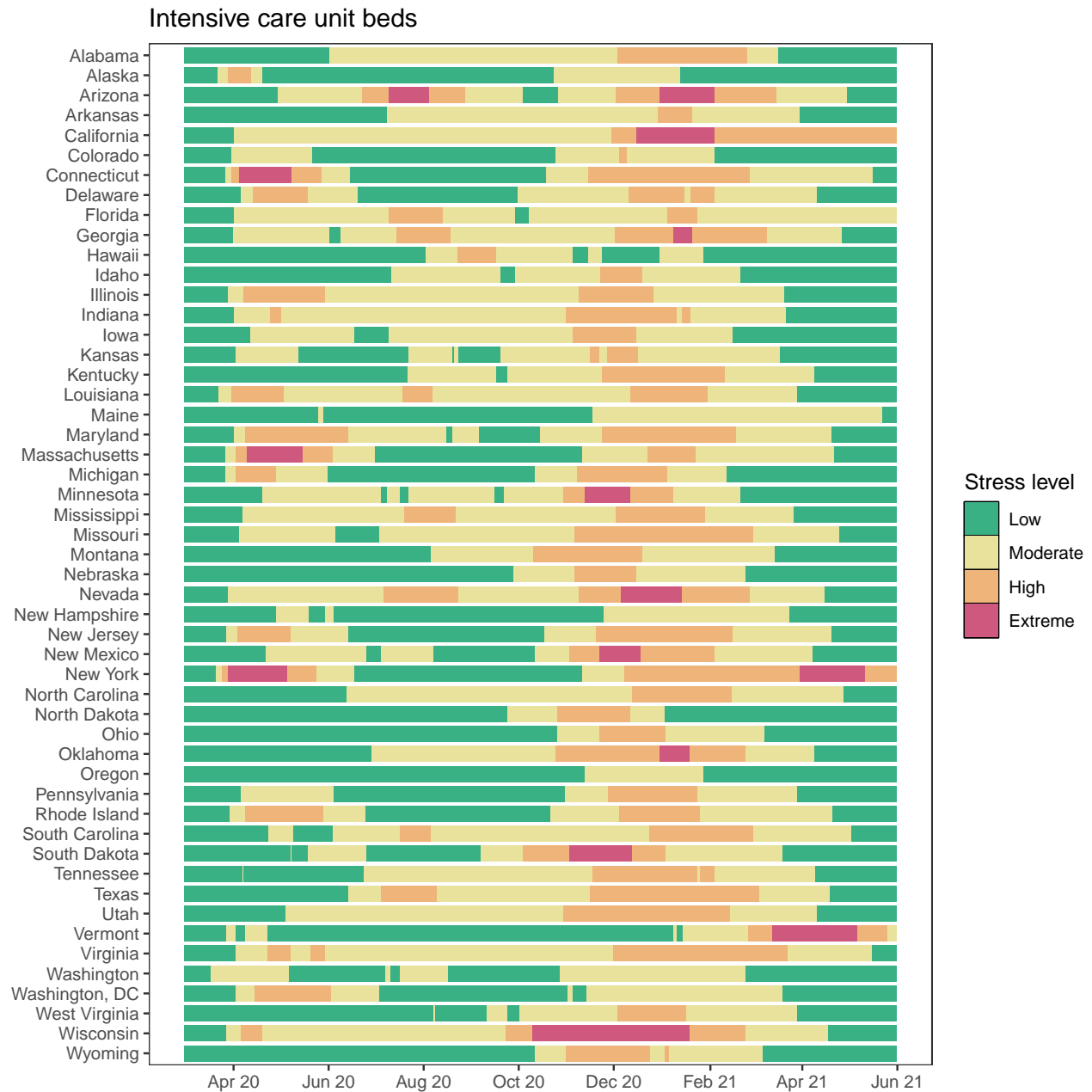


Figure 18. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *moderate stress*, 30-59% is considered *high stress*, and greater than 60% is considered *extreme stress*.



More information

Data sources:

Mask use data sources include PREMISE; Facebook Global symptom survey (This research is based on survey results from University of Maryland Social Data Science Center) and the Facebook United States symptom survey (in collaboration with Carnegie Mellon University); Kaiser Family Foundation; YouGov COVID-19 Behaviour Tracker survey.

Vaccine hesitancy data are from the COVID-19 Beliefs, Behaviors, and Norms Study, a survey conducted on Facebook by the Massachusetts Institute of Technology (<https://covidsurvey.mit.edu/>).

Data on vaccine candidates, stages of development, manufacturing capacity, and pre-purchasing agreements are primarily from Linksbridge and supplemented by Duke University.

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>.