COVID-19 Results Briefing

Hawaii

January 28, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in Hawaii. The model was run on January 27, 2021 with data through January 25, 2021.

Current situation

- Daily reported cases in the last week decreased to 100 per day on average compared to 200 the week before (Figure 1).
- Daily deaths in the last week increased to 0 per day on average compared to 0 the week before (Figure 2). This makes COVID-19 the number 2 cause of death in Hawaii this week (Table 1).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 1 states (Figure 3). The Effective R in Hawaii on January 14 was 0.9.
- We estimated that 3% of people in Hawaii have been infected as of January 25 (Figure 4).
- The daily death rate is greater than 4 per million in 44 states (Figure 5).

Trends in drivers of transmission

- In the last week, new mandates have been imposed in Rhode Island. Mandates have been lifted in California (Table 2).
- Mobility last week was 36% lower than the pre-COVID-19 baseline (Figure 7). Mobility was near baseline (within 10%) in Wyoming. Mobility was lower than 30% of baseline in in 20 states.
- As of January 25 we estimated that 78% of people always wore a mask when leaving their home compared to 78% last week (Figure 8). Mask use was lower than 50% in no states.
- There were 158 diagnostic tests per 100,000 people on January 25 (Figure 9).
- In Hawaii 55.4% of people say they would accept a vaccine for COVID-19 and 25.5% 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 69% in South Dakota to 85% in District of Columbia (Figure 11).
- We expect that 886,200 will be vaccinated by May 1 (Figure 12). With faster scale-up, the number vaccinated could reach 886,200.

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 1,000 cumulative deaths on May 1, 2021. This represents 0 additional deaths from January 25 to May 1 (Figure 13). Daily deaths will peak at 0 on January 26, 2021 (Figure 14).
- By May 1, 2021, we project that 100 lives will be saved by the projected vaccine rollout.
- If **universal mask coverage (95%)** were attained in the next week, our model projects 0 fewer cumulative deaths compared to the reference scenario on May 1, 2021 (Figure 13).
- In the **rapid spread of variants scenario** daily deaths would remain above 0 on May 1, 2021. Cumulative deaths on May 1, 2021 would be 1,000 (Figure 13).
- Under our **worst case scenario**, our model projects 1,000 cumulative deaths on May 1, 2021 (Figure 13).
- We estimate that 23.1% of people will be immune on May 1, 2021 (Figure 14).
- The reference scenario assumes that 5 states will re-impose mandates by May 1, 2021 (Figure 17).
- Figure 20 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.

- At some point from January through May 1, 41 states will have high or extreme stress on hospital beds (Figure 21). At some point from January through May 1, 44 states will have high or extreme stress on ICU capacity (Figure 22).

Model updates

In order to capture the impact of variants and the potential impact of further spread of new variants, we have made changes to our scenarios. We now show results for four scenarios when projecting COVID-19.

The **reference scenario** is our forecast of what we think is most likely to happen and makes the following assumptions: 1) Vaccines will continue to be distributed at the expected pace. 2) Governments adapt their response by re-imposing social distancing mandates for six weeks whenever daily deaths reach eight per million, unless a location has already spent at least seven 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. 3) 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. 4) Mask use stays at current levels.

The **rapid variant spread scenario** shares assumptions with the reference scenario and in addition, we assume that variant B.1.351 (first identified in South Africa) spreads to everywhere in the world, starting February 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 ratio by 29% and transmissibility by 35%. 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%.

The **worst case scenario** makes the same assumptions as the rapid variant spread scenario and also assumes that mobility moves towards pre-COVID-19 levels as vaccination rates increase.

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

In summary, here are the assumptions in each of the four scenarios:

Scenario	Mobility	New variant spread	Vaccination	Mask use
Reference (most likely to happen)	Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 25% of those vaccinated, mobility returns toward pre-COVID-19 levels.	B.1.1.7 (UK) continues to spread in locations with > 100 cases detected.	Expected pace	Stays at current levels
Rapid variant increase	Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 25% of those vaccinated, mobility returns toward pre-COVID-19 levels.	• B.1.1.7 (UK) continues to spread in locations with > 100 cases detected. • B.1.351 (S. Africa) spreads everywhere in the world starting Feb 1.	• Expected pace • Vaccines' effectiveness lower against B.1.351	Stays at current levels
Worst case	Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 100% of those vaccinated, mobility returns toward pre-COVID-19 levels.	• B.1.1.7 (UK) continues to spread in locations with > 100 cases detected. • B.1.351 (S. Africa) spreads everywhere in the world starting Feb 1.	• Expected pace • Vaccines' effectiveness is lower against B.1.351	Stays at current levels
Universal mask use	Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 25% of those vaccinated, mobility returns towards pre-COVID-19 levels.	B.1.1.7 (UK) continues to spread in locations with >100 cases detected.	Expected pace	Increases to 95%

Note that scenarios assume the following about social-distancing mandates. Governments adapt their response by re-imposing social distancing mandates for six weeks whenever daily deaths reach eight per million, unless a location has already spent at least seven 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.

More details on each of the assumptions

- *How do the new variants scale up over time?*

In locations with more than 100 B.1.1.7 variants sequenced, we have included the further scale-up of the variant. Based on studies reported in England, we assume that B.1.1.7 is 35% more transmissible and the infection-fatality ratio is 29% higher than wild variants.

For B.1.351, we assume that the scale-up of the proportion of cases due to the new variant will follow the trajectory that has been well documented in London and other English locations for B.1.1.7. We assume that the variant is 35% more transmissible and the infection-fatality ratio is 29% higher. In the rapid variant scenario and the worst case scenario, we assume that B.1.351 will be introduced in all locations on February 1. With our assumptions of infectiousness, we find that all locations reach 80% of infections due to B.1.351 by May 19th.

- *How effective are the vaccines against the new variants?*

This scenario 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%.

- *How do we forecast increases in mobility in the worst case scenario?*

We have modified our mobility forecasts to reflect that as the coverage of vaccination increases, there will likely be fewer mandates in place. We reflect this in our model that forecasts mandates by building in an assumption that as vaccine coverage increases, the probability that mandates will stay in place decreases. Specifically, we do this by applying scalar that ranges from 1 when vaccine coverage a month ago was zero to 0.5 when vaccine coverage a month ago was 75%. This scalar is multiplied by the location-specific projections of the percent of mandates that are in place. As data emerges in places with high levels of vaccination, we will modify this assumption in future iterations of the model.

Current situation

Figure 1. Reported daily COVID-19 cases

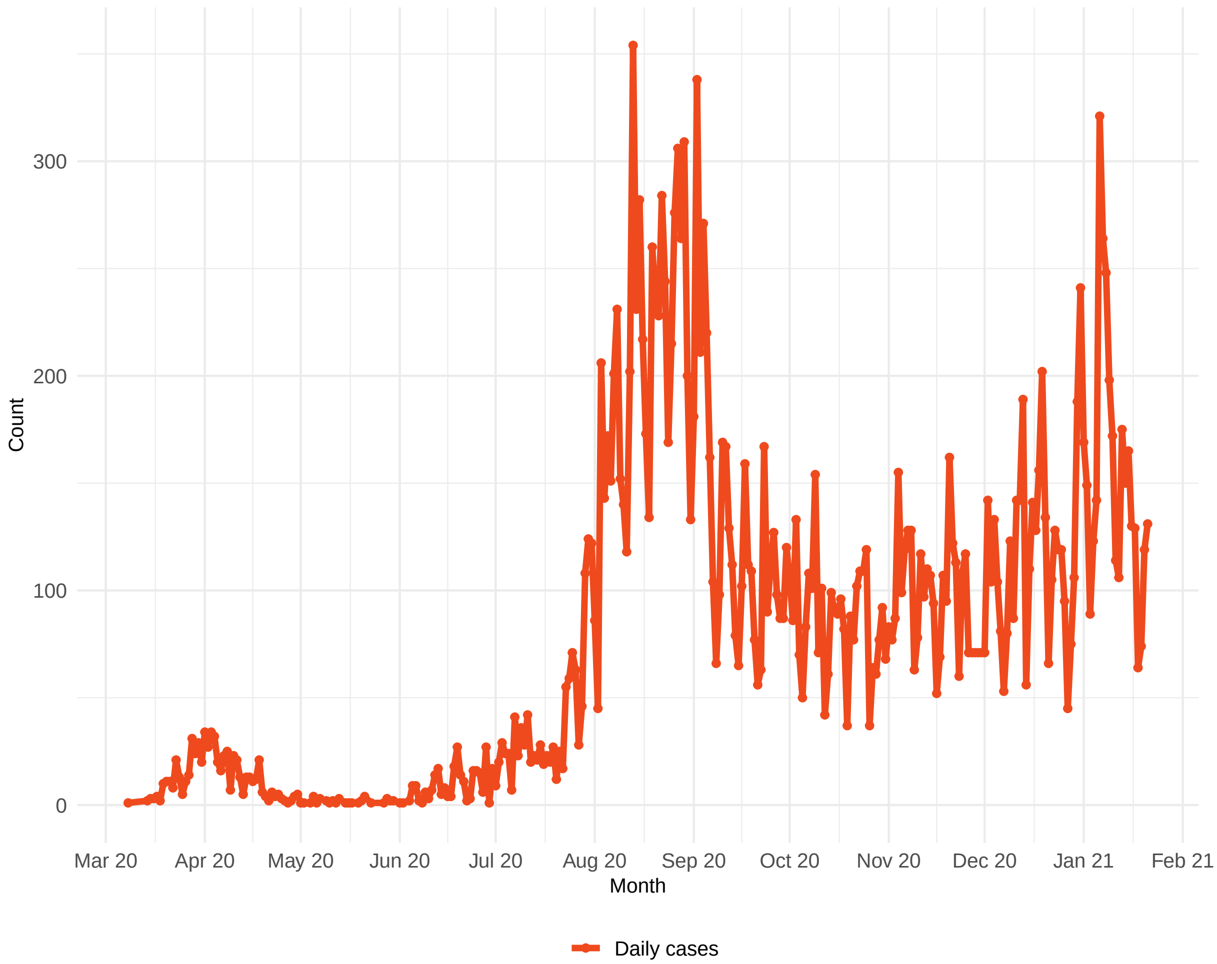


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	39	1
COVID-19	20	2
Alzheimer's disease and other dementias	19	3
Stroke	19	4
Tracheal, bronchus, and lung cancer	15	5
Lower respiratory infections	11	6
Chronic obstructive pulmonary disease	10	7
Chronic kidney disease	9	8
Colon and rectum cancer	8	9
Pancreatic cancer	6	10

Figure 2a. Reported daily COVID-19 deaths

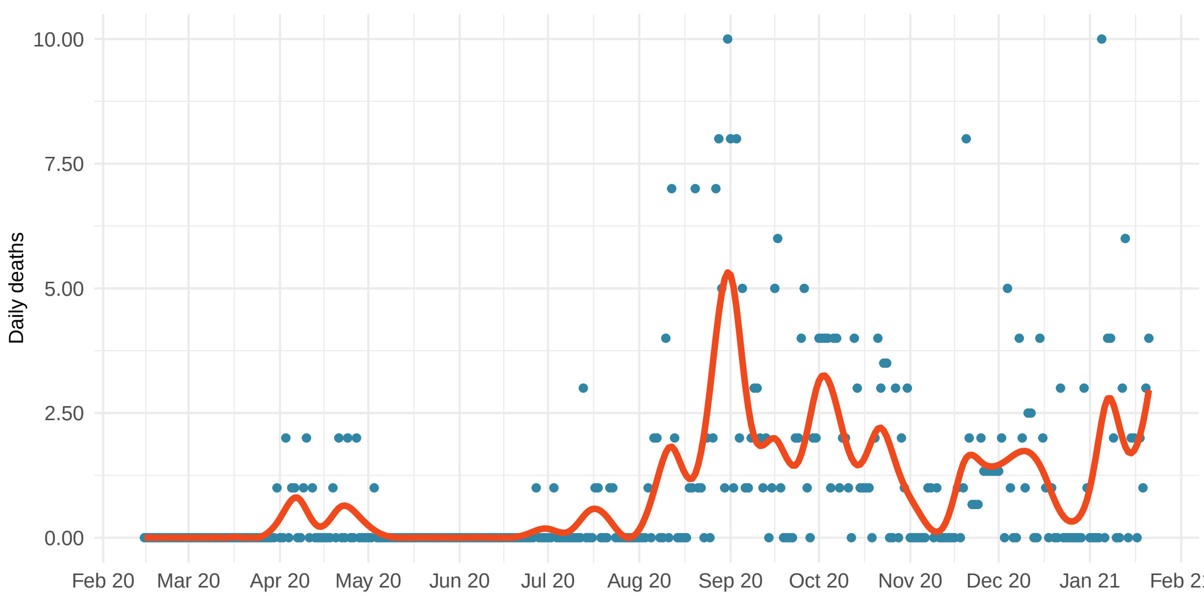


Figure 2b. Estimated cumulative deaths by age group

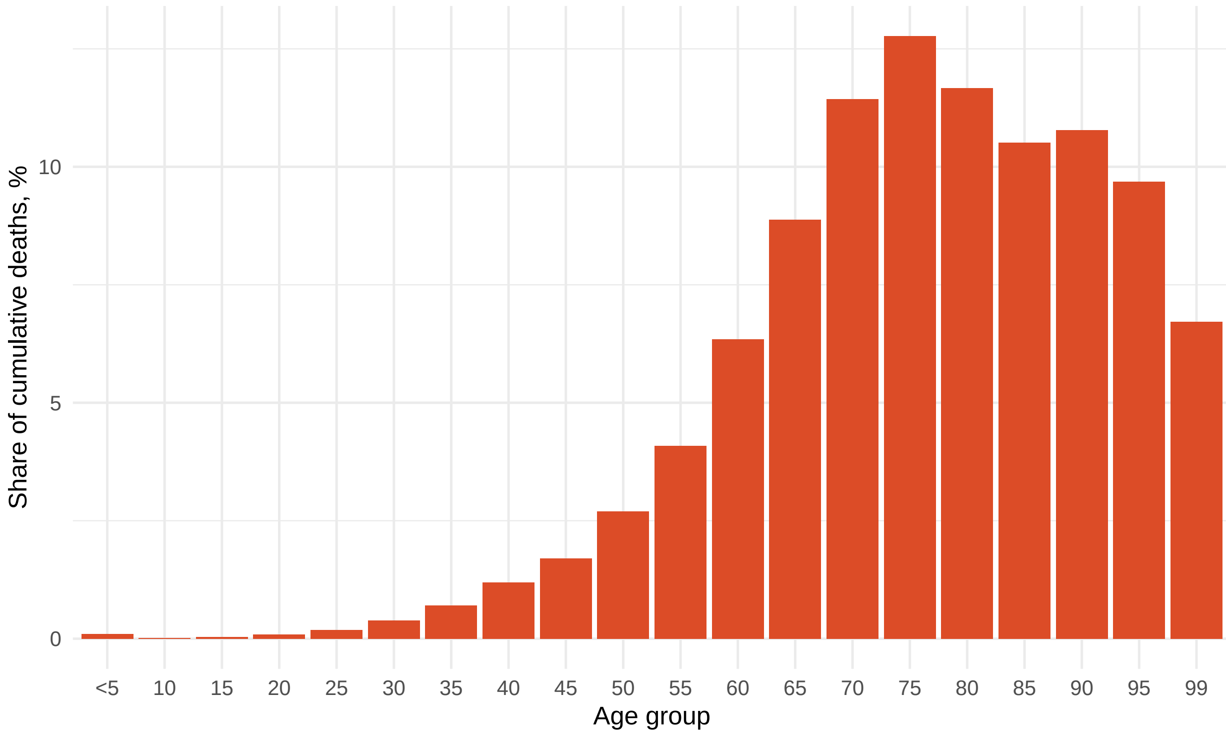


Figure 3. Mean effective R on January 14, 2021. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline, all other things being held the same.

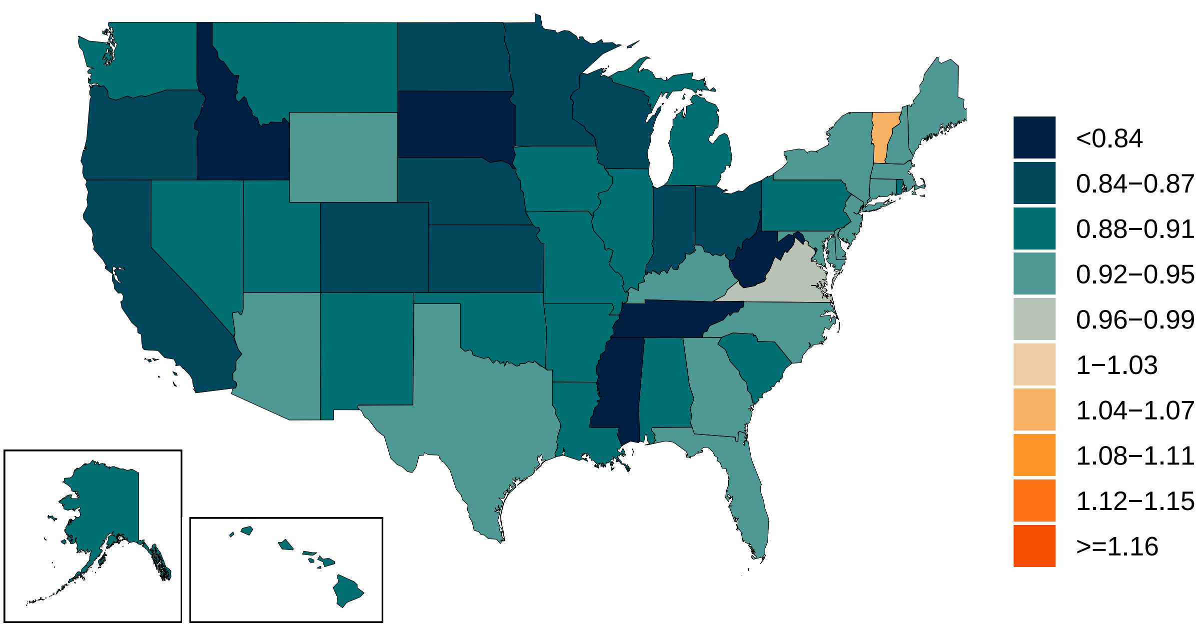


Figure 4. Estimated percent of the population infected with COVID-19 on January 25, 2021

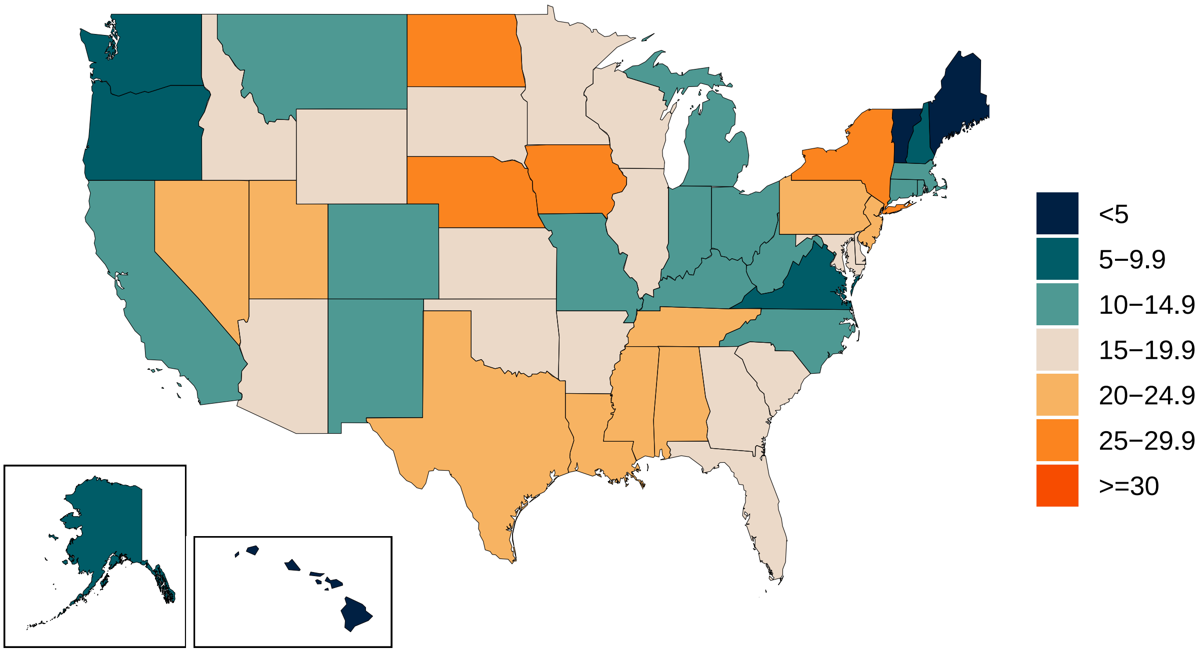
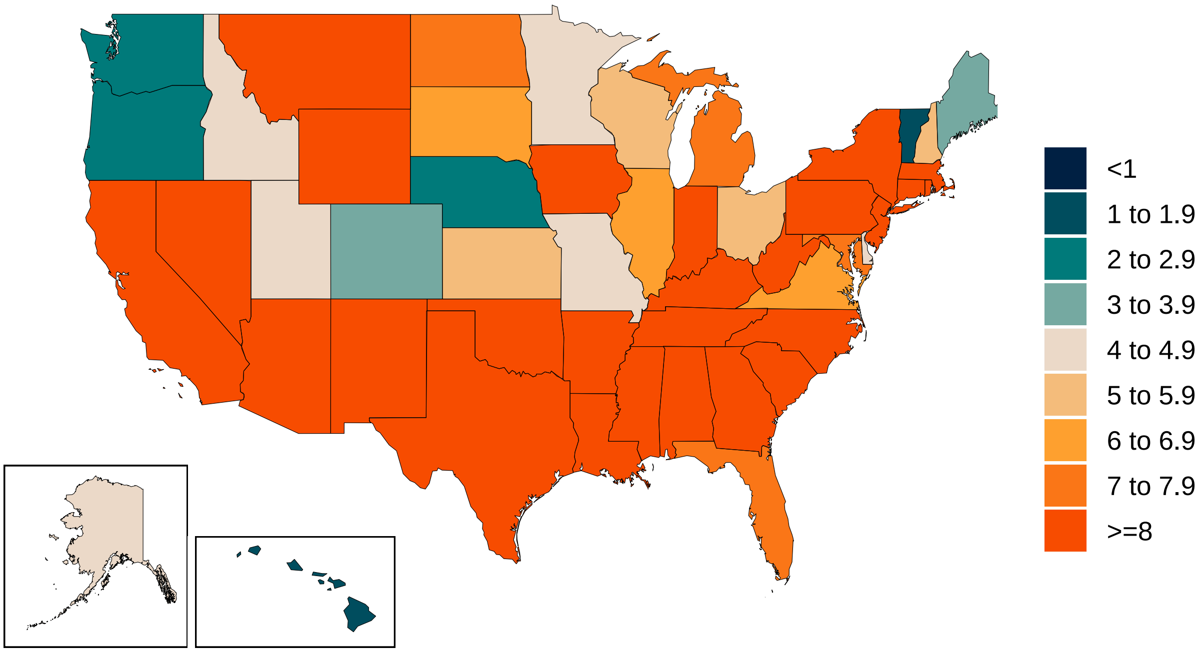


Figure 5. Daily COVID-19 death rate per 1 million on January 25, 2021



Critical drivers

Table 2. Current mandate implementation

*Not all locations are measured at the subnational level.

Figure 6. Total number of social distancing mandates (including mask use)

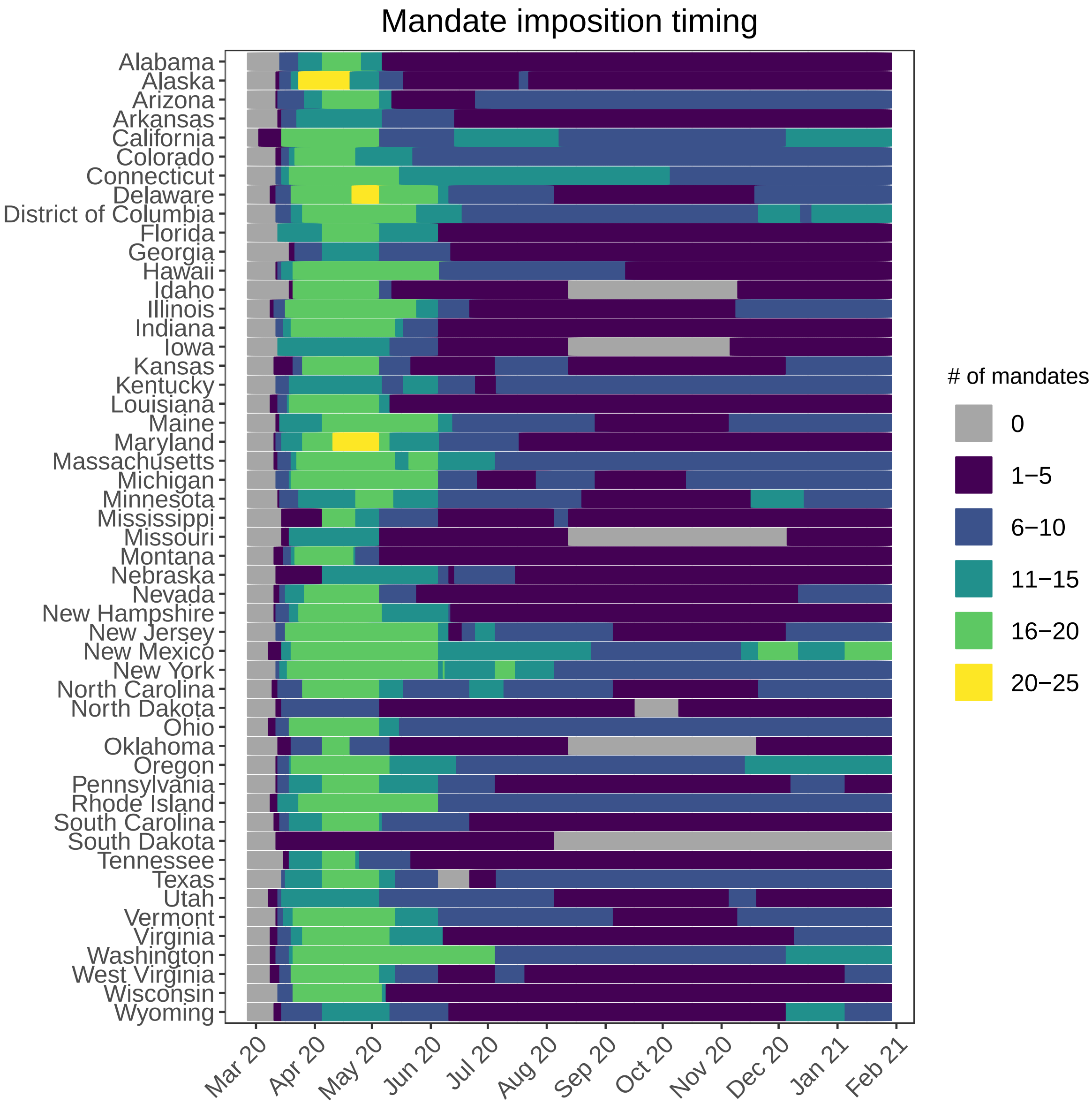


Figure 7a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

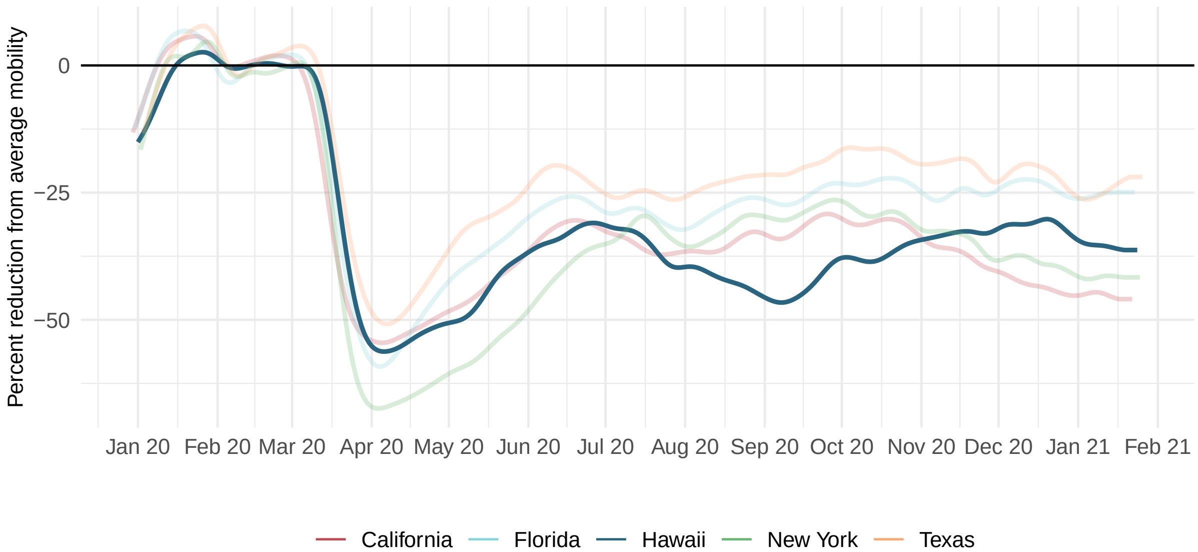


Figure 7b. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on January 25, 2021

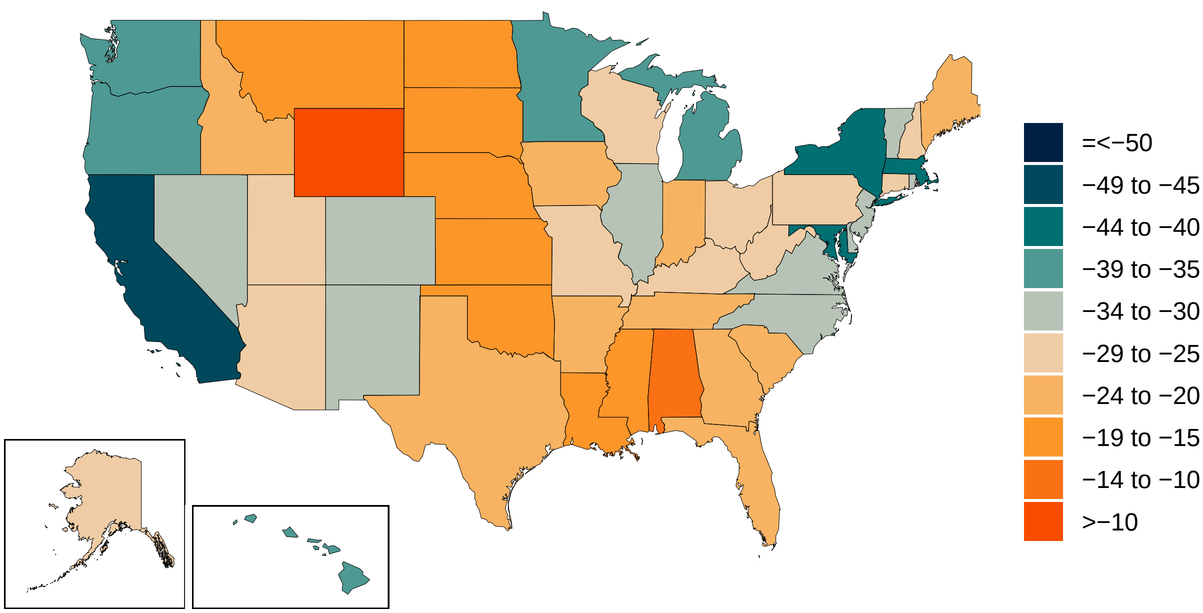


Figure 7c. Trend in visits to restaurants as measured through cell phone data compared to 2019 average

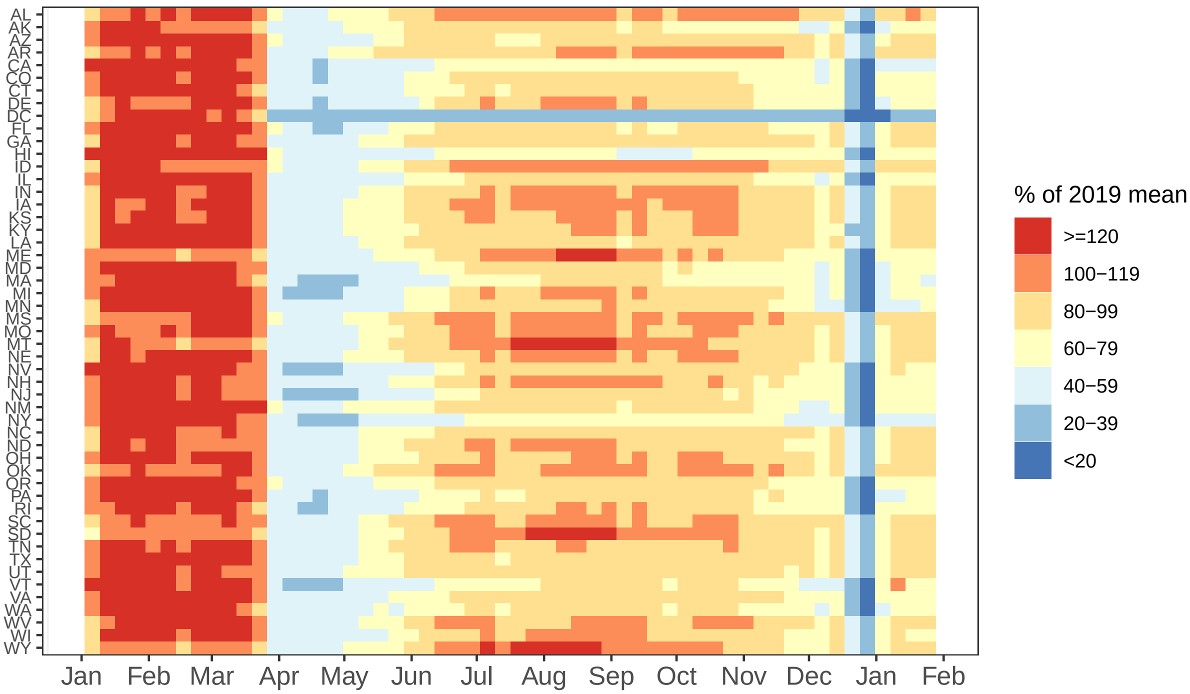


Figure 7d. Trend in visits to bars as measured through cell phone data compared to 2019 average

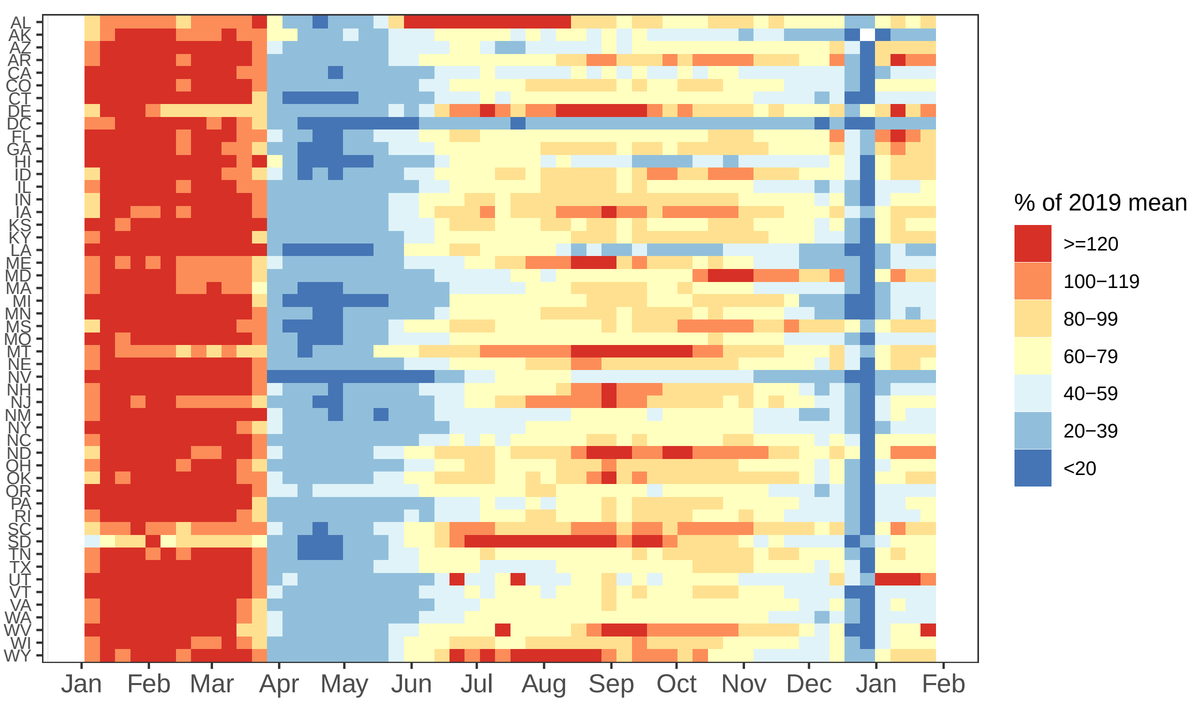


Figure 7e. Trend in visits to elementary & secondary schools as measured through cell phone data compared to 2019 average

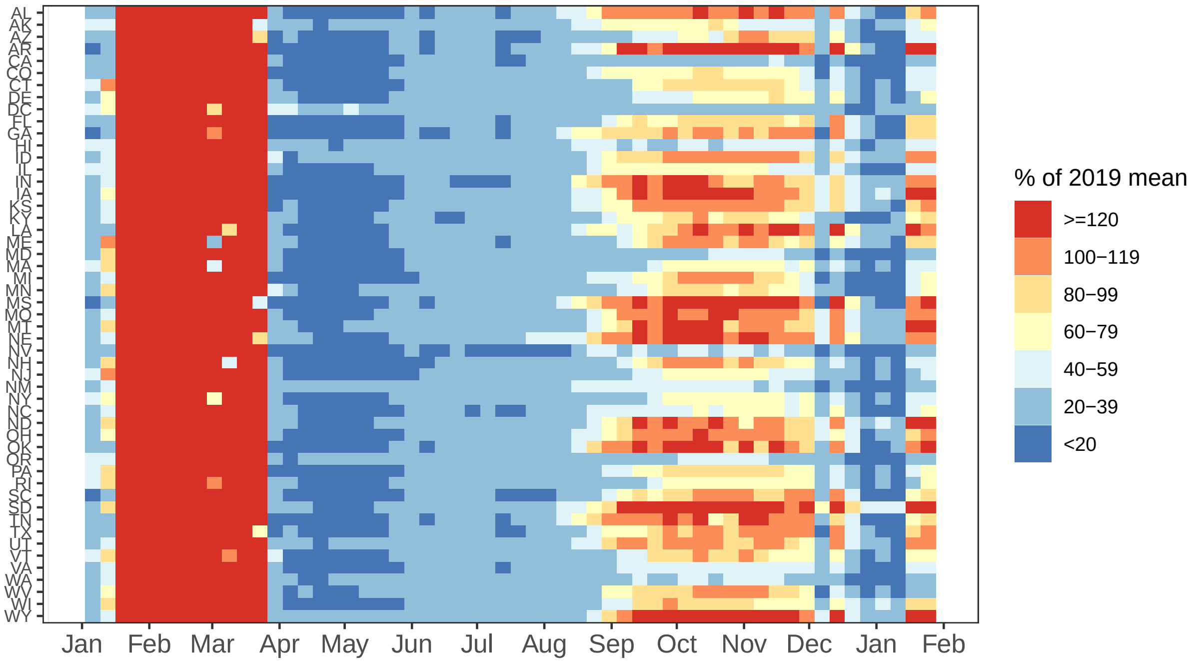


Figure 7f. Trend in visits to department stores as measured through cell phone data compared to 2019 average

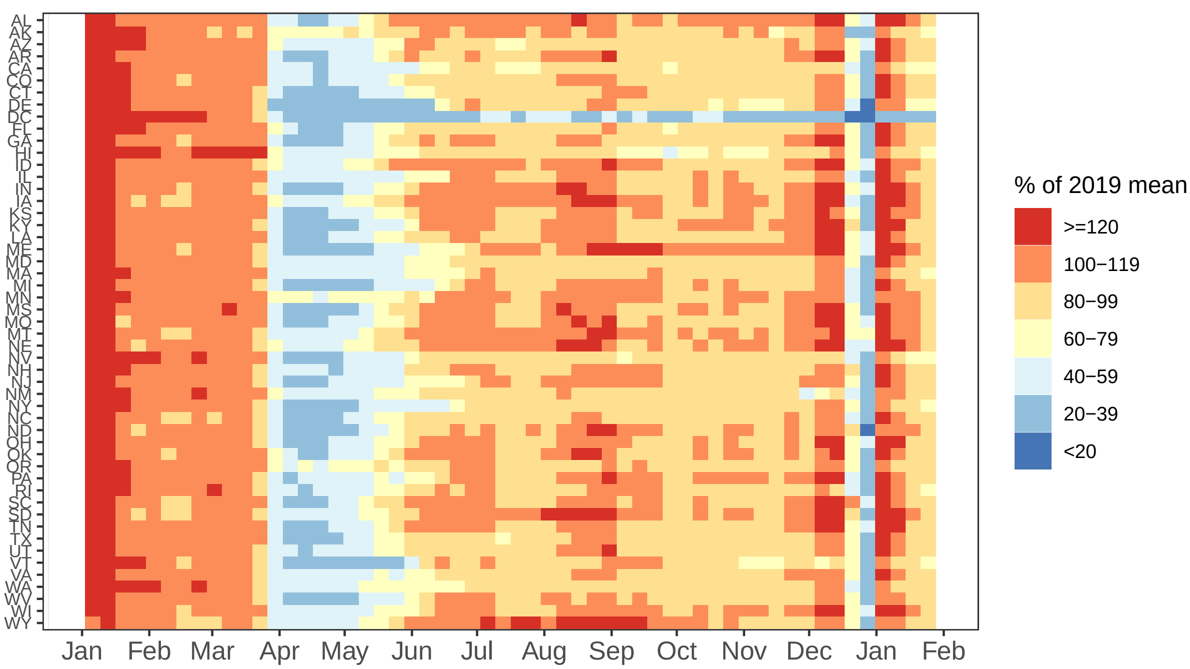


Figure 8a. Trend in the proportion of the population reporting always wearing a mask when leaving home

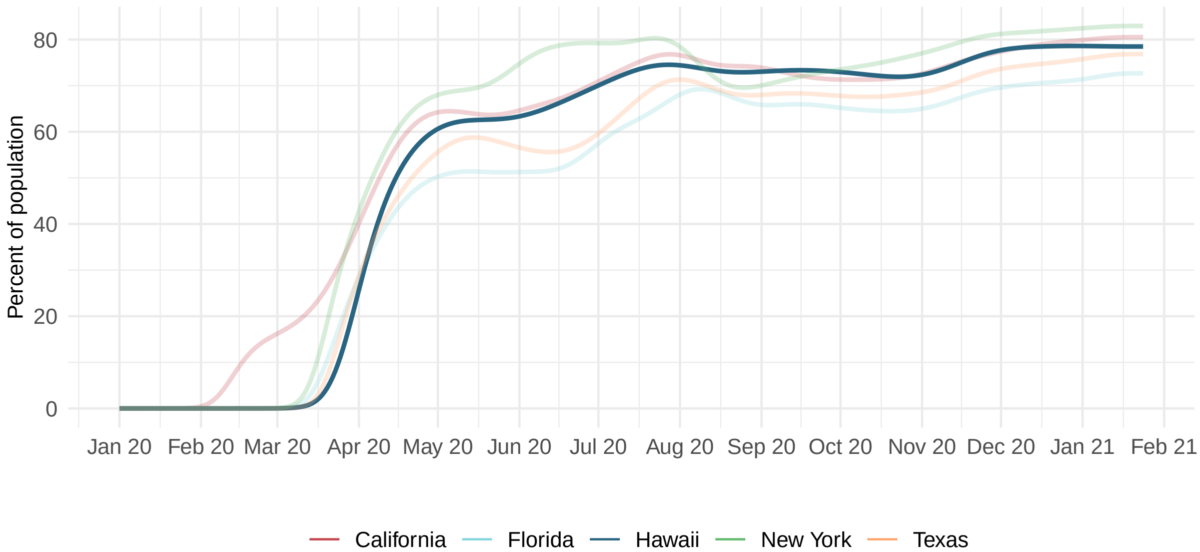


Figure 8b. Proportion of the population reporting always wearing a mask when leaving home on January 25, 2021

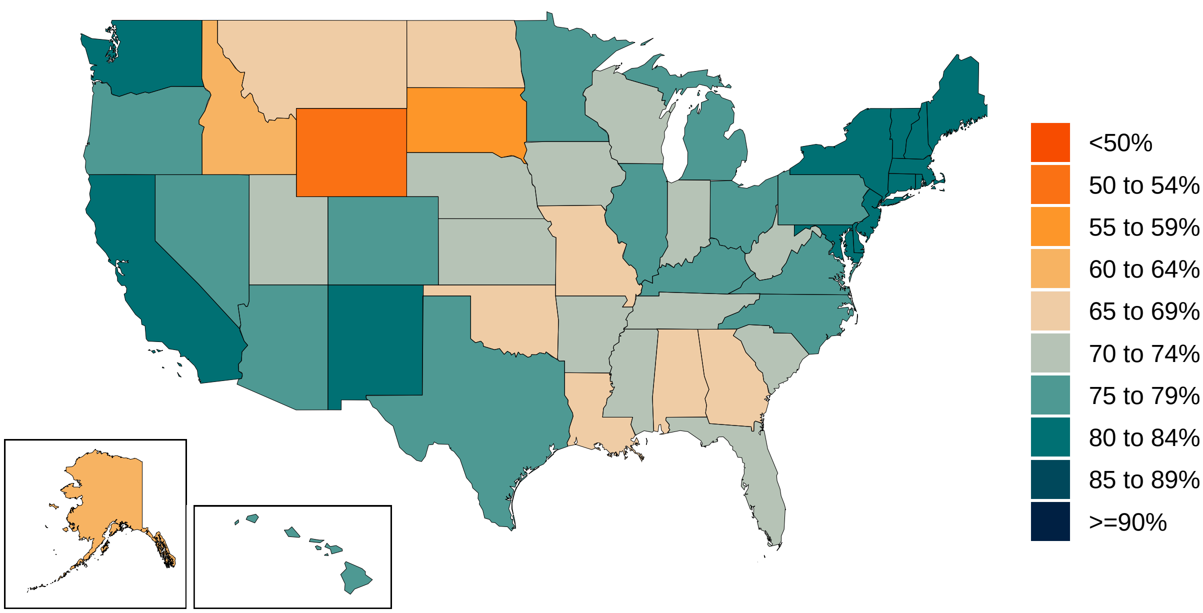


Figure 9a. Trend in COVID-19 diagnostic tests per 100,000 people

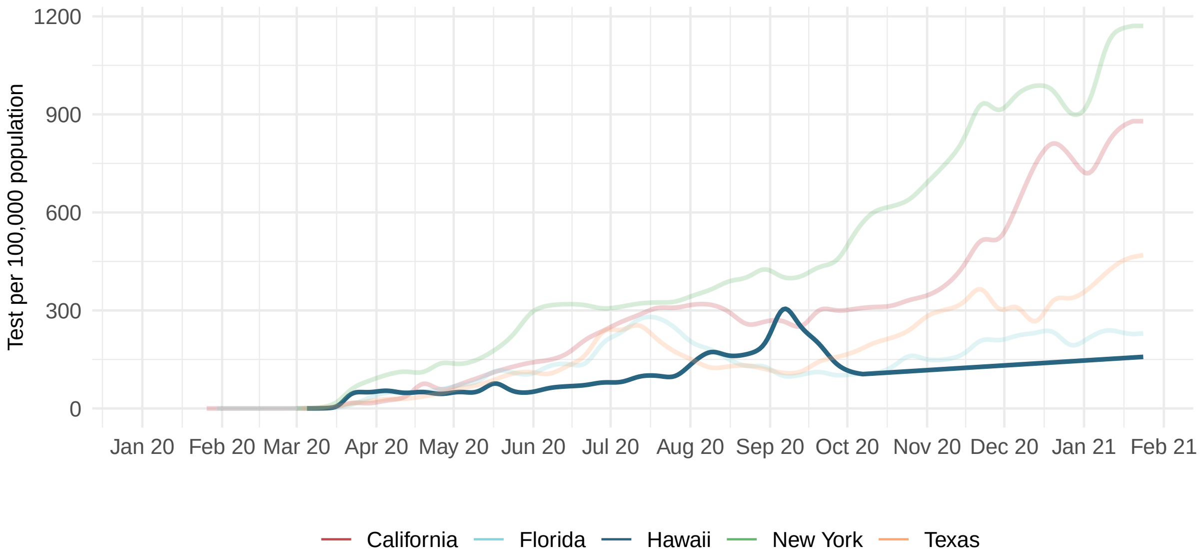


Figure 9b. COVID-19 diagnostic tests per 100,000 people on January 20, 2021

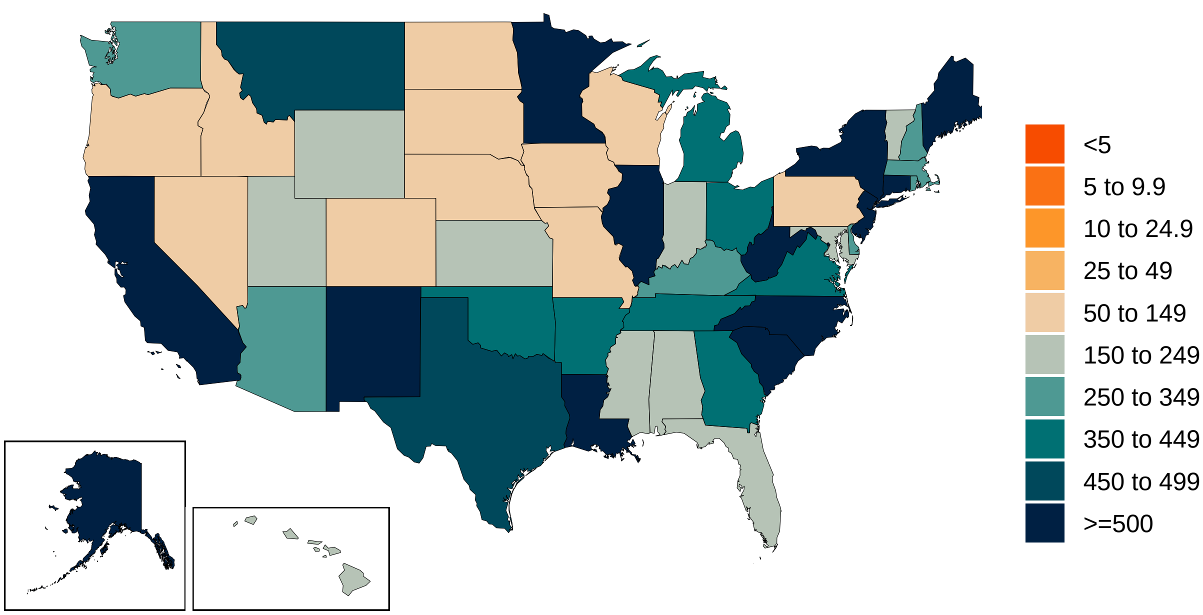


Figure 10. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

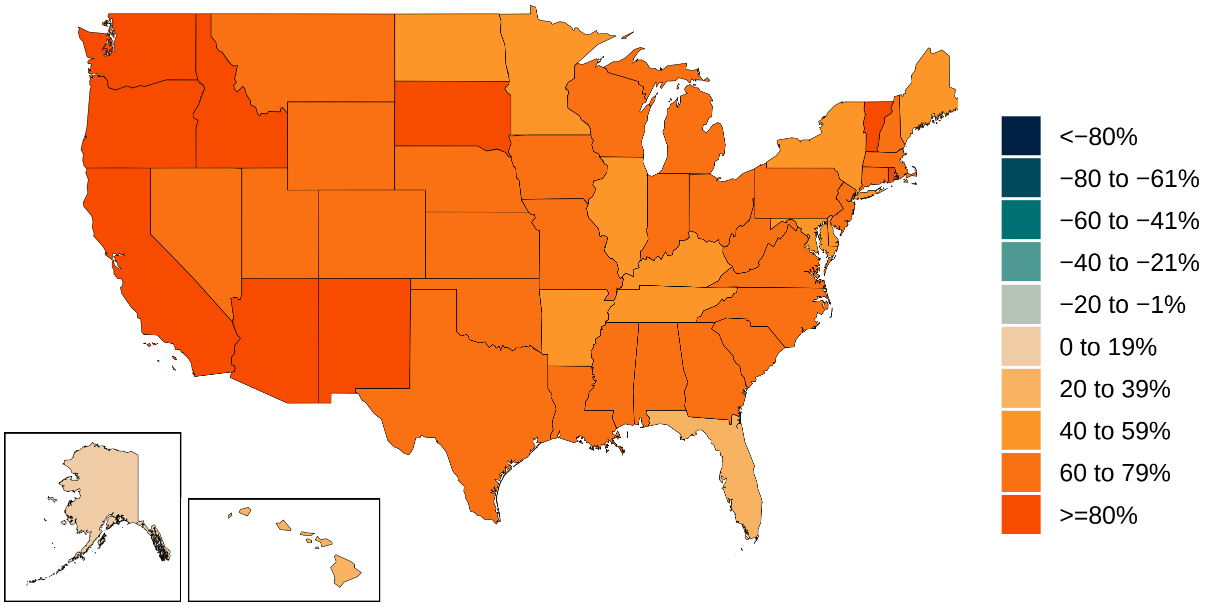


Figure 11. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and unsure).

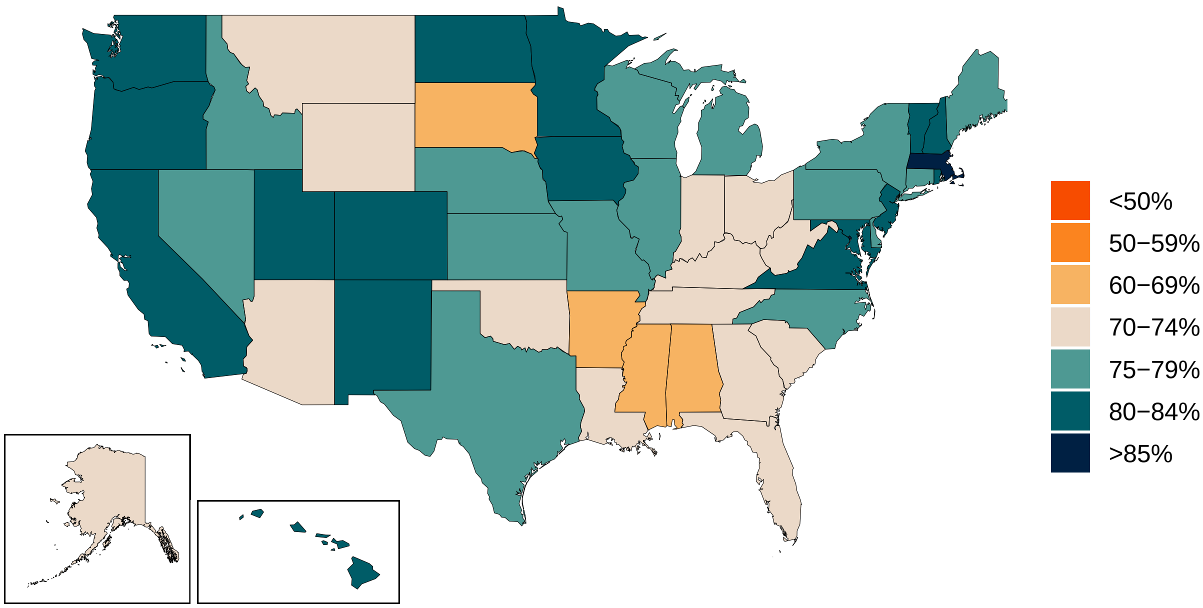
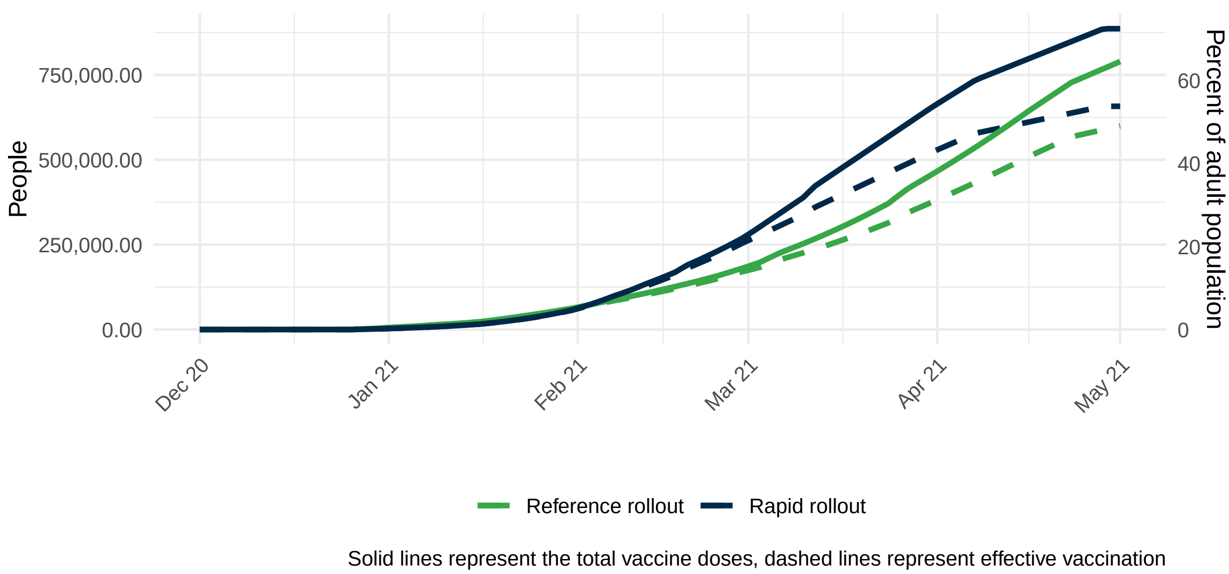


Figure 12. The number of people who receive any vaccine and those who are immune, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses.



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 13. Cumulative COVID-19 deaths until May 01, 2021 for four scenarios

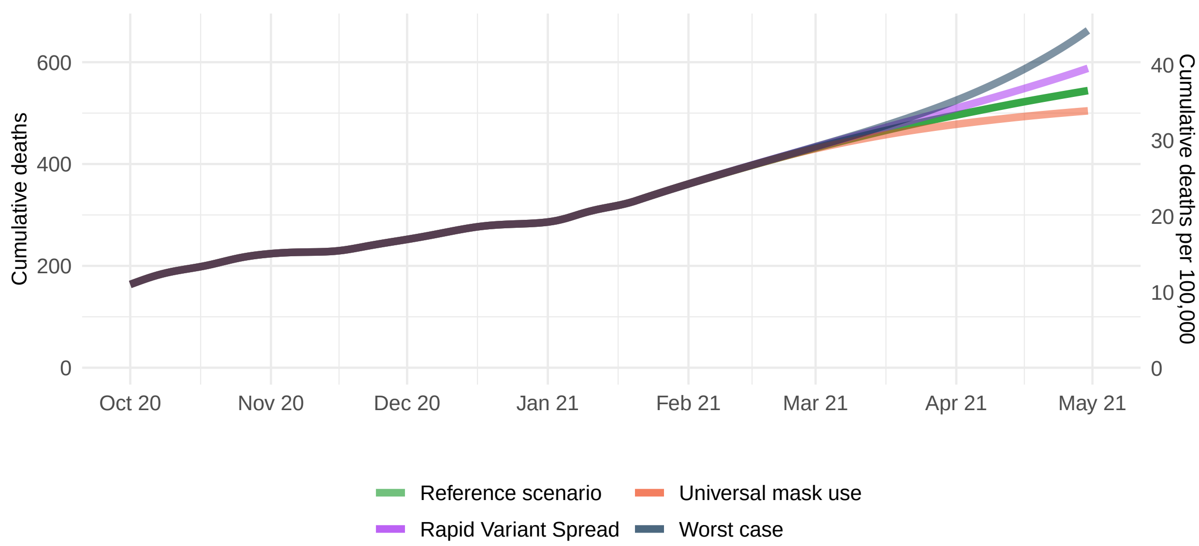


Figure 14. Daily COVID-19 deaths until May 01, 2021 for four scenarios

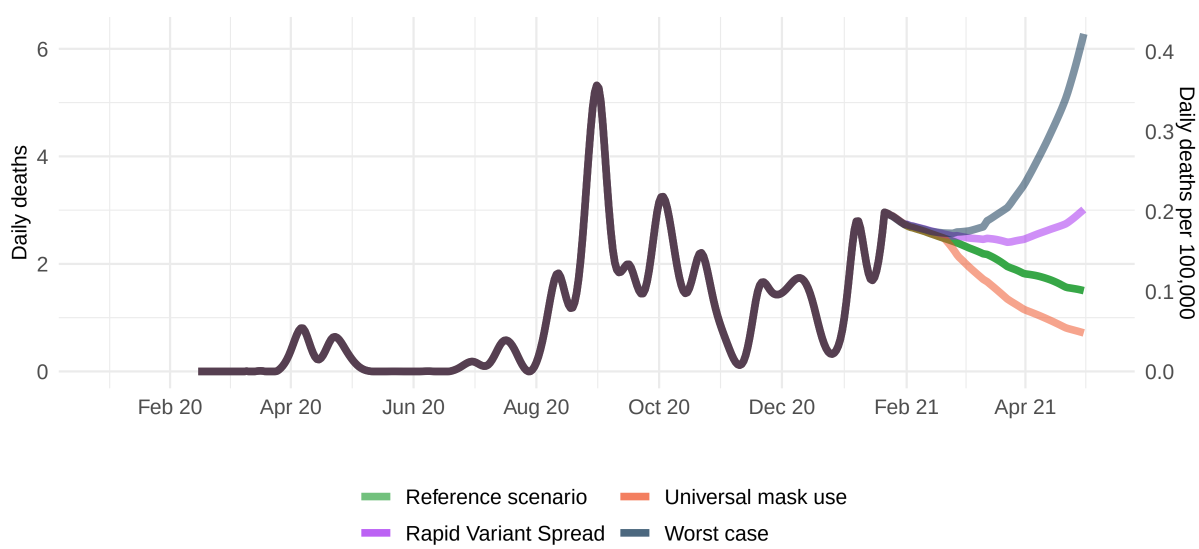


Figure 15. Daily COVID-19 infections until May 01, 2021 for four scenarios

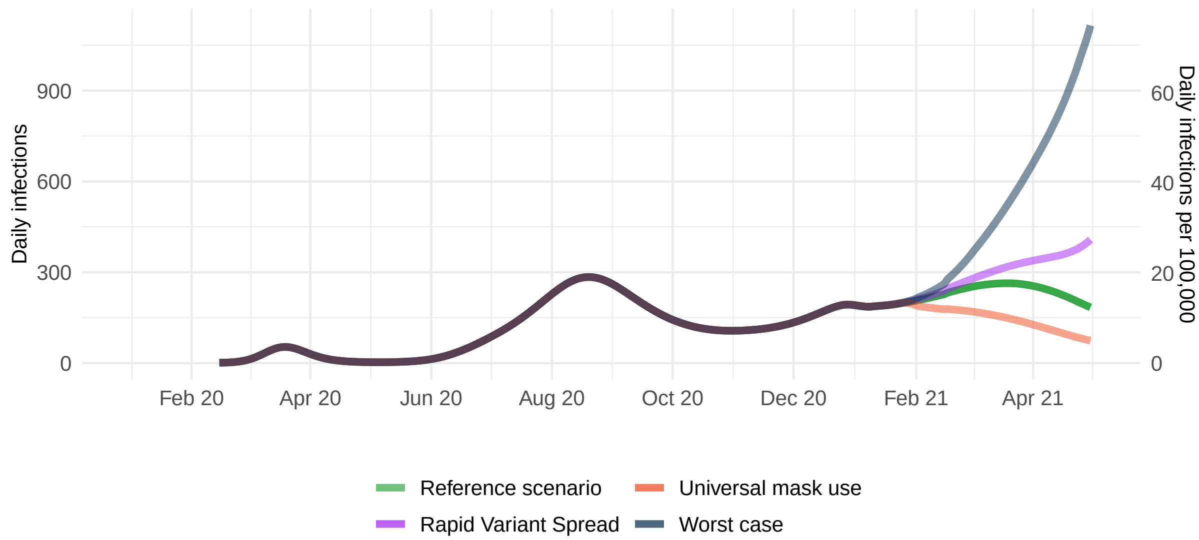


Figure 16. Estimated percentage immune based on cumulative infections and vaccinations. We assume that vaccine impact on transmission is 50% of the vaccine effectiveness for severe disease

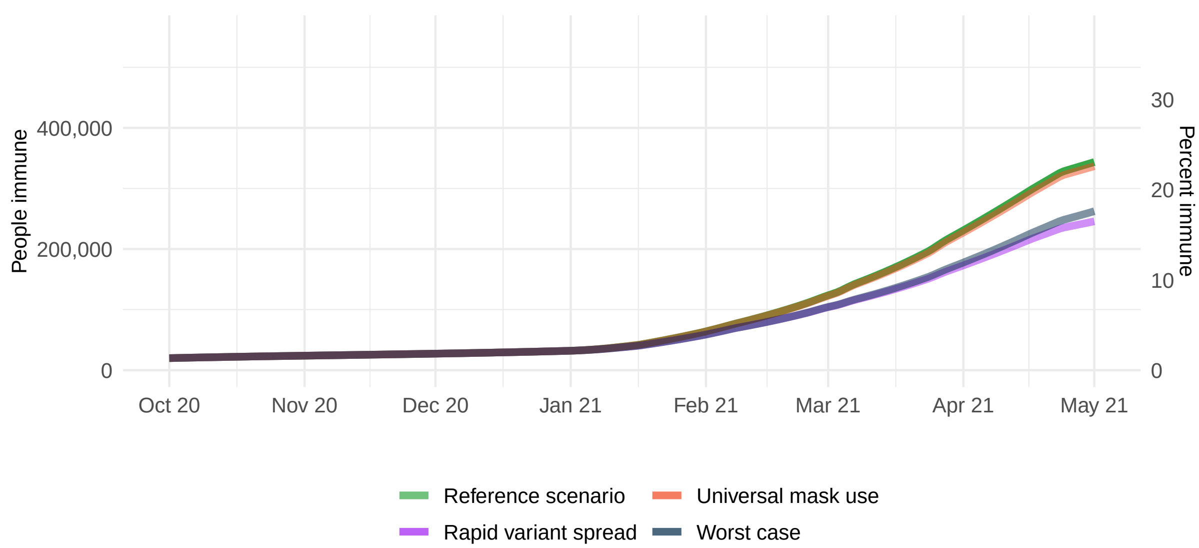


Figure 17. Month of assumed mandate re-implementation. We assume that governments adapt their response by re-imposing social distancing mandates for 6 weeks whenever daily deaths reach 8 per million, unless a location has already spent at least 7 of the last 14 days with daily deaths above this rate and not yet re-imposed social distancing mandates, in which case mandates are assumed to be re-imposed when daily deaths reach 15 per million.

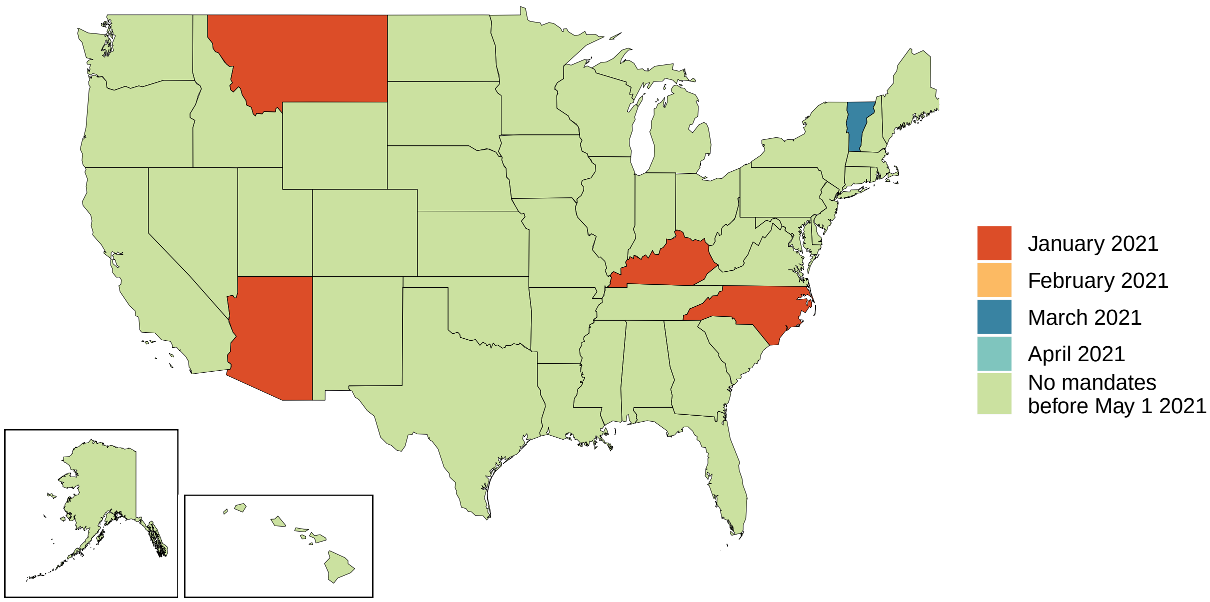


Figure 18. Forecasted percent infected with COVID-19 on May 01, 2021

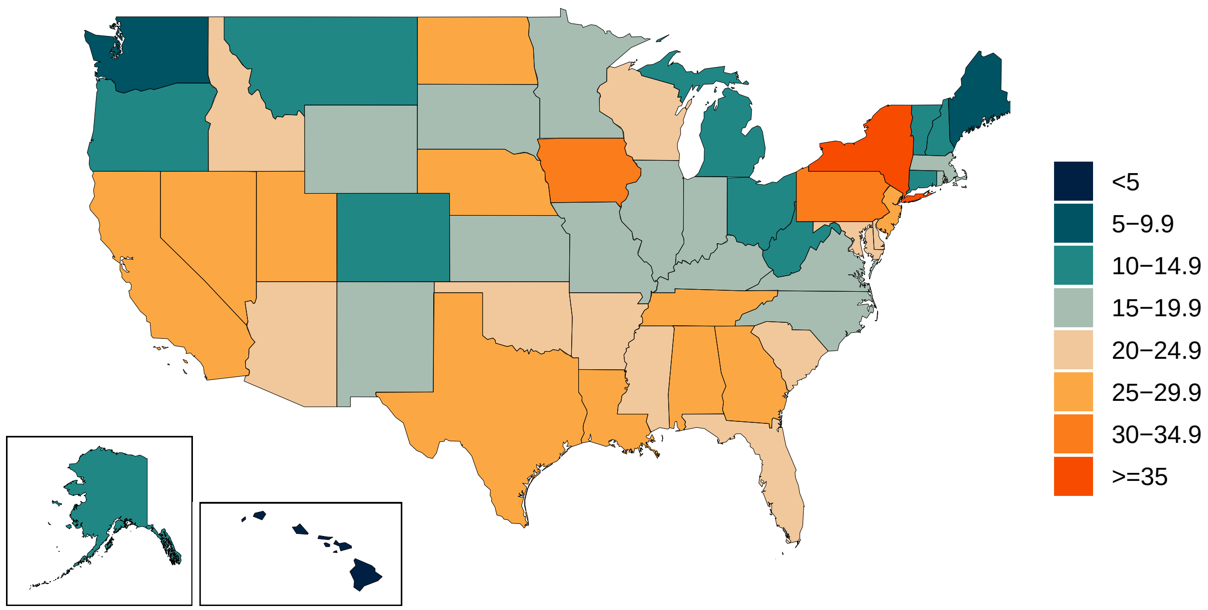


Figure 19. Daily COVID-19 deaths per million forecasted on May 01, 2021 in the reference scenario

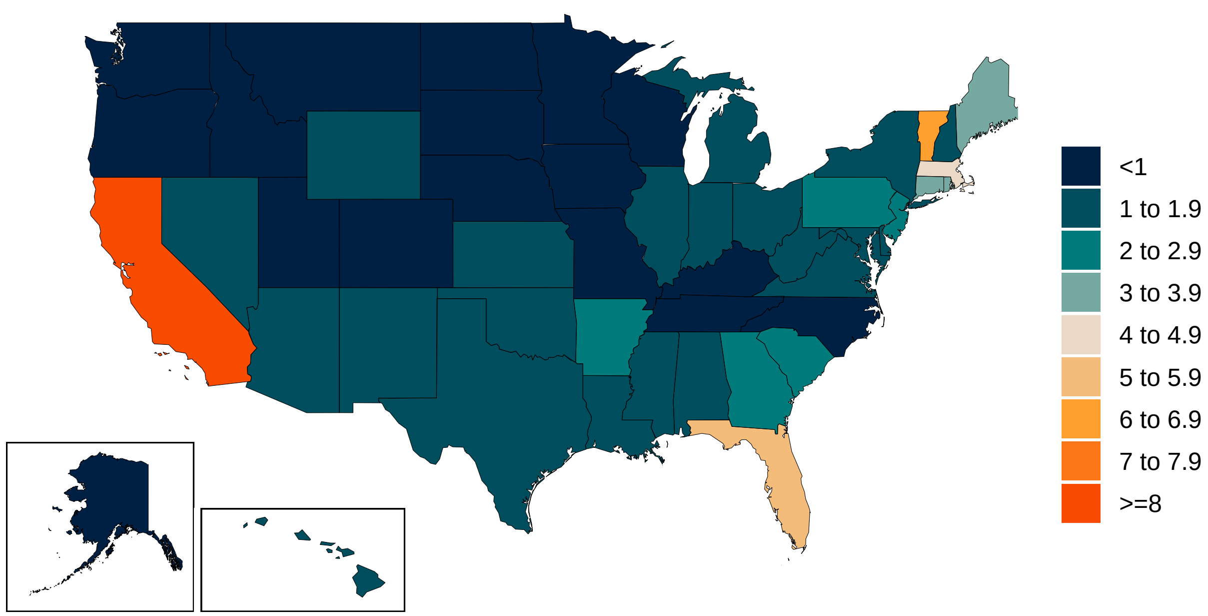


Figure 20. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), 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 availble locations in that region.

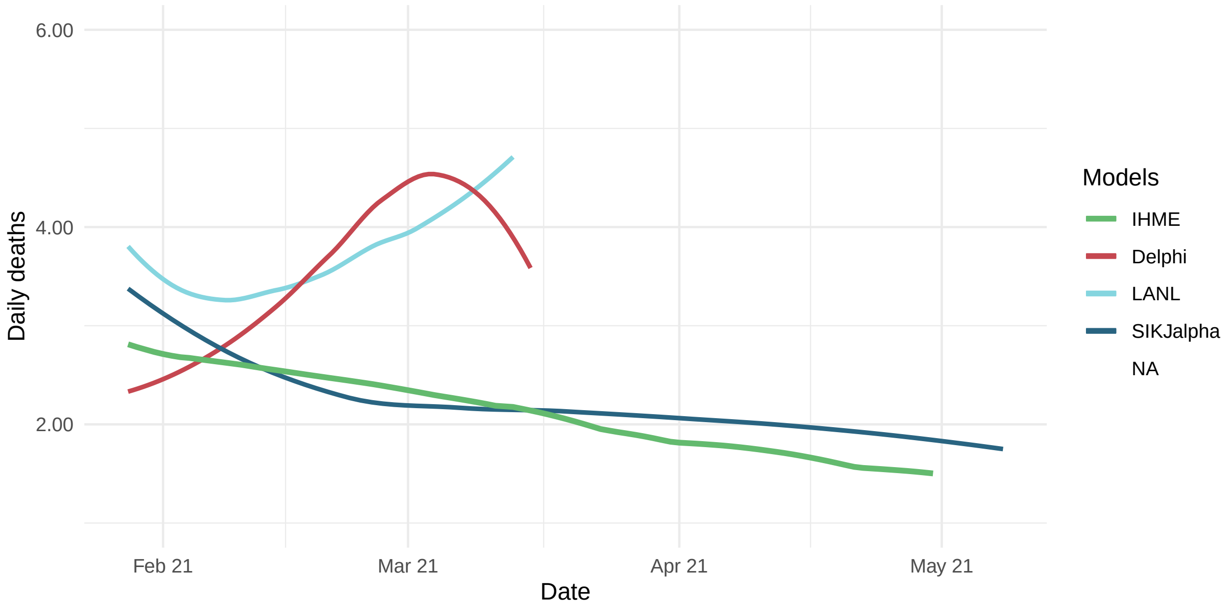


Figure 21. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and greater than 20% is considered *extreme stress*.

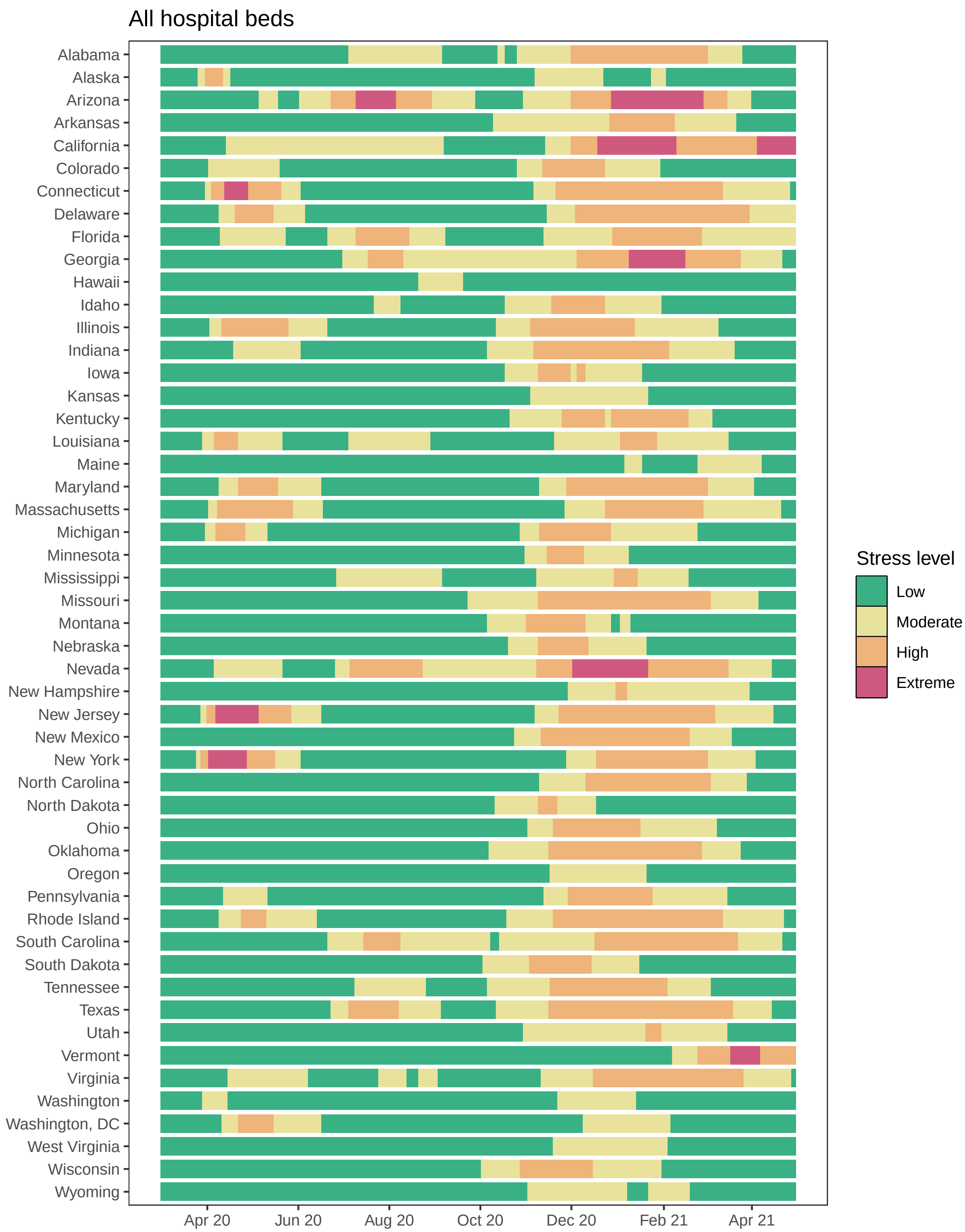


Figure 22. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *moderate stress*, 30-59% is considered *high stress*, and greater than 60% is considered *extreme stress*.

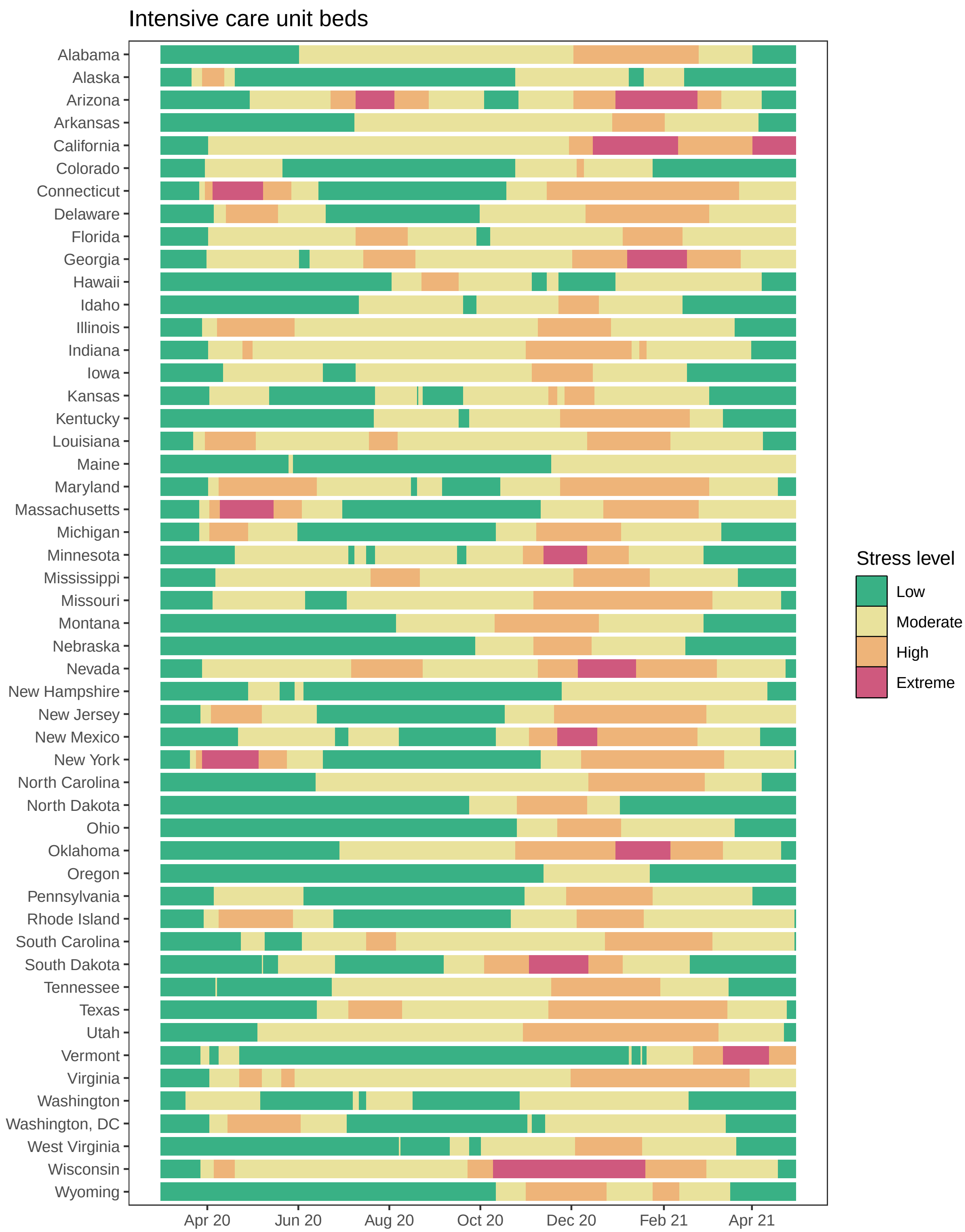


Table 3. Ranking of COVID-19 among the leading causes of mortality in the full year 2020. Deaths from COVID-19 are projections of cumulative deaths on Jan 1, 2021 from the reference scenario. Deaths from other causes are from the Global Burden of Disease study 2019 (rounded to the nearest 100).

Cause name	Annual deaths	Ranking
Ischemic heart disease	2,000	1
Alzheimer's disease and other dementias	1,000	2
Stroke	1,000	3
Tracheal, bronchus, and lung cancer	800	4
Lower respiratory infections	600	5
Chronic obstructive pulmonary disease	500	6
Chronic kidney disease	500	7
Colon and rectum cancer	400	8
Pancreatic cancer	300	9
COVID-19	286	10

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.