COVID-19 Results Briefing

Colorado

December 10, 2020

This document contains summary information on the latest projections from the IHME model on COVID-19 in Colorado. The model was run on December 08, 2020.

Current situation

- Daily reported cases in the last week decreased to 4,200 per day on average compared to 5,100 the week before (Figure 1).
- Daily deaths in the last week decreased to 40 per day on average compared to 40 the week before (Figure 2). This makes COVID-19 the number 1 cause of death in Colorado this week (Table 1).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 15 states (Figure 3). The Effective R in Colorado on November 26 was 0.94.
- We estimated that 13% of people in Colorado have been infected as of December 07 (Figure 4).
- The daily death rate is greater than 4 per million in Alabama, Arizona, Arkansas, Colorado, Connecticut, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, West Virginia, Wisconsin, and Wyoming (Figure 6).

Trends in drivers of transmission

- In the last week, no new mandates have been imposed. No mandates have been lifted this week (Table 2).
- Mobility last week was 42% lower than the pre-COVID-19 baseline (Figure 8). Mobility was near baseline (within 10%) in no locations. Mobility was lower than 30% of baseline in California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, the District of Columbia, Utah, Vermont, Virginia, and Washington.
- As of December 07 we estimated that 75% of people always wore a mask when leaving their home (Figure 9) compared to 75% last week. Mask use was lower than 50% in Wyoming.
- There were 314 diagnostic tests per 100,000 people on December 07 (Figure 10).
- The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 68% in Alabama to 84% in California. (Figure 12)
- 1.65 million are expected to be vaccinated by April 1st. (Figure 13) With faster scale-up, the number vaccinated could reach 3.91 million.

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 7,000 cumulative deaths on April 1, 2021. This represents 4,000 additional deaths from December 07 to April 1st (Figure 14). Daily deaths will peak at 50 on January 29, 2021 (Figure 15).
- The reference scenario assumes that 32 states will re-impose mandates by April 1, 2021.
- If **universal mask coverage (95%)** were attained in the next week, our model projects 1,000 fewer cumulative deaths compared to the reference scenario on April 1, 2021.
- Under our **mandates easing scenario**, our model projects 9,000 cumulative deaths on April 1, 2021.

- By April 1 2021, we project that 600 lives will be saved by the projected vaccine rollout. If rapid rollout of vaccine is achieved, 1,000 lives will be saved compared to a no vaccine scenario. Rapid rollout targeting high-risk individuals only could save, compared to a no vaccine scenario, 1,200 lives.
- Figure 21 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.
- 42 states will have high or extreme stress on hospital beds at some point in December through February (Figure 22). 48 states will have high or extreme stress on ICU capacity in December through February (Figure 23).

Model updates

See the briefs for December 4th (https://www.healthdata.org/covid/updates/archive) for details on how vaccination has been incorporated into our reference and alternative scenarios. In this week's release, we have revised some assumptions on vaccination based on the Pfizer FDA authorization filing. Using that new information, we now assume that 8 days after the first dose, the vaccine becomes 50% effective, increasing to 95% after the second dose.

Current situation

Figure 1. Reported daily COVID-19 cases

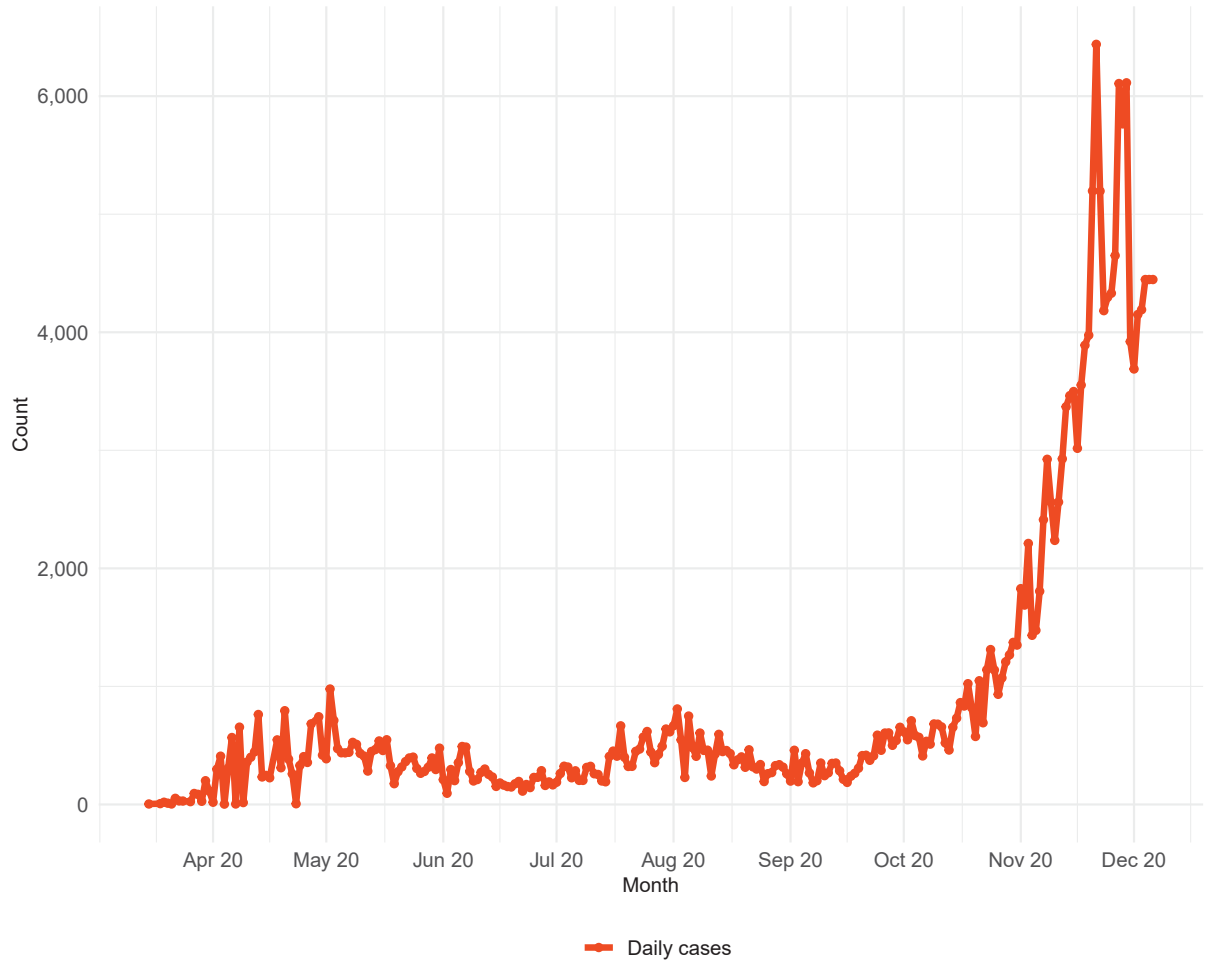


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	255	1
Ischemic heart disease	118	2
Chronic obstructive pulmonary disease	64	3
Stroke	49	4
Tracheal, bronchus, and lung cancer	45	5
Alzheimer's disease and other dementias	40	6
Chronic kidney disease	24	7
Cirrhosis and other chronic liver diseases	23	8
Colon and rectum cancer	22	9
Self-harm	21	10

Figure 2a. Reported daily COVID-19 deaths

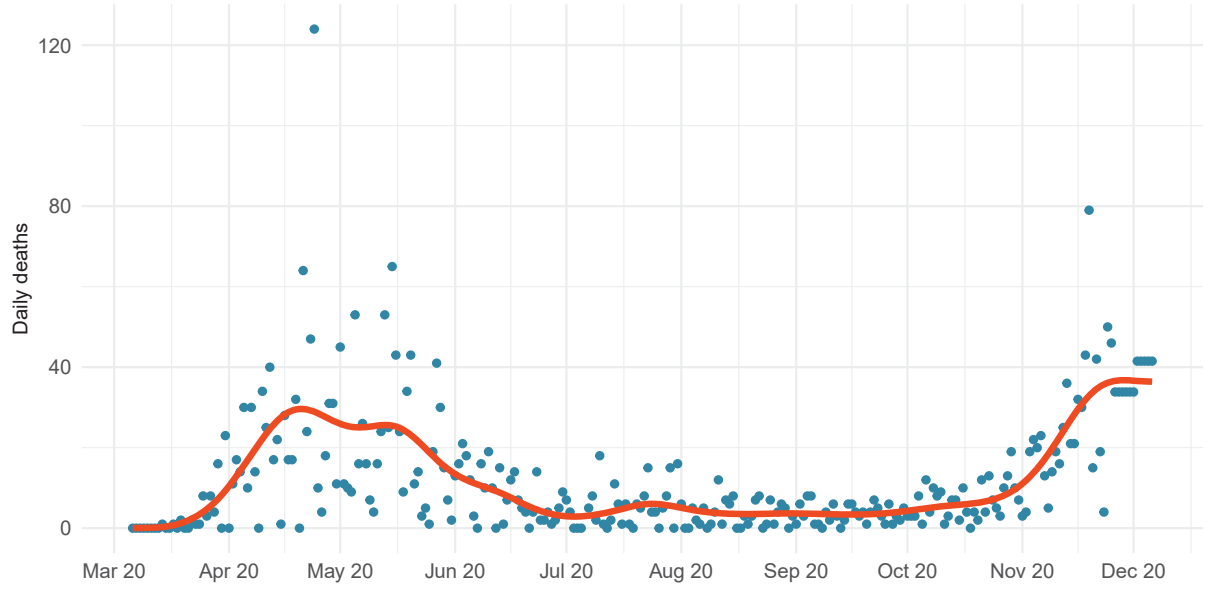


Figure 2b. Estimated cumulative deaths by age group

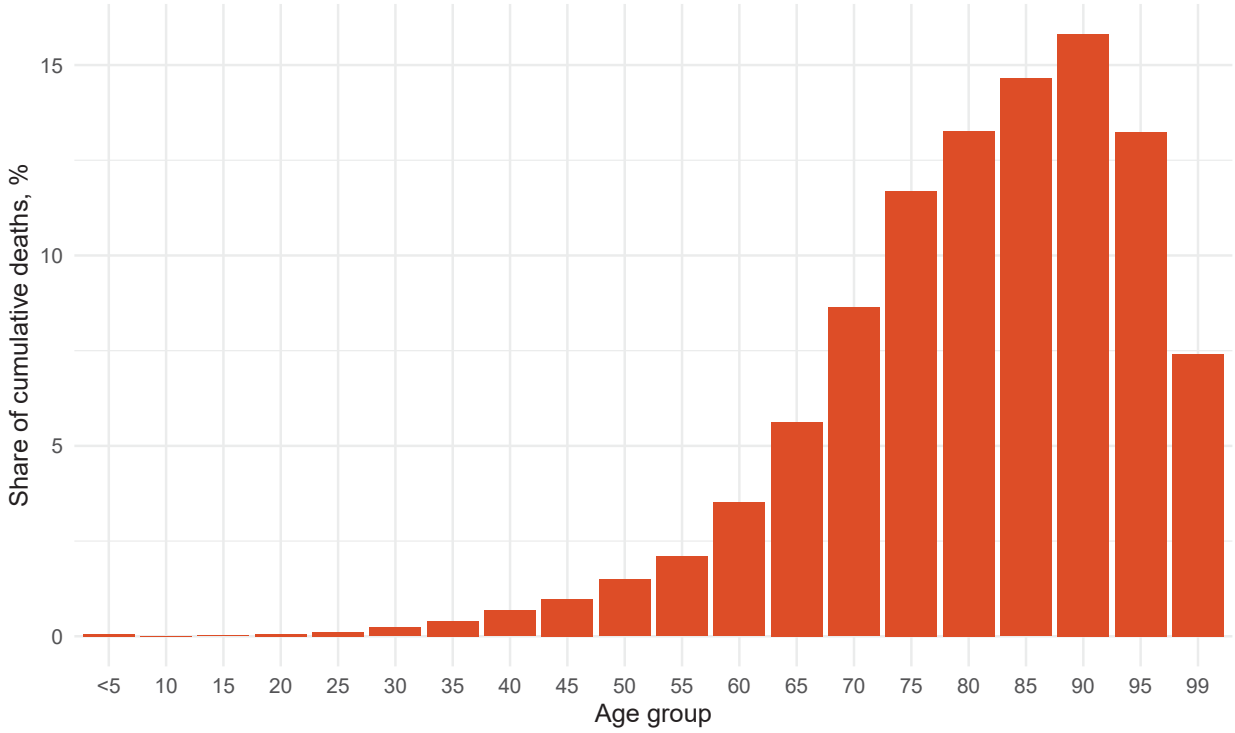


Figure 3. Mean effective R on November 26, 2020. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline, all other things being held the same.

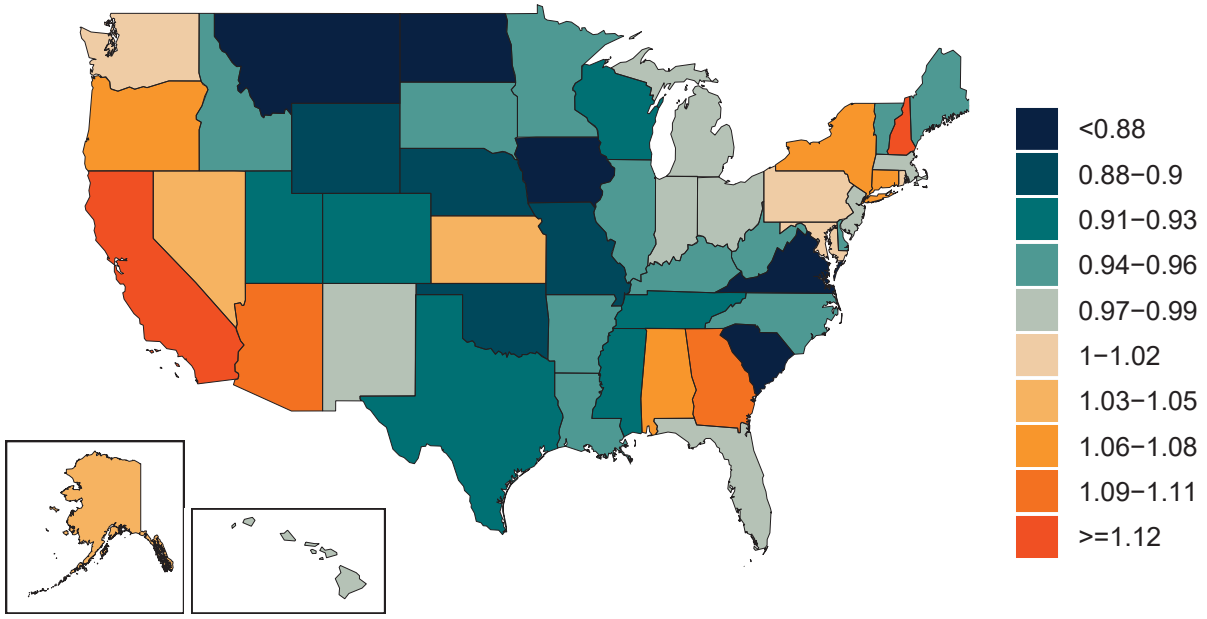


Figure 4. Estimated percent of the population infected with COVID-19 on December 07, 2020

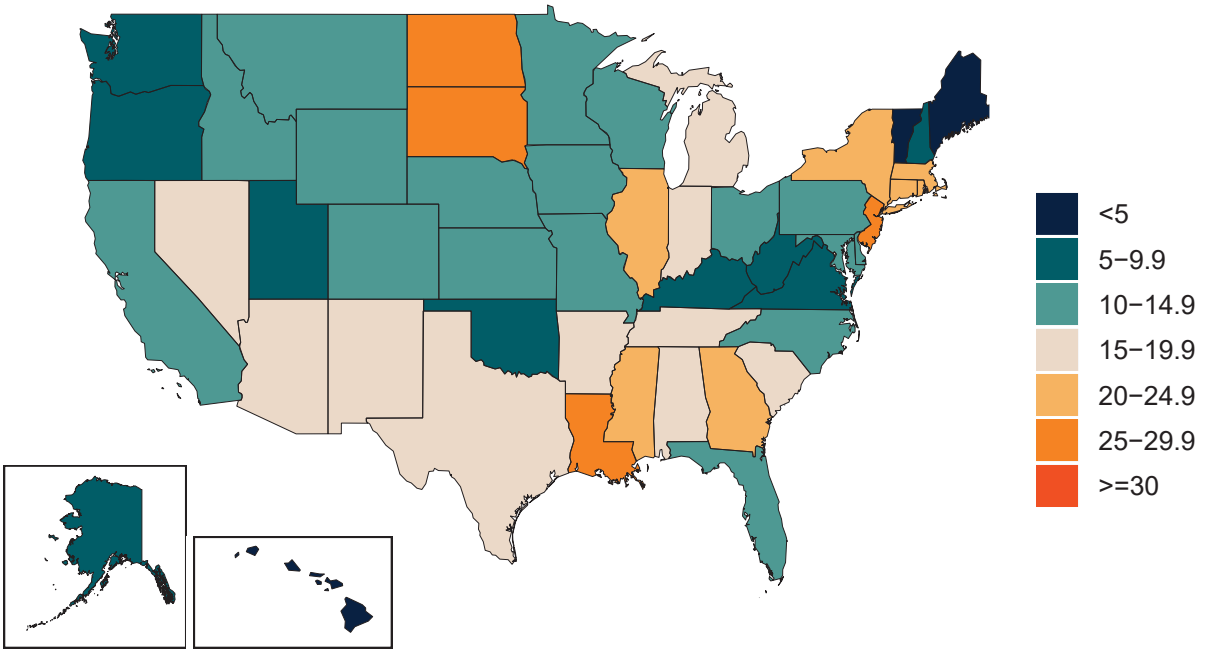


Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.

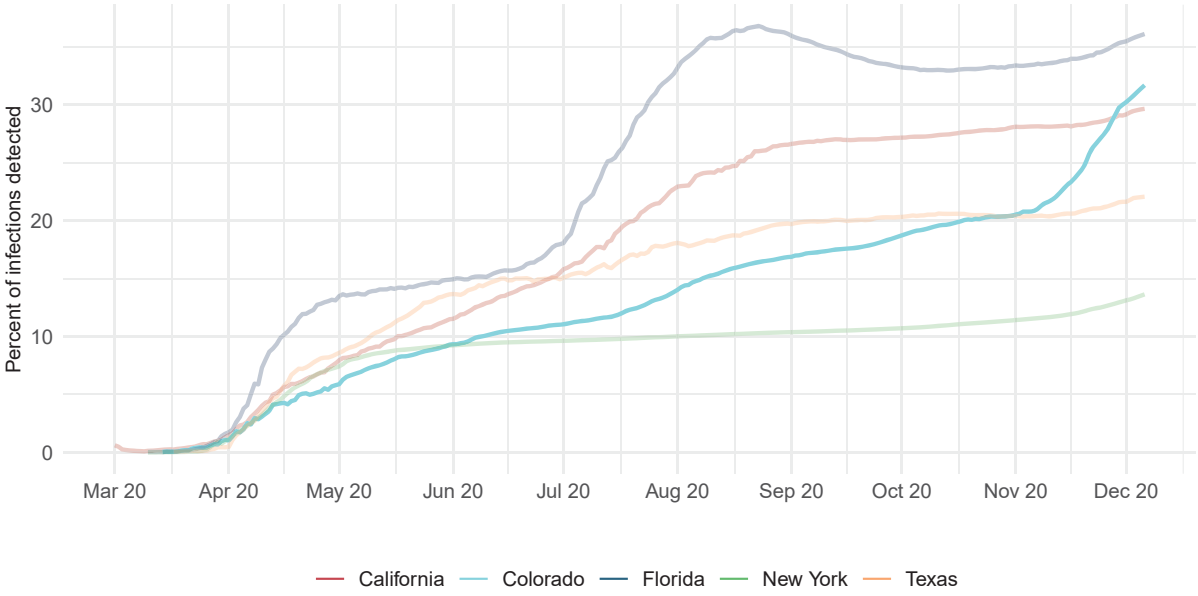
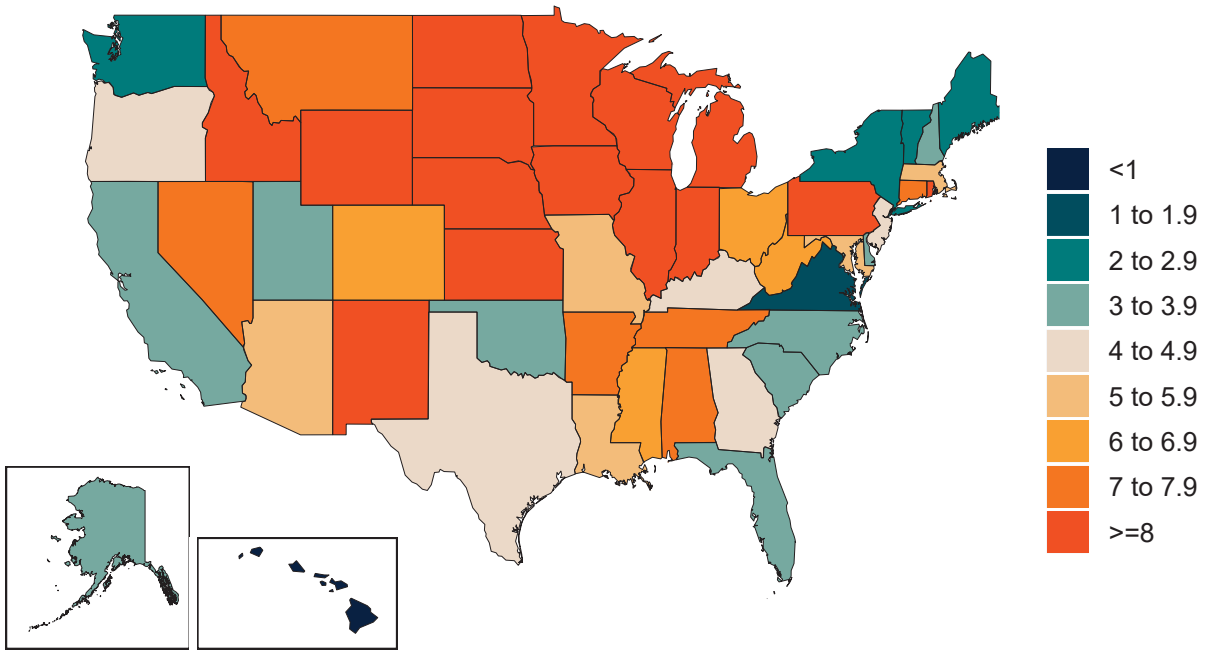


Figure 6. Daily COVID-19 death rate per 1 million on December 07, 2020



Critical drivers

Table 2. Current mandate implementation

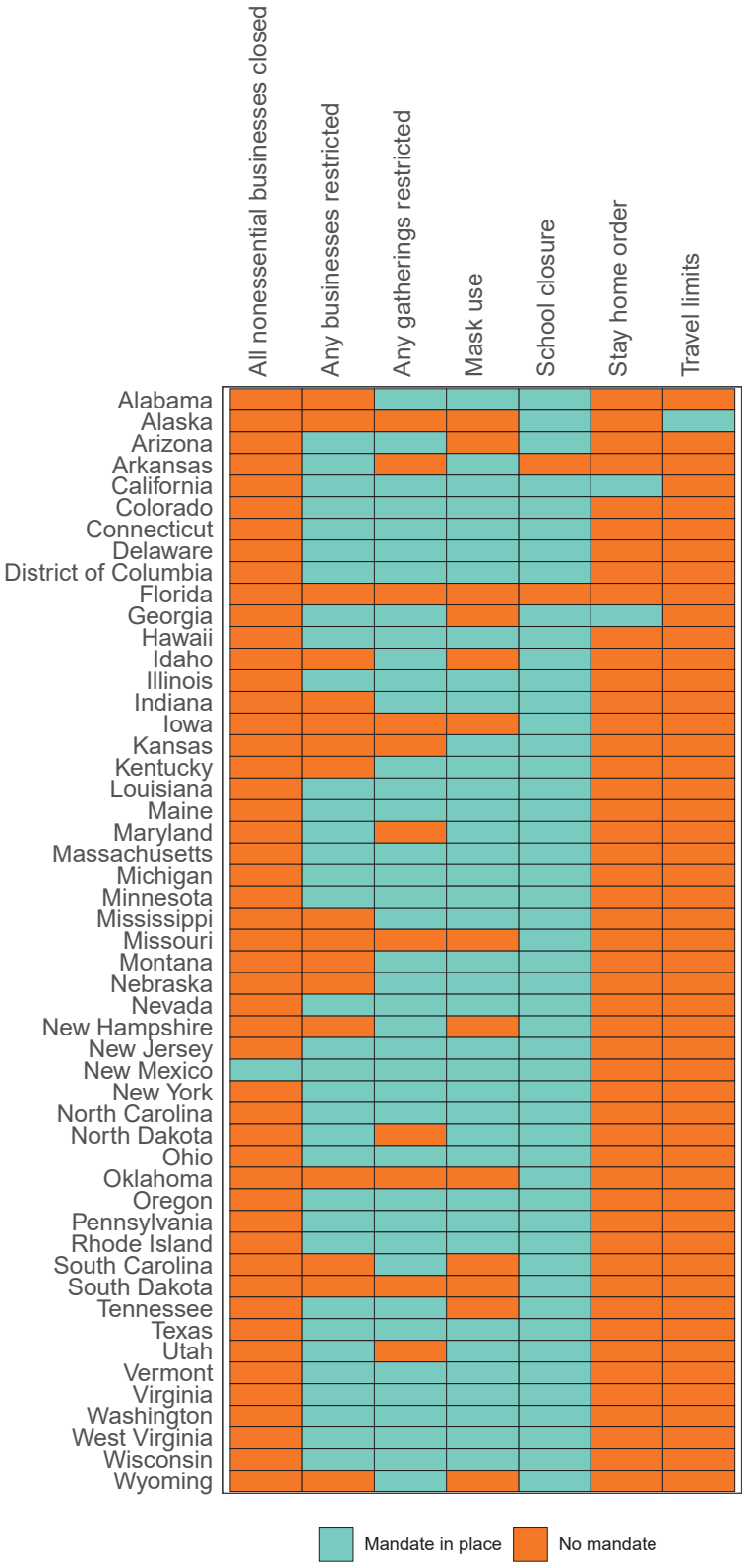


Figure 7. Total number of social distancing mandates (including mask use)

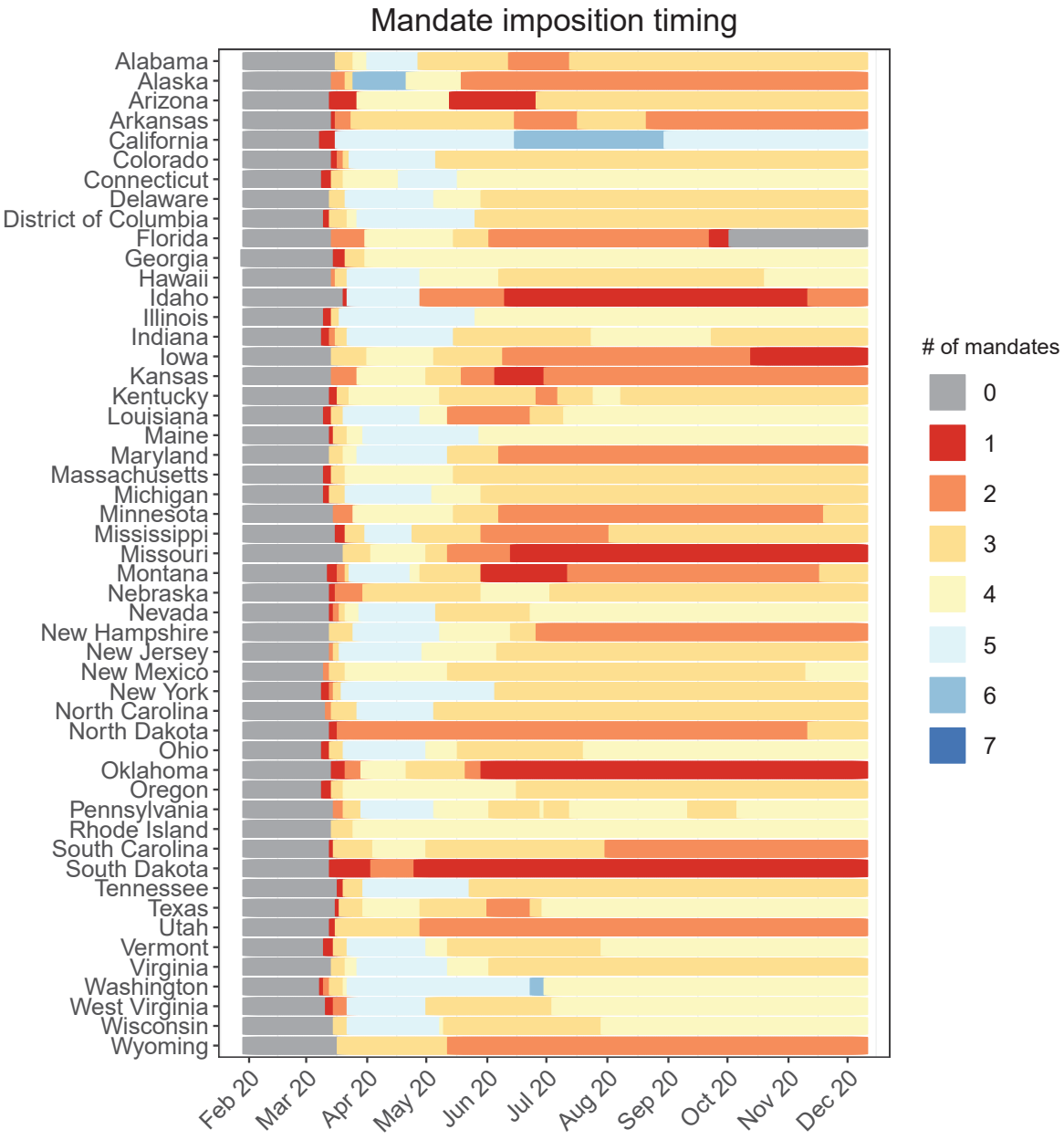


Figure 8a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

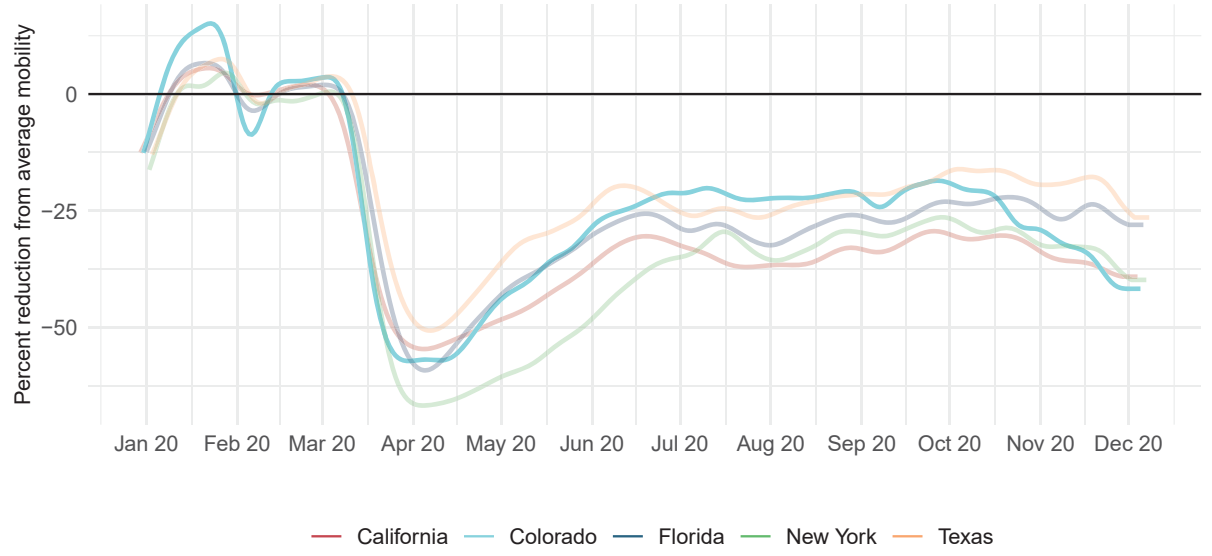


Figure 8b. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on December 07, 2020

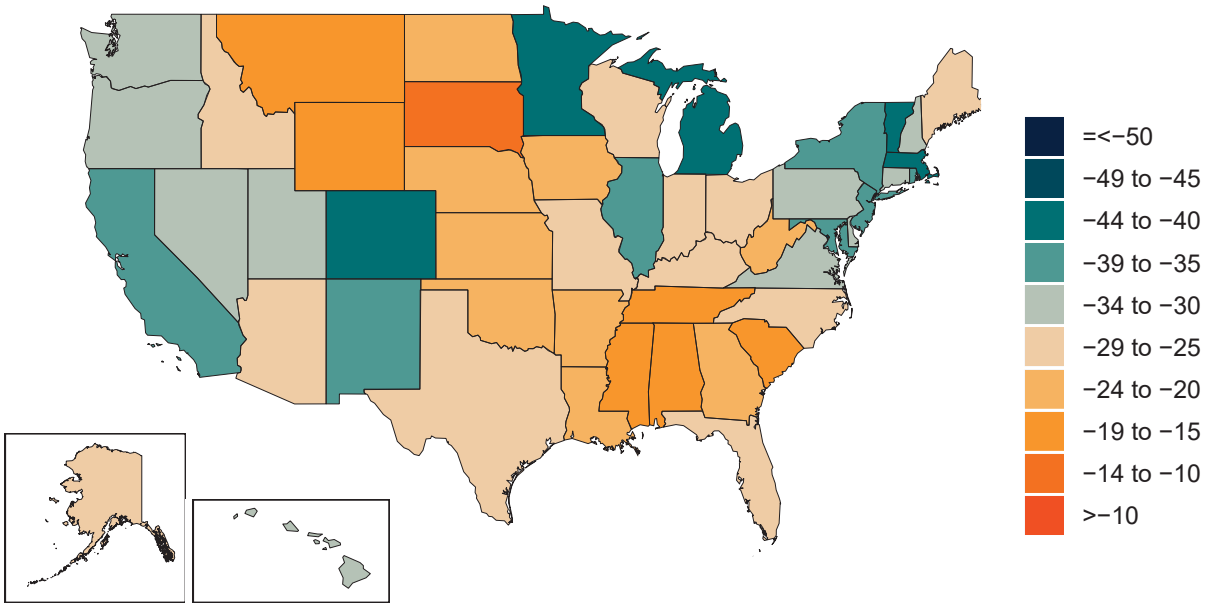


Figure 9a. Trend in the proportion of the population reporting always wearing a mask when leaving home

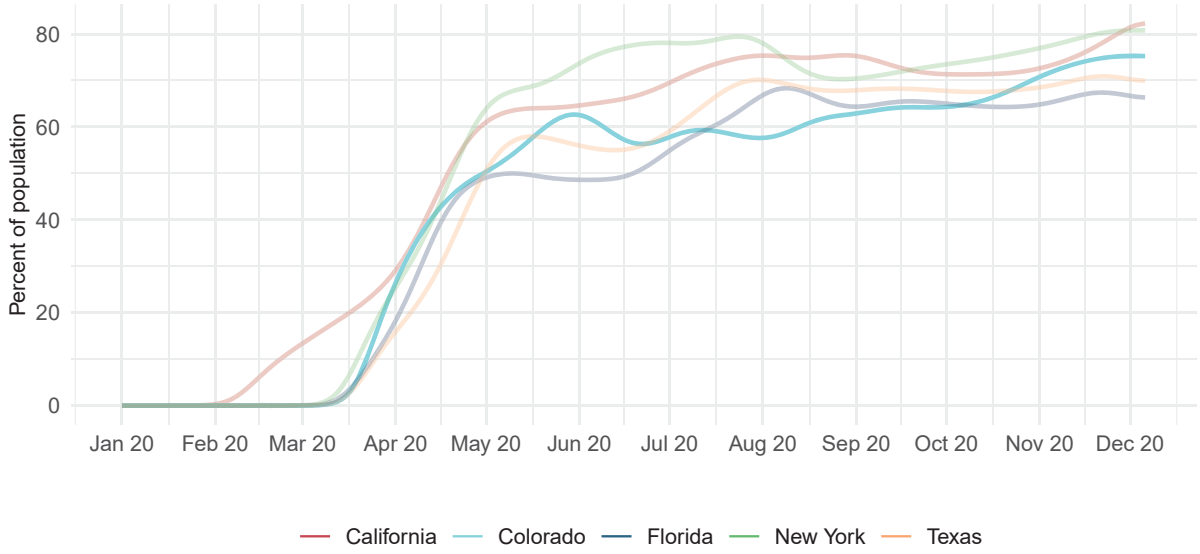


Figure 9b. Proportion of the population reporting always wearing a mask when leaving home on December 07, 2020

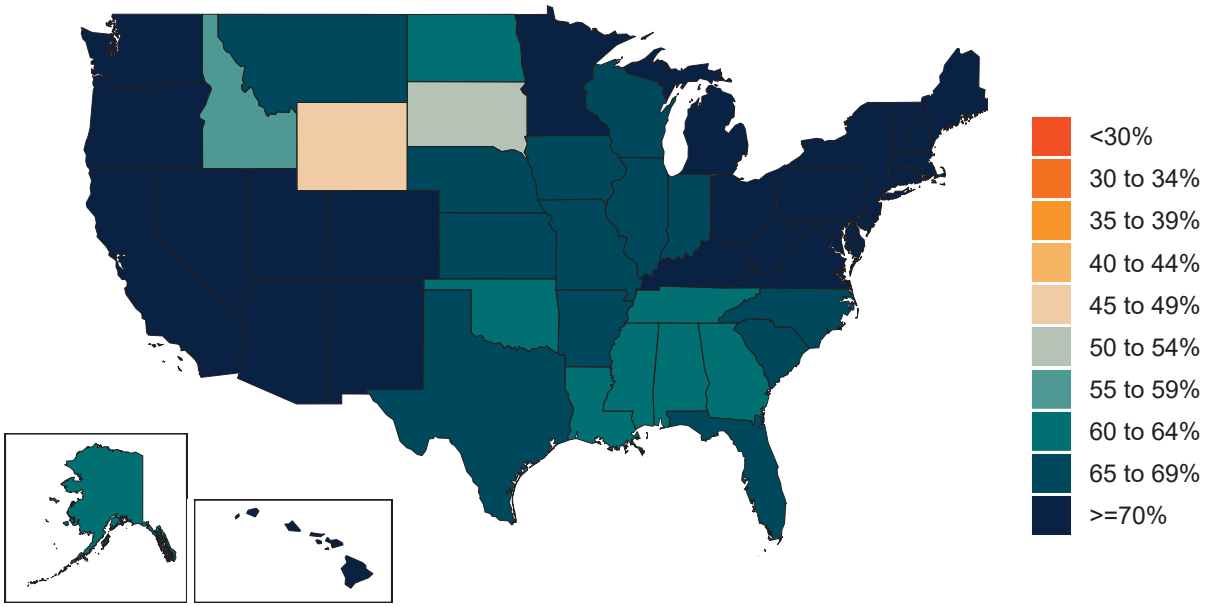


Figure 10a. Trend in COVID-19 diagnostic tests per 100,000 people

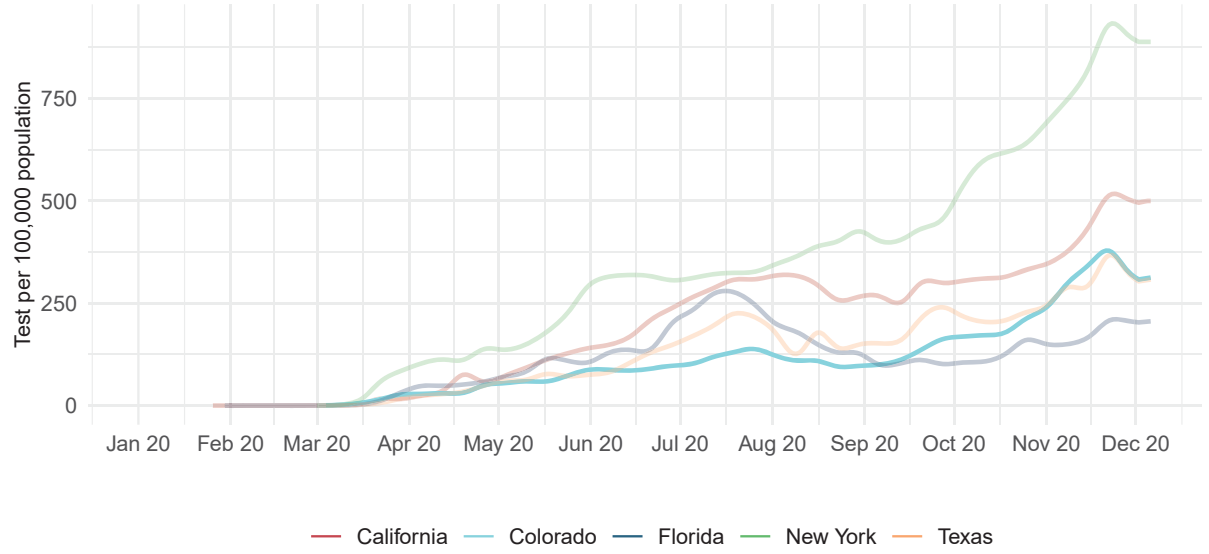


Figure 10b. COVID-19 diagnostic tests per 100,000 people on December 02, 2020

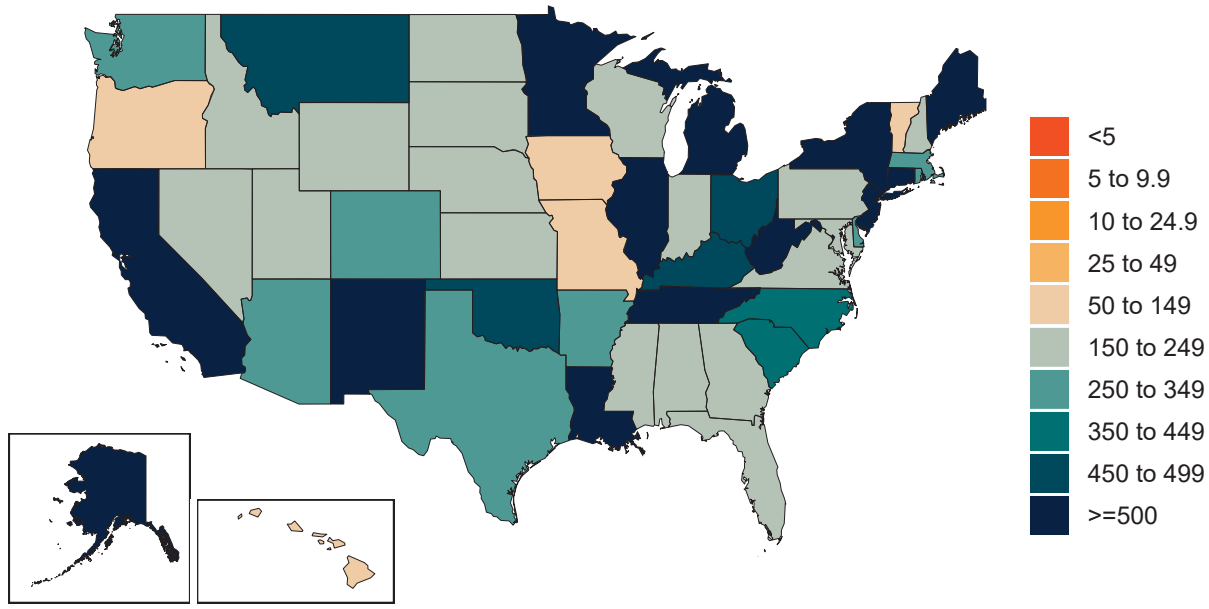


Figure 11. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

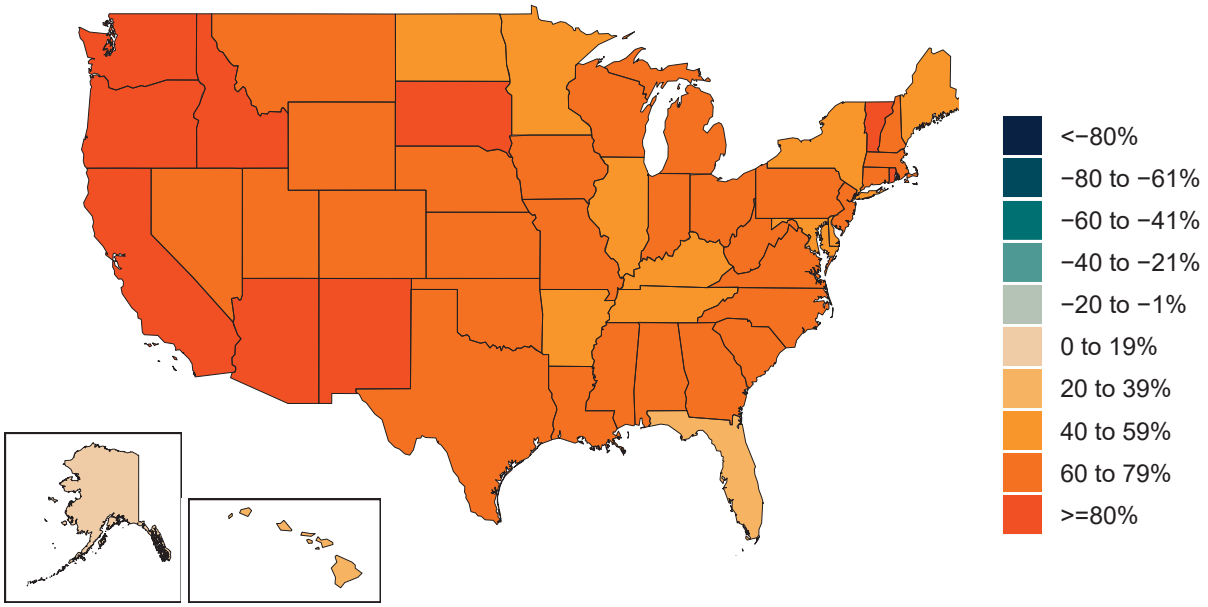


Figure 12. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses

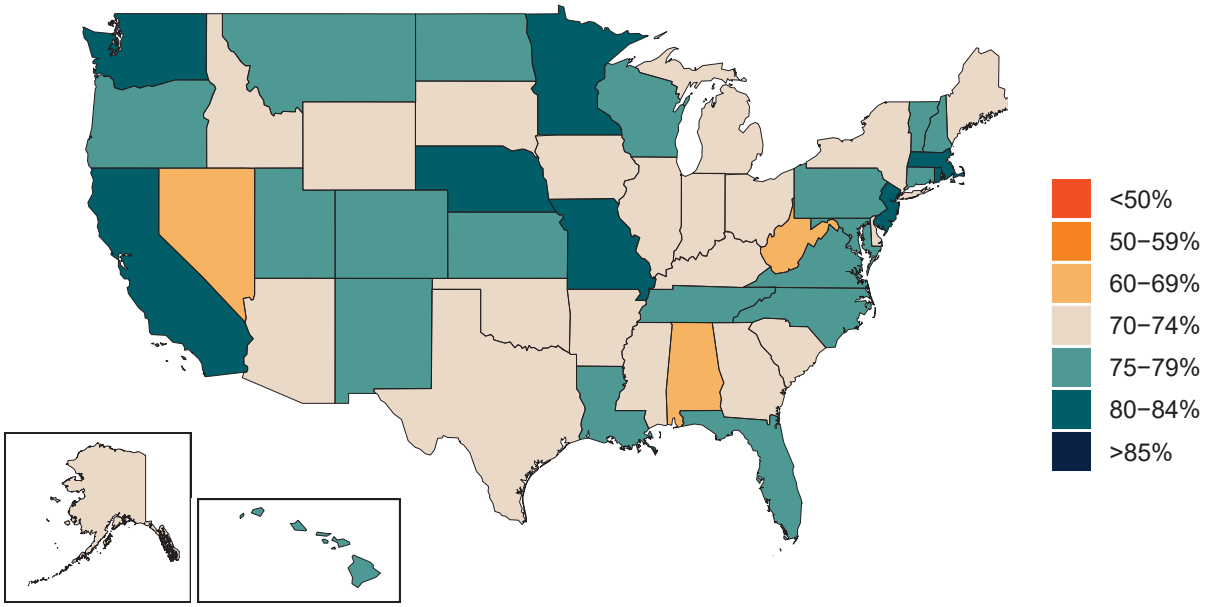
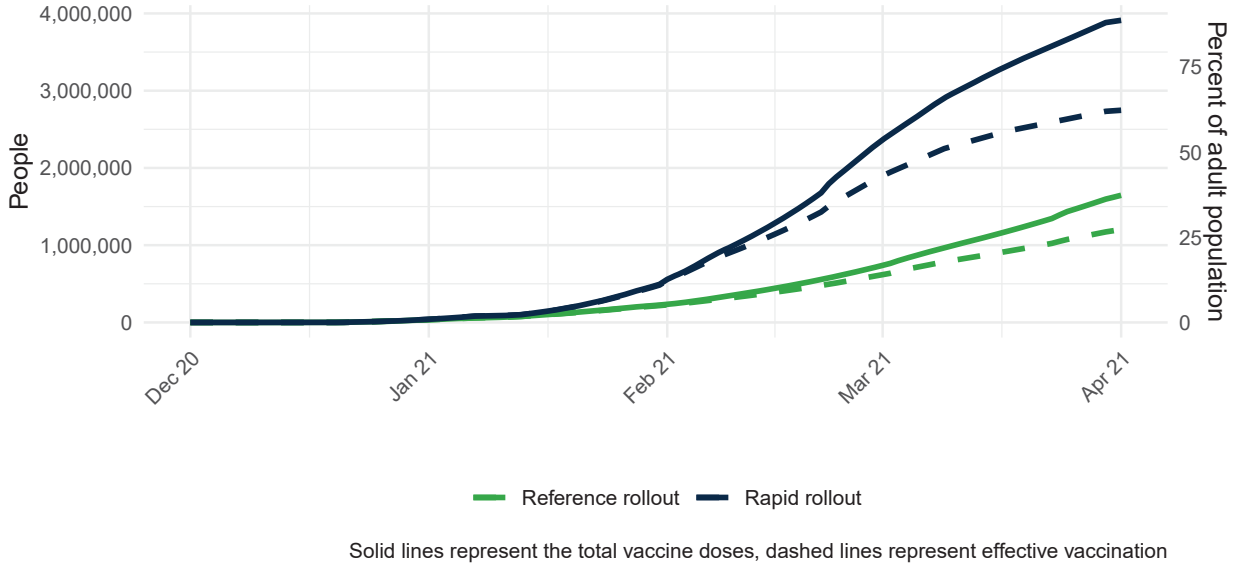


Figure 13. The number of people who receive any vaccine and those that are immune accounting for efficacy, loss to follow up for 2 dose vaccines, and a 28 day delay between first dose and immunity for 2 dose vaccines.



Projections and scenarios

We produce six scenarios when projecting COVID-19. The reference scenario is our forecast of what we think is most likely to happen. We assume that if the daily mortality rate from COVID-19 reaches 8 per million, social distancing (SD) mandates will be re-imposed. The mandate easing scenario is what would happen if governments continue to ease social distancing mandates with no re-imposition. The universal mask mandate scenario is what would happen if mask use increased immediately to 95% and social distancing mandates were re-imposed at 8 deaths per million. These three scenarios assume our reference vaccine delivery scale up where vaccine delivery will scale to full capacity over 90 days.

The rapid vaccine rollout scenario assumes that vaccine distribution will scale up to full delivery capacity in half the time as the reference delivery scenario and that the maximum doses that can be delivered per day is twice as much as the reference delivery scenario. The rapid vaccine rollout to high-risk populations scenario is the same but high-risk populations are vaccinated before essential workers or other adults. The no vaccine scenario is the same as our reference scenario but with no vaccine use.

Figure 14. Cumulative COVID-19 deaths until April 01, 2021 for six scenarios

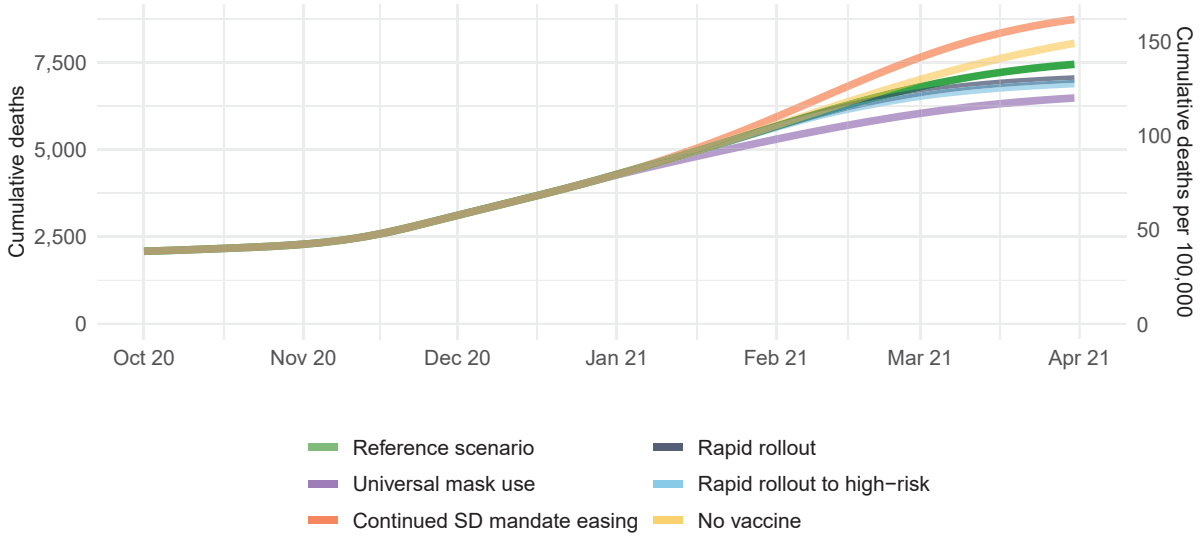


Figure 15. Daily COVID-19 deaths until April 01, 2021 for six scenarios

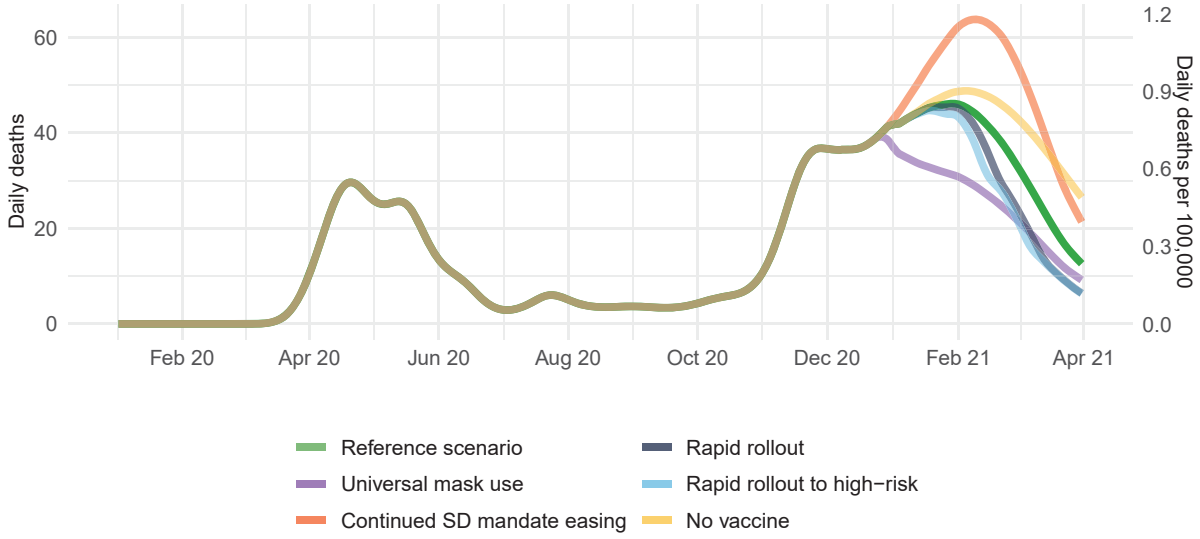


Figure 16. Daily COVID-19 infections until April 01, 2021 for six scenarios

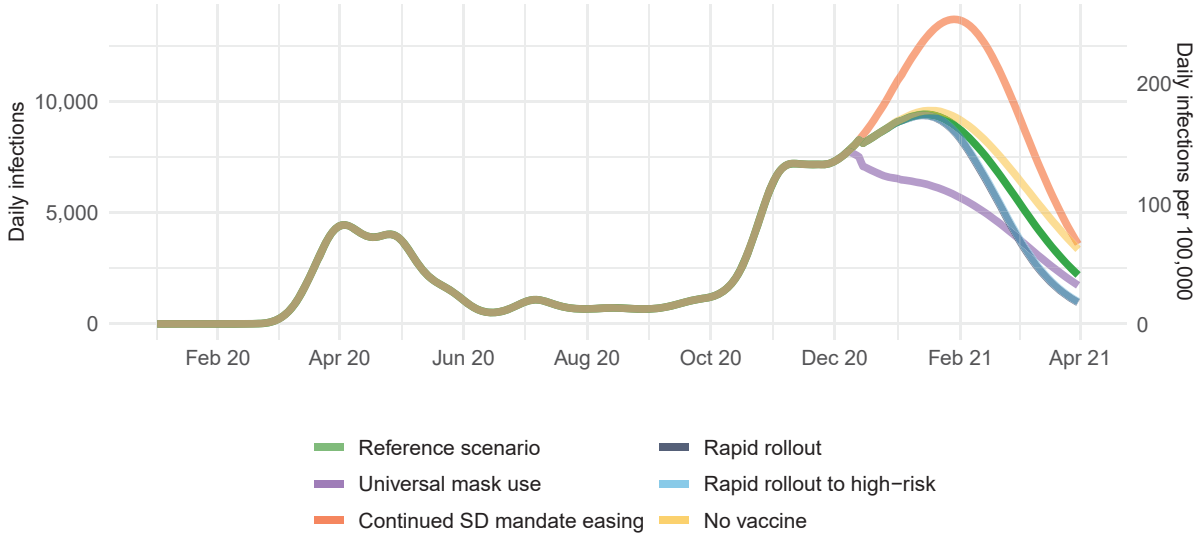


Figure 17. Susceptible population, accounting for infections and people immune through vaccination

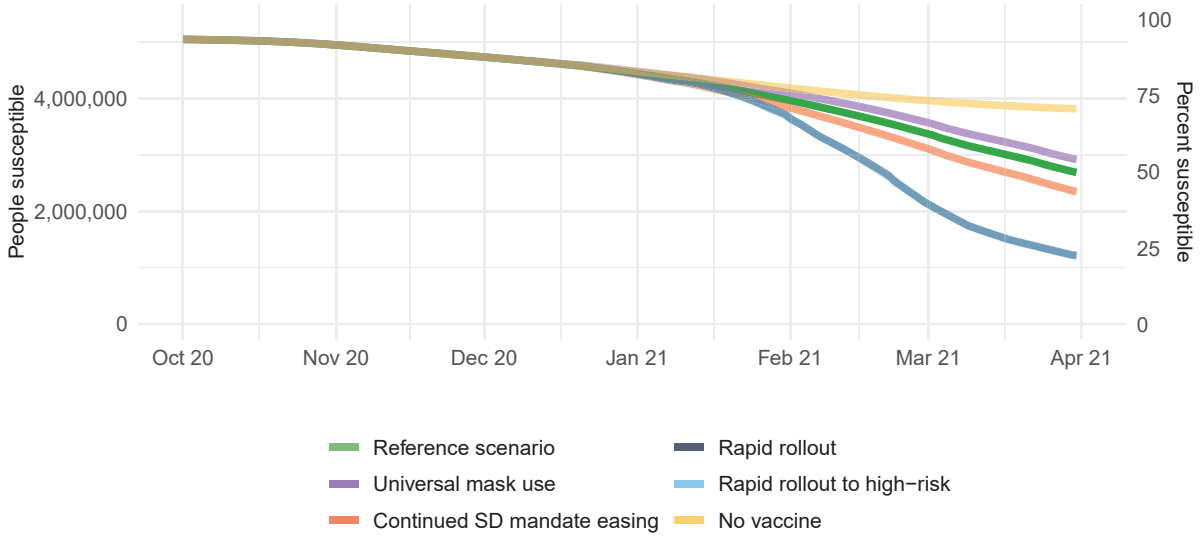


Figure 18. Month of assumed mandate re-implementation. (Month when daily death rate passes 8 per million, when reference scenario model assumes mandates will be re-imposed.)

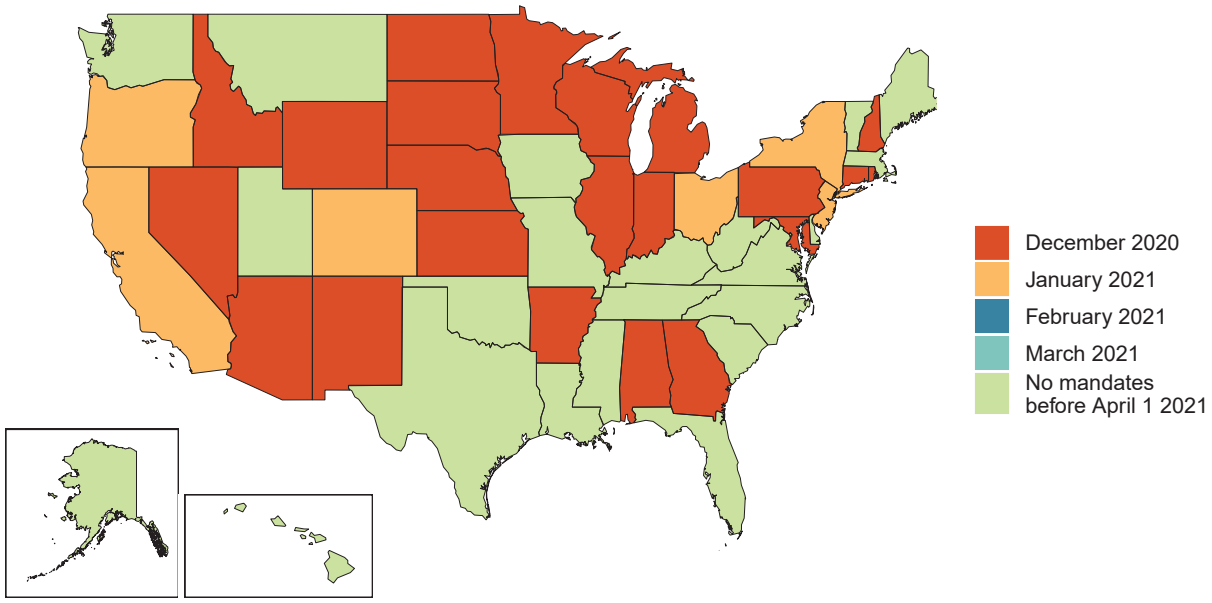


Figure 19. Forecasted percent infected with COVID-19 on April 01, 2021

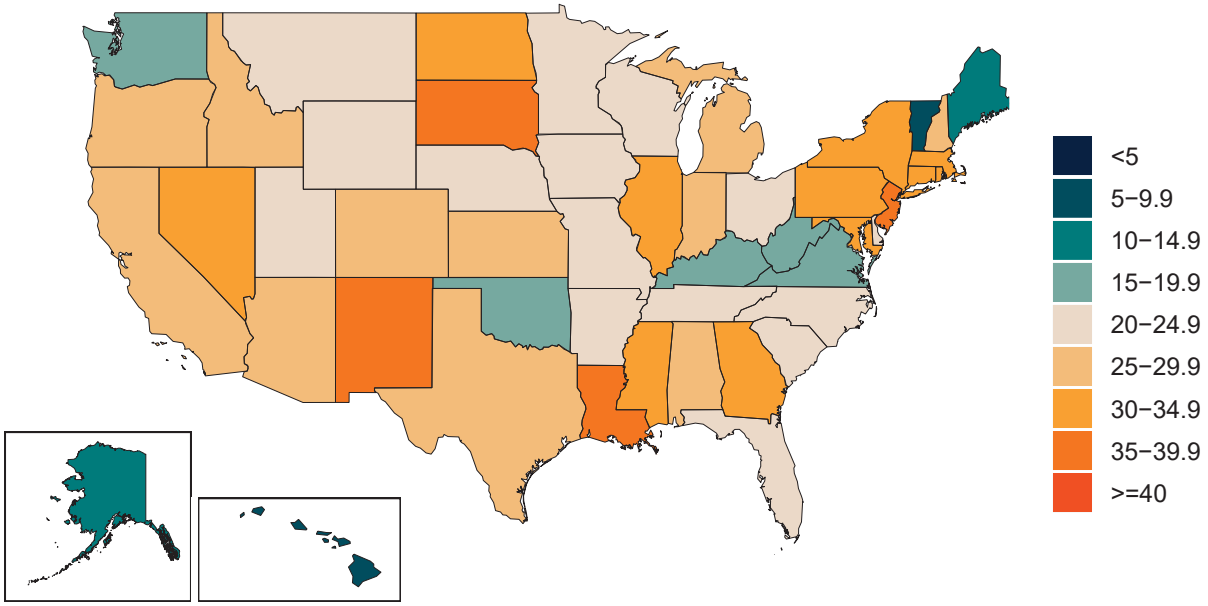


Figure 20. Daily COVID-19 deaths per million forecasted on April 01, 2021 in the reference scenario

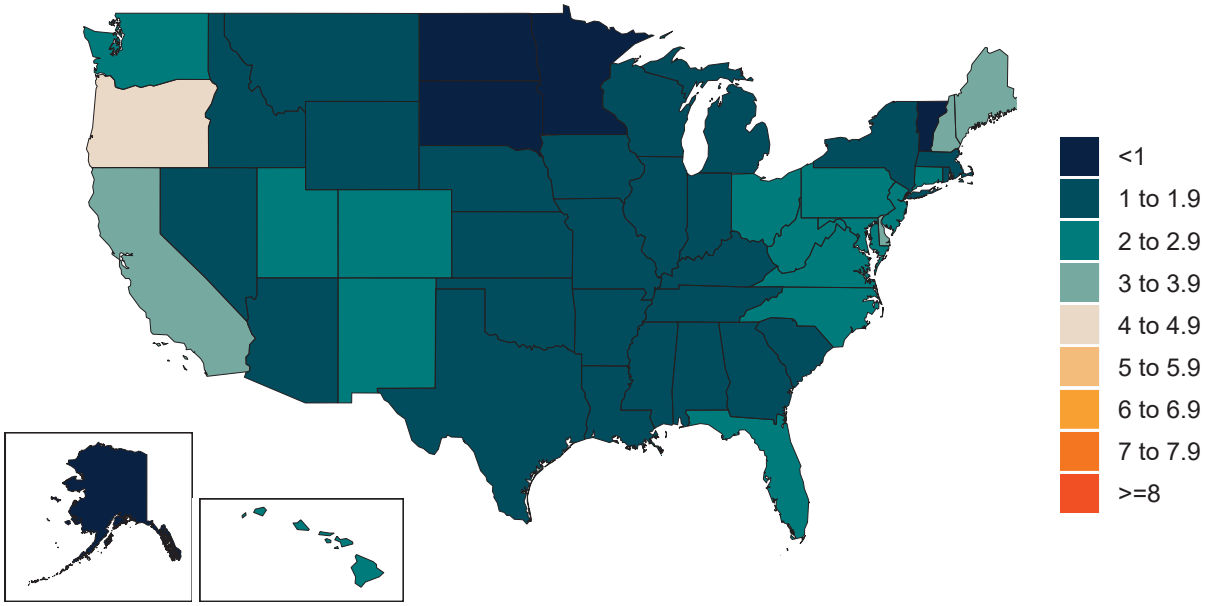


Figure 21. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), 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.

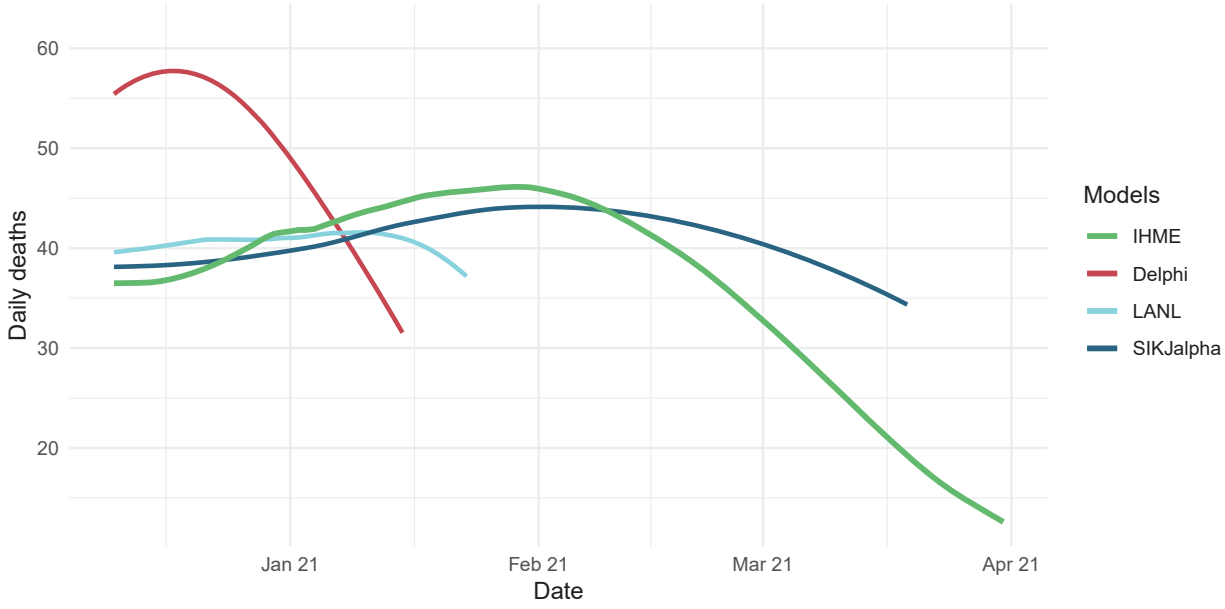


Figure 22. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and greater than 20% is considered *extreme stress*.

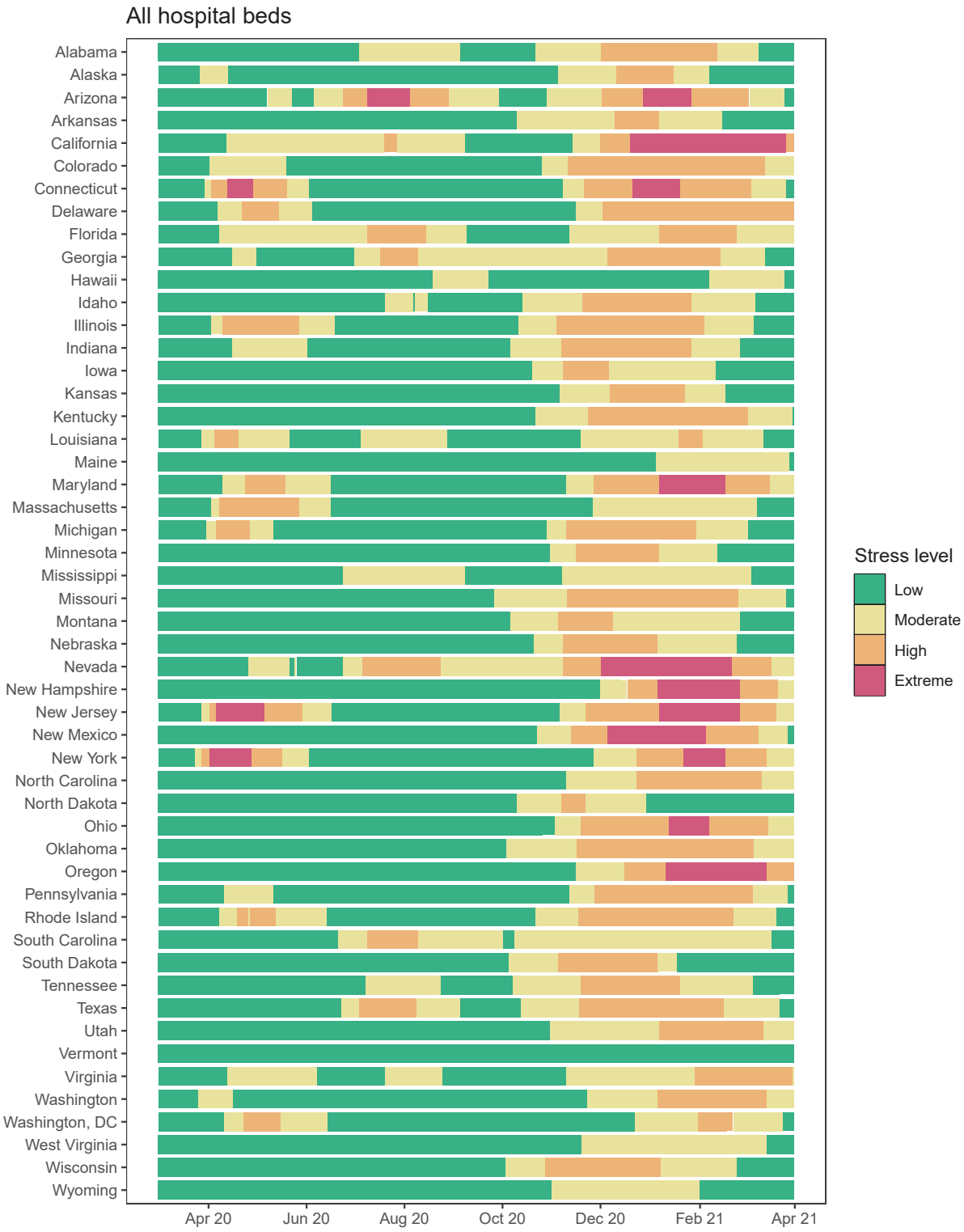


Figure 23. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *moderate stress*, 30-59% is considered *high stress*, and greater than 60% is considered *extreme stress*.

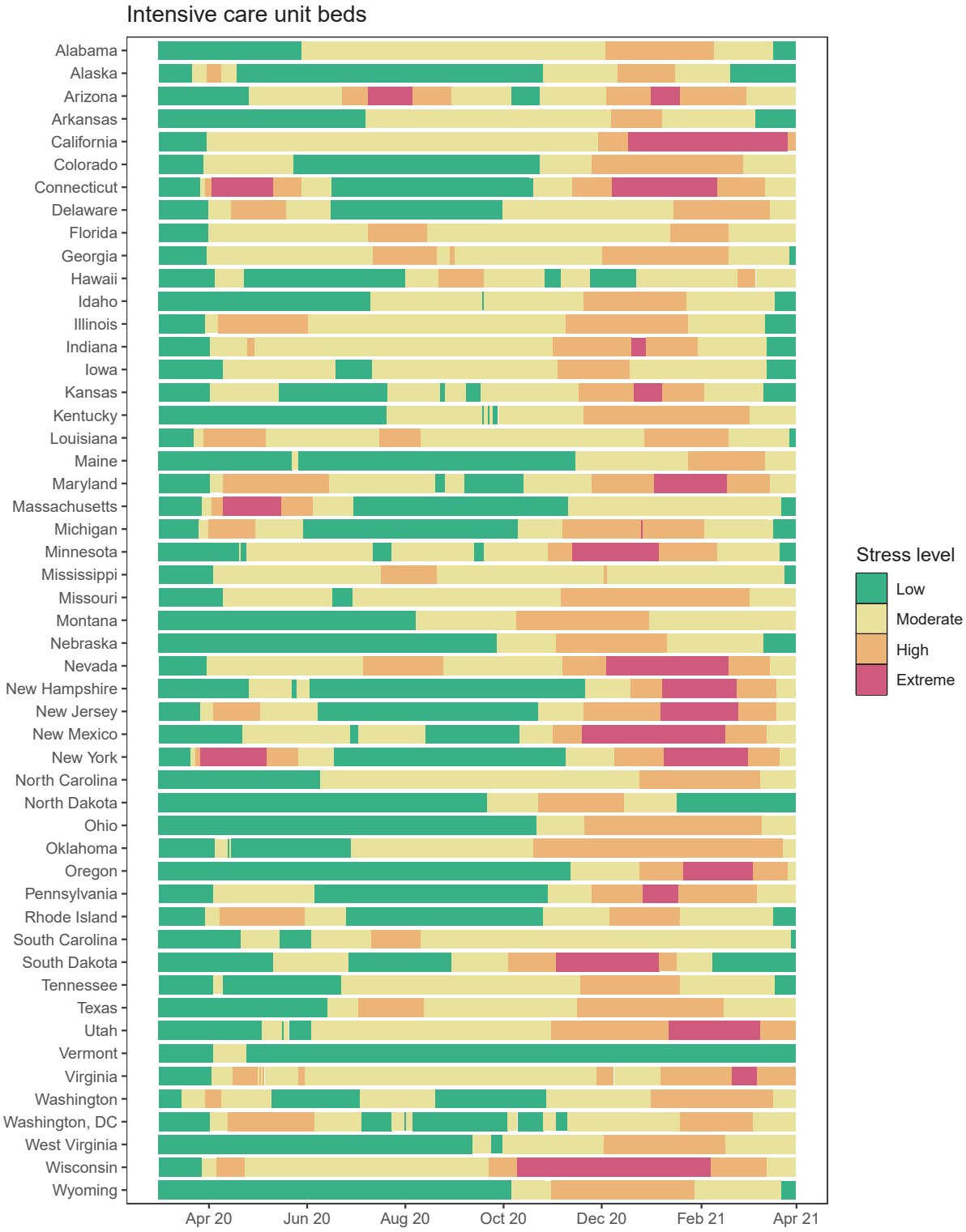


Table 3. Ranking of COVID-19 among the leading causes of mortality in the full year 2020. Deaths from COVID-19 are projections of cumulative deaths on Jan 1, 2021 from the reference scenario. Deaths from other causes are from the Global Burden of Disease study 2019 (rounded to the nearest 100).

Cause name	Annual deaths	Ranking
Ischemic heart disease	6,100	1
COVID-19	4,293	2
Chronic obstructive pulmonary disease	3,300	3
Stroke	2,500	4
Tracheal, bronchus, and lung cancer	2,400	5
Alzheimer's disease and other dementias	2,100	6
Chronic kidney disease	1,300	7
Cirrhosis and other chronic liver diseases	1,200	8
Colon and rectum cancer	1,100	9
Self-harm	1,100	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.