

COVID-19 Results Briefing: United States of America

January 14, 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 January 13, 2021, with data through January 11, 2021.

Despite huge reporting lags around the holidays leading to false declines in the last week of December and subsequent overestimated increases, it appears that there are two distinct groups of states. In most of the coastal states, cases, hospitalizations, and deaths are increasing, while the epidemic is trending down in much of the Midwest. We expect the death toll will reach 567,000 by May 1, with a likely peak at the beginning of February. Daily deaths are expected to decline steadily after the peak, reaching below 500 a day sometime in April due to seasonality and the scale-up of vaccination. By May 1, some states may be close to herd immunity. If more transmissible variants spread in the US in the coming weeks, the peak could be delayed by weeks and the death toll substantially increased. Hospitals in many states will be under severe stress in the next four weeks. Expanding mask use, timely reintroduction of some social distancing mandates, and more rapid scale-up of vaccination remain the best options for reducing the death toll.

Current situation

- Daily reported cases in the last week increased to 243,300 per day on average compared to 211,300 the week before (Figure 1). The increase may be exaggerated because of the major reporting lags during and after the holiday period.
- Daily deaths in the last week increased to 3,010 per day on average compared to 2,690 the week before (Figure 2). Death counts are also likely affected in many states by delayed reporting of deaths over the holidays. This makes COVID-19 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 in 27 states (Figure 3). Effective R is less than 1 in most of the Midwest.
- We estimated that 22% of people in the US have been infected as of January 11 (Figure 4).
- The daily death rate is greater than 4 per million in 46 states and the District of Columbia (Figure 6).

Trends in drivers of transmission

- The current set of detailed mandates show many states with gathering restrictions, mask mandates, and higher education closed. Two states have stay-at-home orders in place (Table 2).

- Mobility continued to decline, reaching 33% lower than the pre-COVID-19 baseline (Figure 8). No state has mobility levels near baseline (within 10%). Mobility was lower than 30% of baseline in 26 states. While mobility overall is down, visits to restaurants (Figure 8c) and to department stores (Figure 8f) are up substantially from the weeks prior.
- As of January 11, we estimated that 76% of people always wore a mask when leaving their home, unchanged from last week (Figure 9). All states had mask use over 50%.
- Diagnostic testing as reported is down in the last 3 weeks, but this may reflect lags in reporting by labs (Figure 10).
- In the US, 52.5% of people say they would accept a vaccine for COVID-19 and 24.1% say they are unsure if they would accept one. The fraction of the population who are open to receiving a COVID-19 vaccine (responses of yes or unsure) ranges from 66% in Mississippi to 85% in Utah (Figure 12).
- We expect that 141 million people will be vaccinated by May 1 (Figure 13). With faster scale-up, the number vaccinated could reach 179 million people.

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 567,000 cumulative deaths on May 1, 2021. This represents 192,000 additional deaths from January 11 to May 1 (Figure 14). Daily deaths will peak at 3,680 on February 1, 2021 (Figure 15). Daily deaths are estimated to be well below 500 a day in the month of April.
- By May 1, 2021, we project that 37,800 lives will be saved by the projected vaccine rollout. If rapid rollout of vaccine is achieved, 51,100 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, 59,300 lives (Figure 14).
- If **universal mask coverage (95%)** were attained in the next week, our model projects 31,000 fewer cumulative deaths compared to the reference scenario on May 1, 2021 (Figure 14).
- Under our **mandates easing scenario**, our model projects 621,000 cumulative deaths on May 1, 2021 (Figure 14).
- We estimate that 36.4% of people will still be susceptible on May 1, 2021 (Figure 17).
- The reference scenario assumes that 39 states will re-impose mandates by May 1, 2021 (Figure 18).
- Figure 21 compares our reference scenario forecasts to other publicly archived models. Los Alamos National Labs projects increasing deaths to nearly 5,000 a day at the end of February. All other models have declines in daily deaths beginning at least by the second week of February.

- At some point from January through May 1, 42 states will have high or extreme stress on hospital beds (Figure 22). At some point from January through May 1, 45 states will have high or extreme stress on ICU capacity (Figure 23).

Model updates

Methods have not been changed in this week's update. Reported data on vaccination scale-up for select countries has led us to revise the expected rates of vaccination. For some countries, the revision has reduced the expected vaccination rates, and for others – such as Israel – the revision has increased expected vaccination rates.

Current situation

Figure 1. Reported daily COVID-19 cases

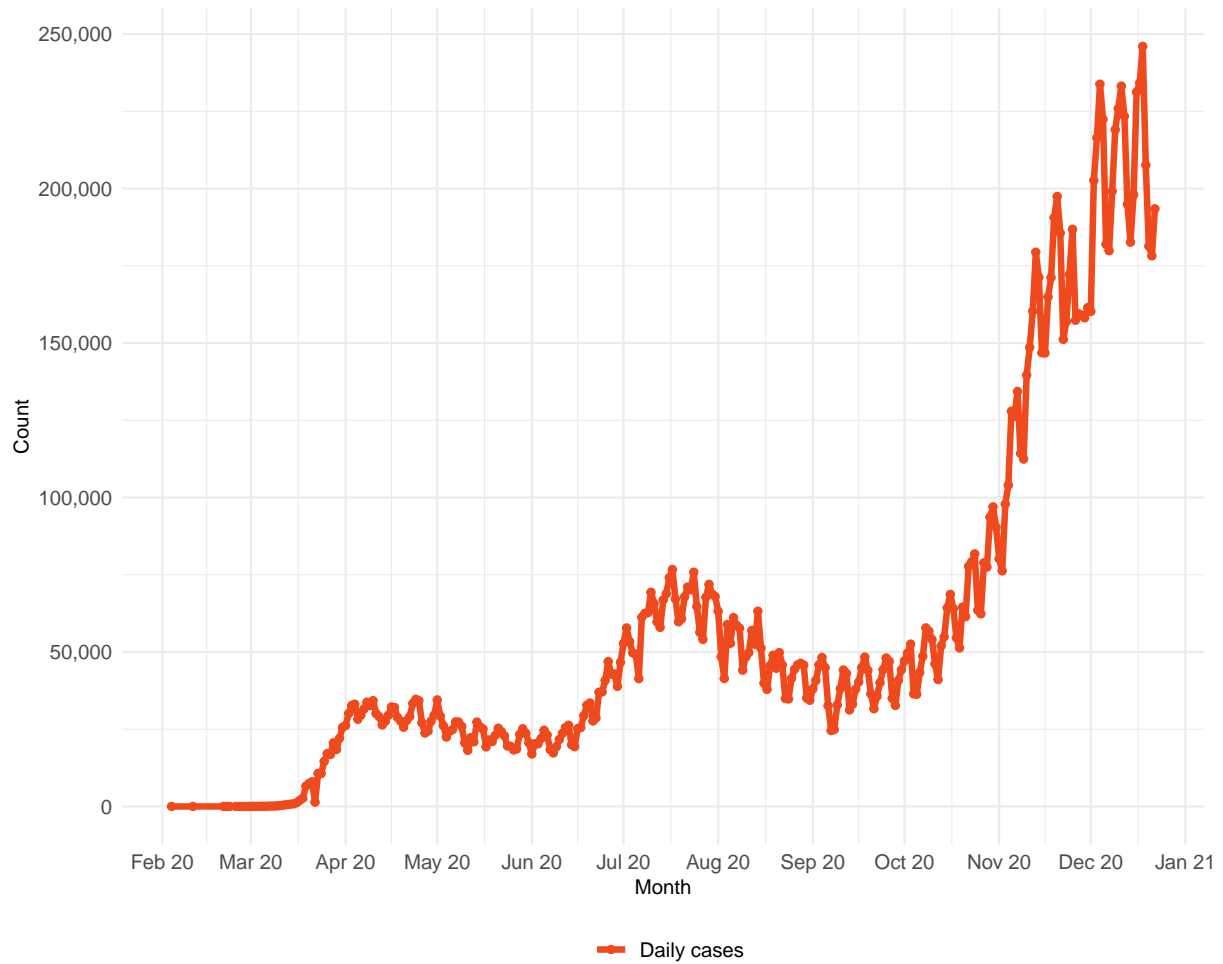


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	21,049	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

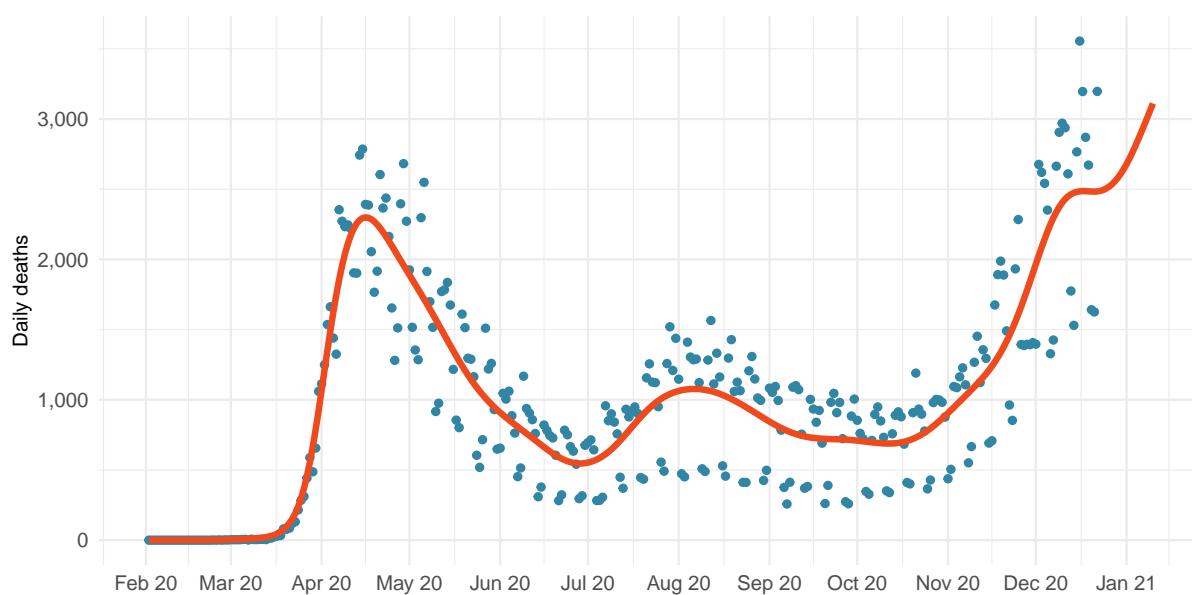


Figure 2b. Estimated cumulative deaths by age group



Figure 3. Mean effective R on December 31, 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.

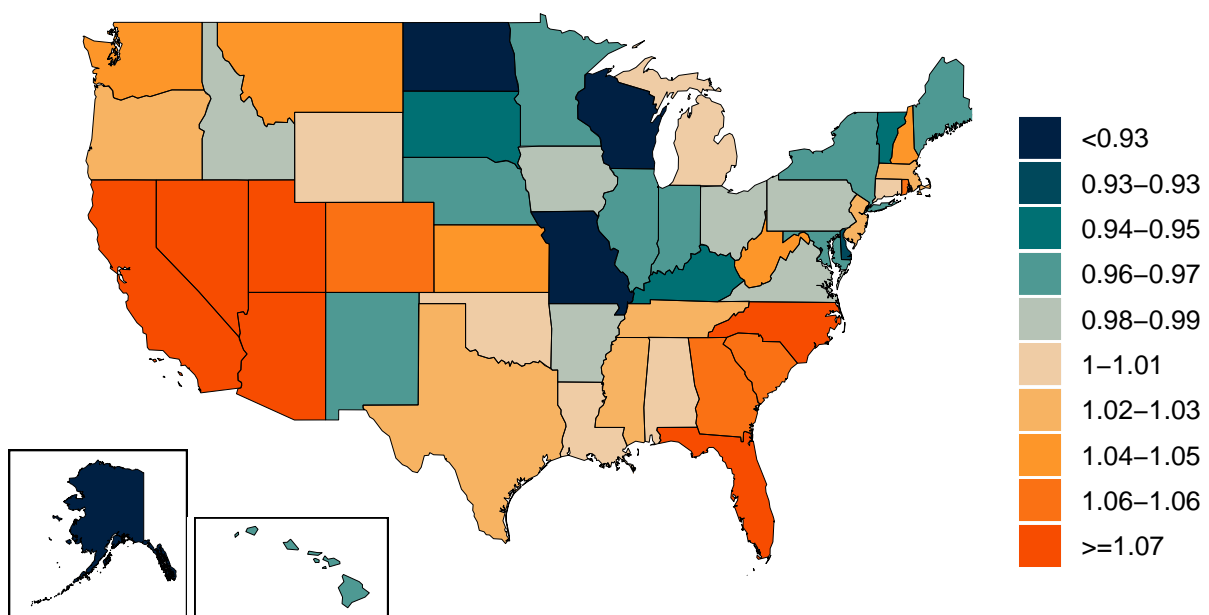


Figure 4. Estimated percent of the population infected with COVID-19 on January 11, 2021

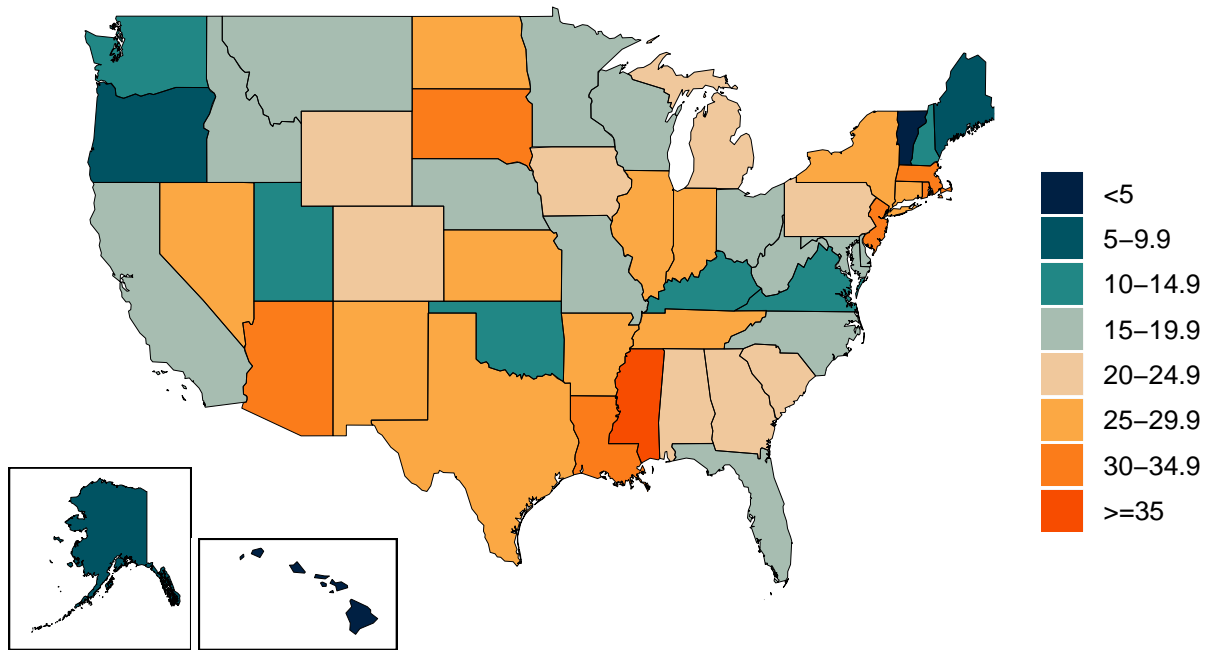


Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.

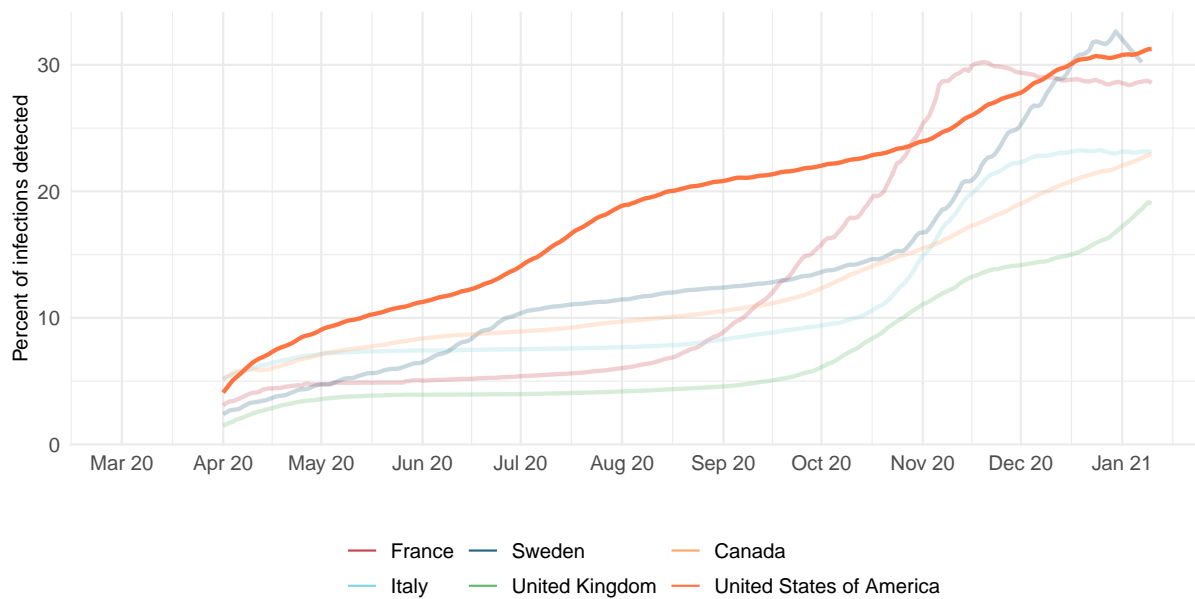
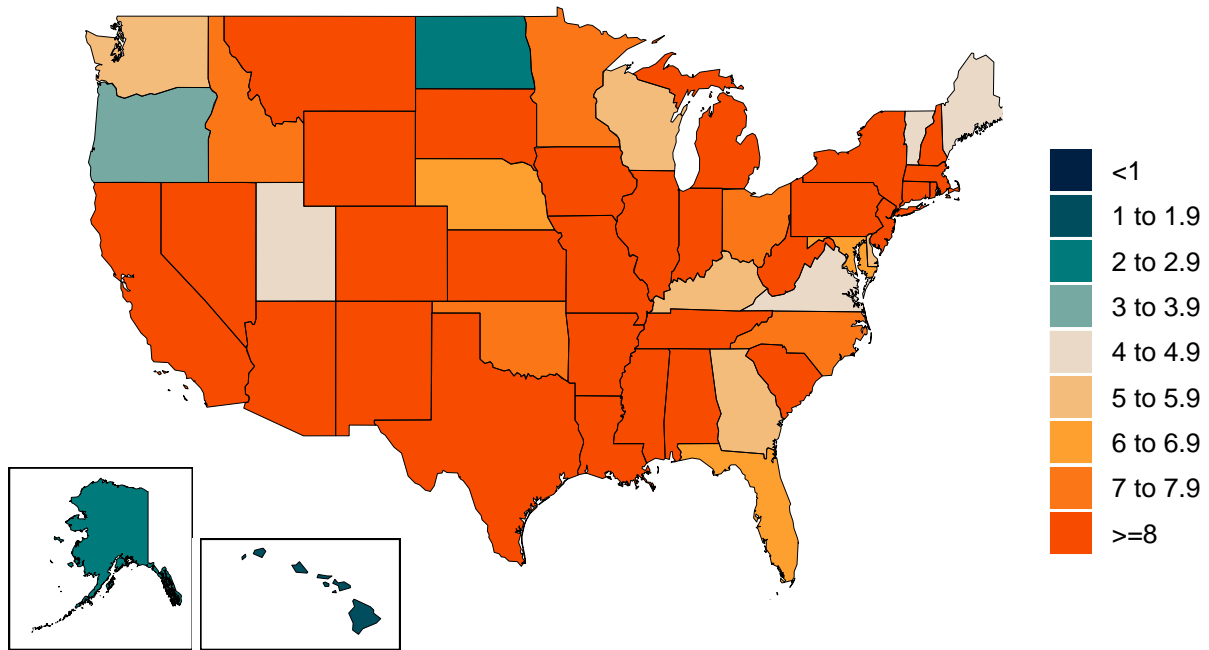
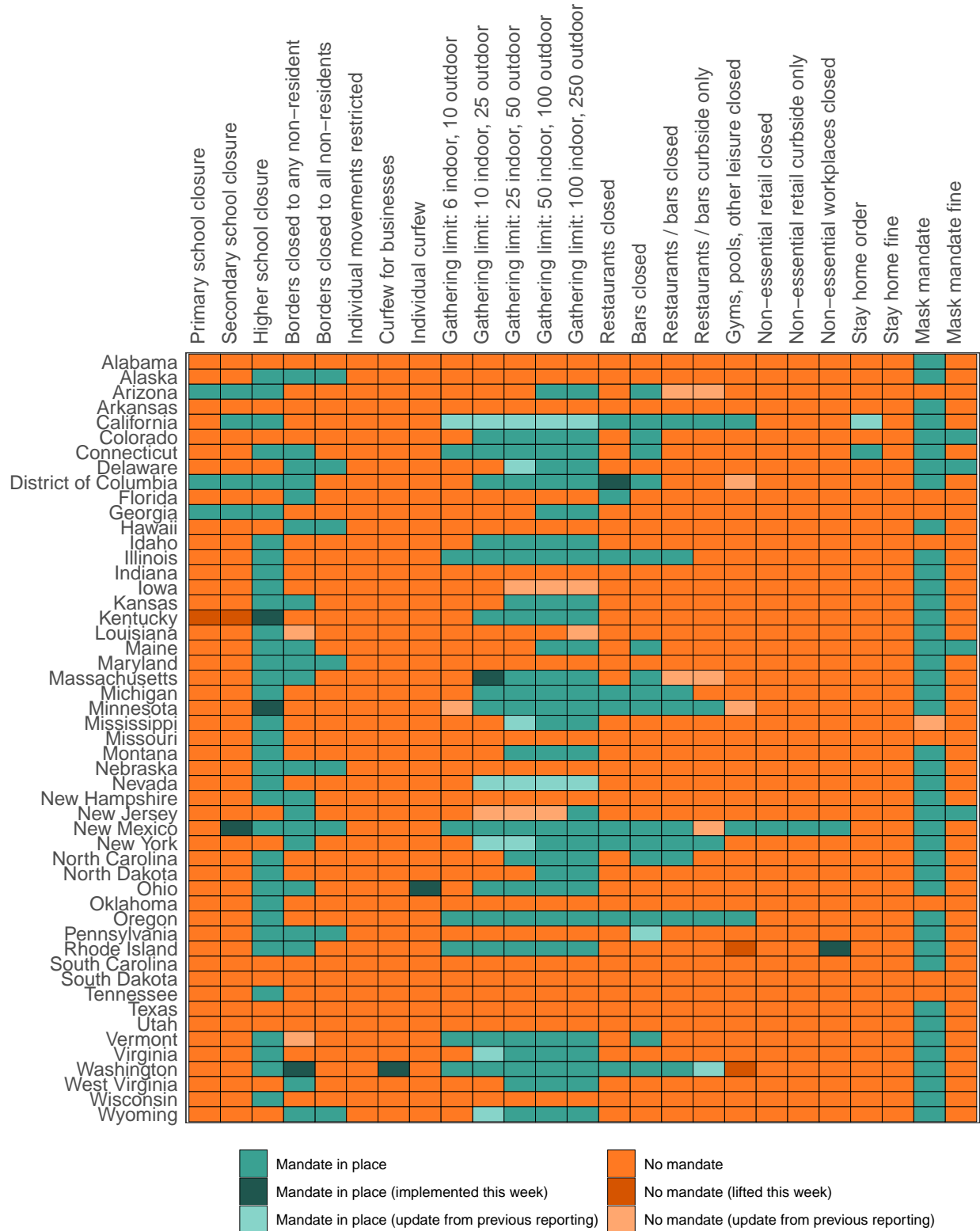


Figure 6. Daily COVID-19 death rate per 1 million on January 11, 2021



Critical drivers

Table 2. Current mandate implementation



*Not all locations are measured at the subnational level.

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

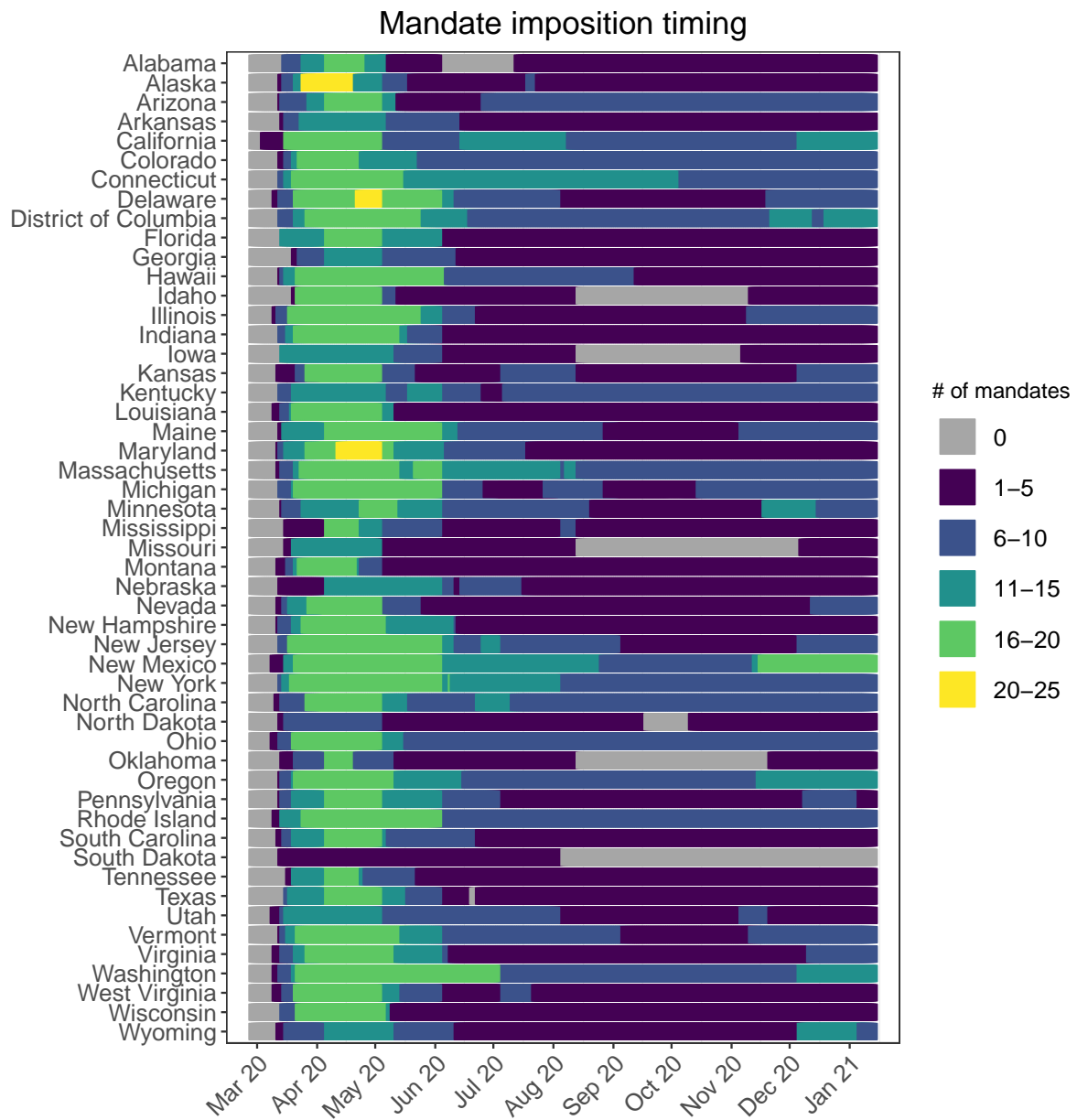


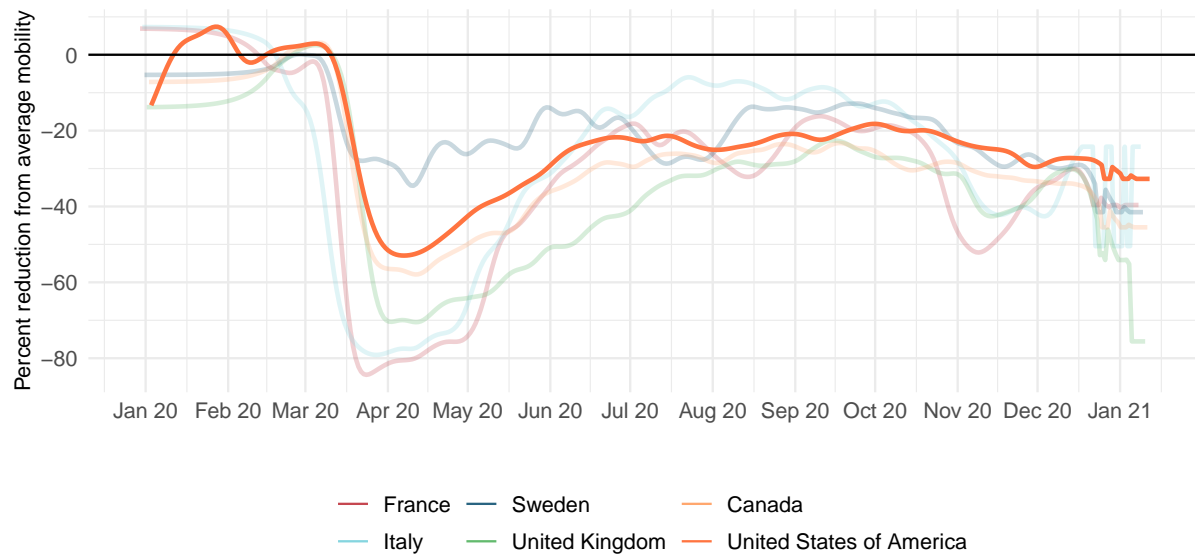
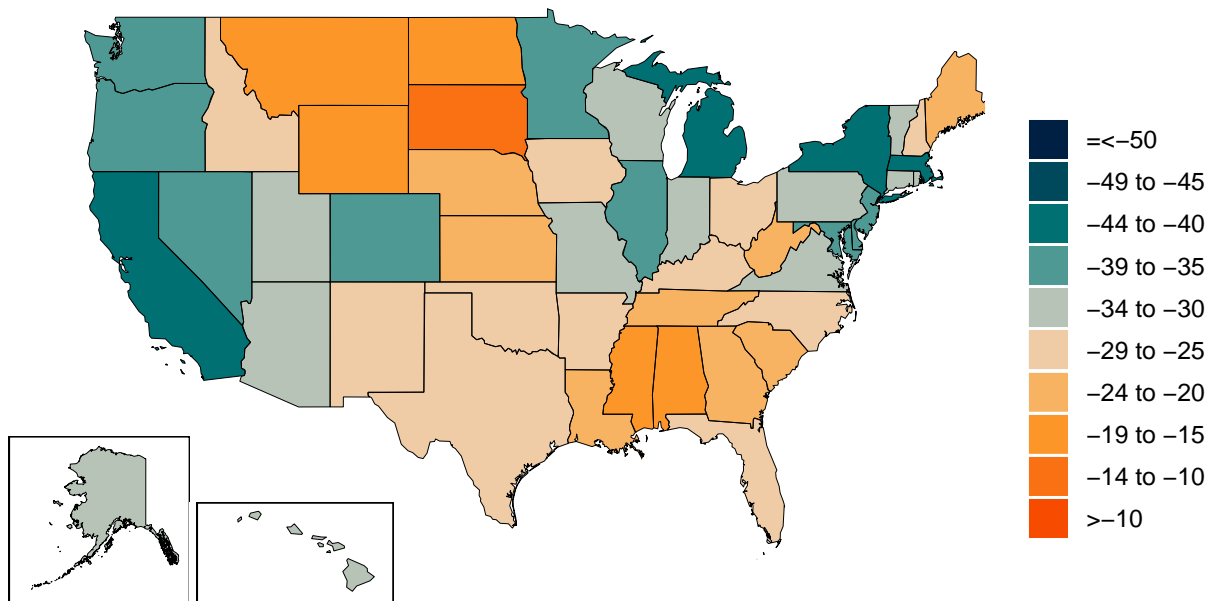
Figure 8a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline**Figure 8b.** Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on January 11, 2021

Figure 8c. Trend in visits to restaurants as measured through cell phone data compared to 2019 average

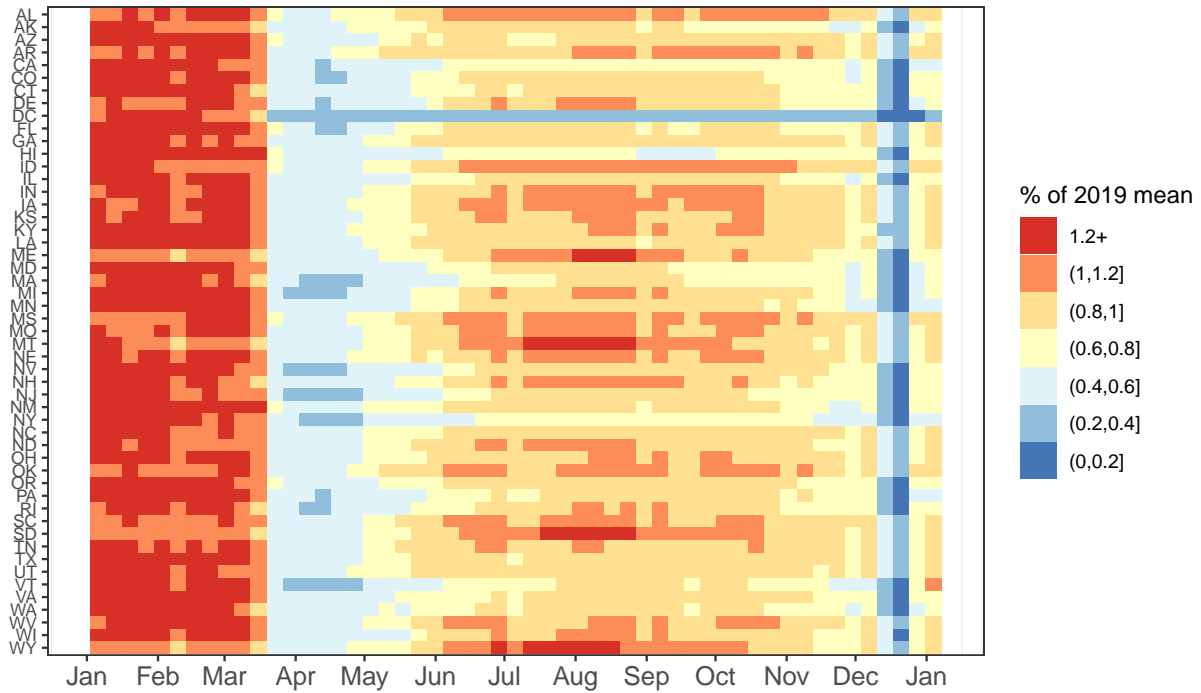


Figure 8d. Trend in visits to bars as measured through cell phone data compared to 2019 average

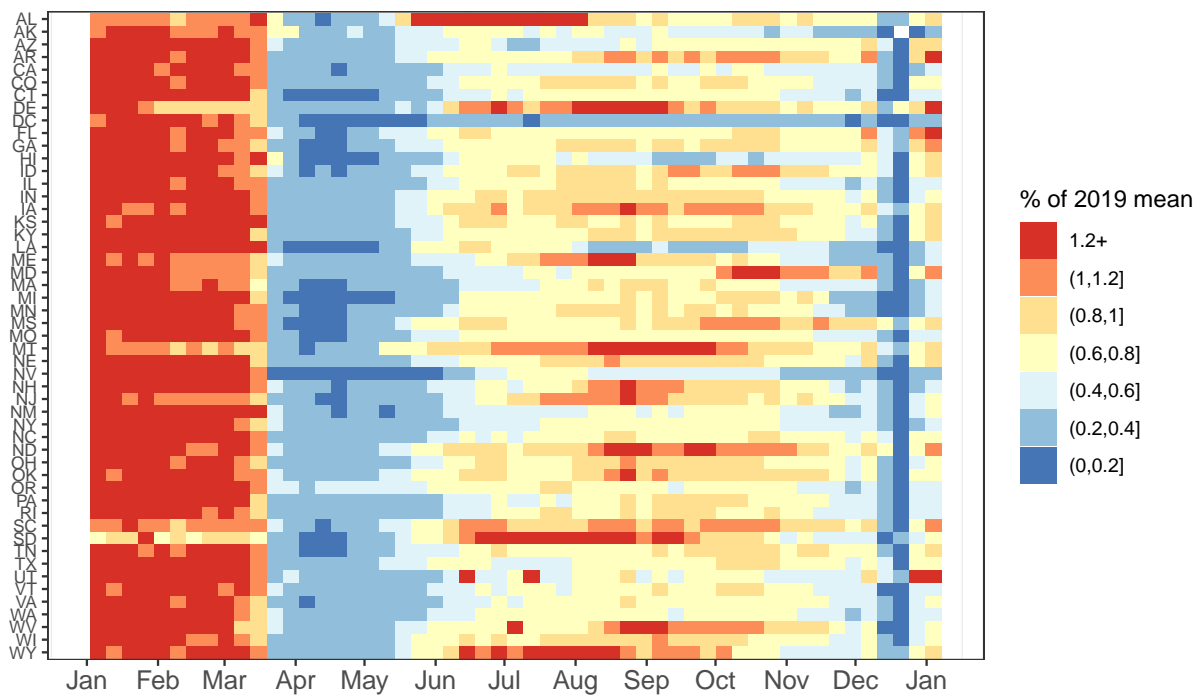


Figure 8e. Trend in visits to elementary & secondary schools as measured through cell phone data compared to 2019 average

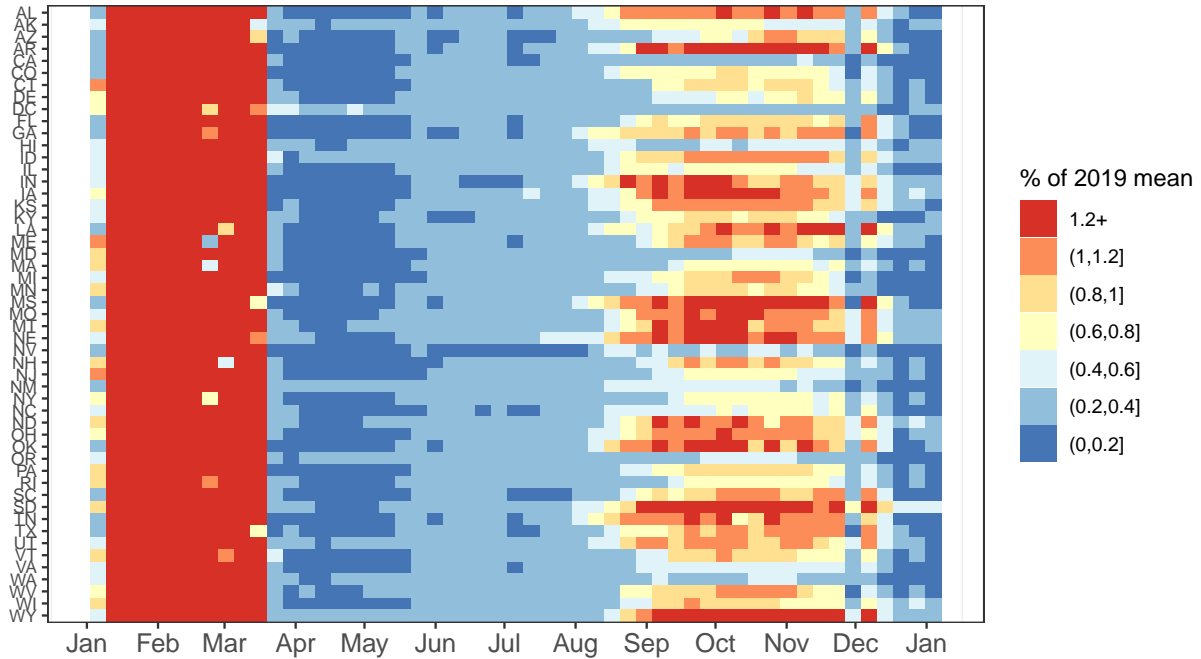


Figure 8f. Trend in visits to department stores as measured through cell phone data compared to 2019 average

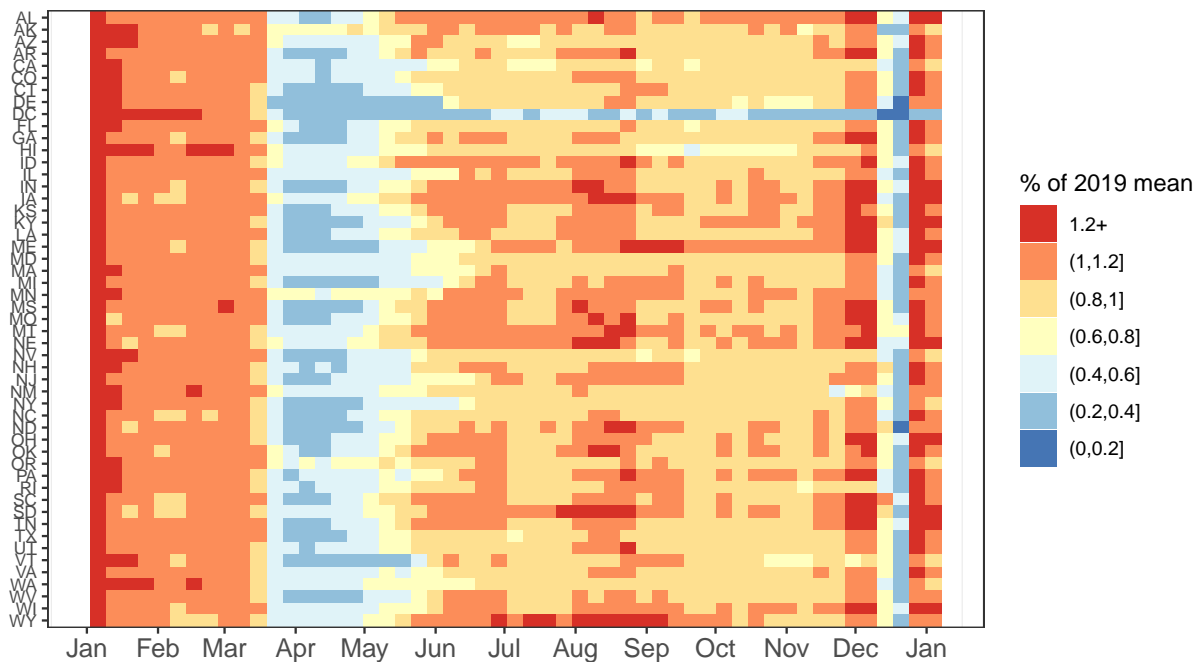


Figure 9a. Trend in the proportion of the population reporting always wearing a mask when leaving home

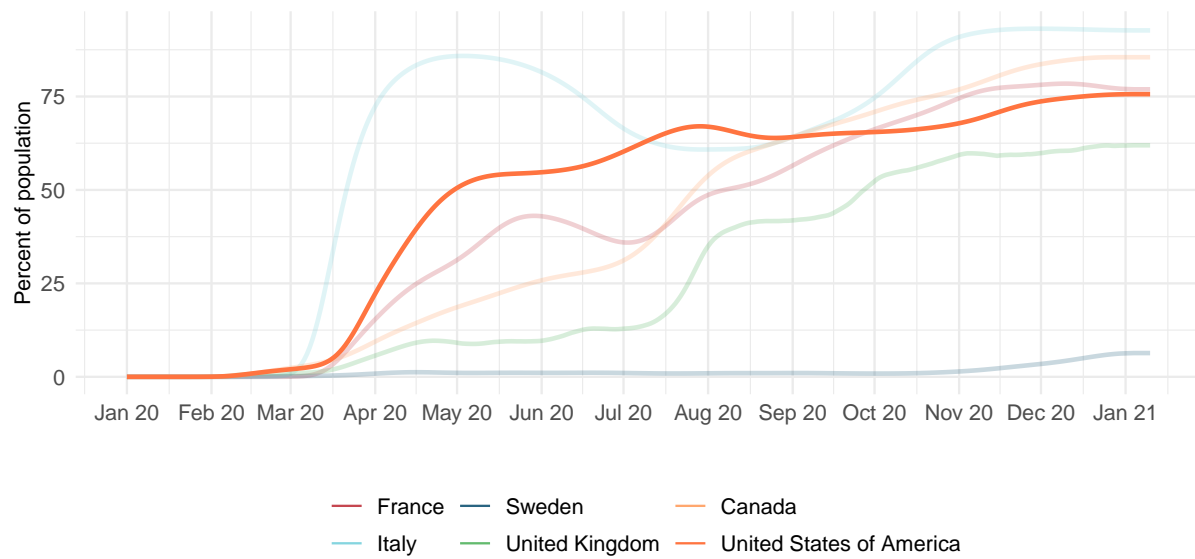


Figure 9b. Proportion of the population reporting always wearing a mask when leaving home on January 11, 2021

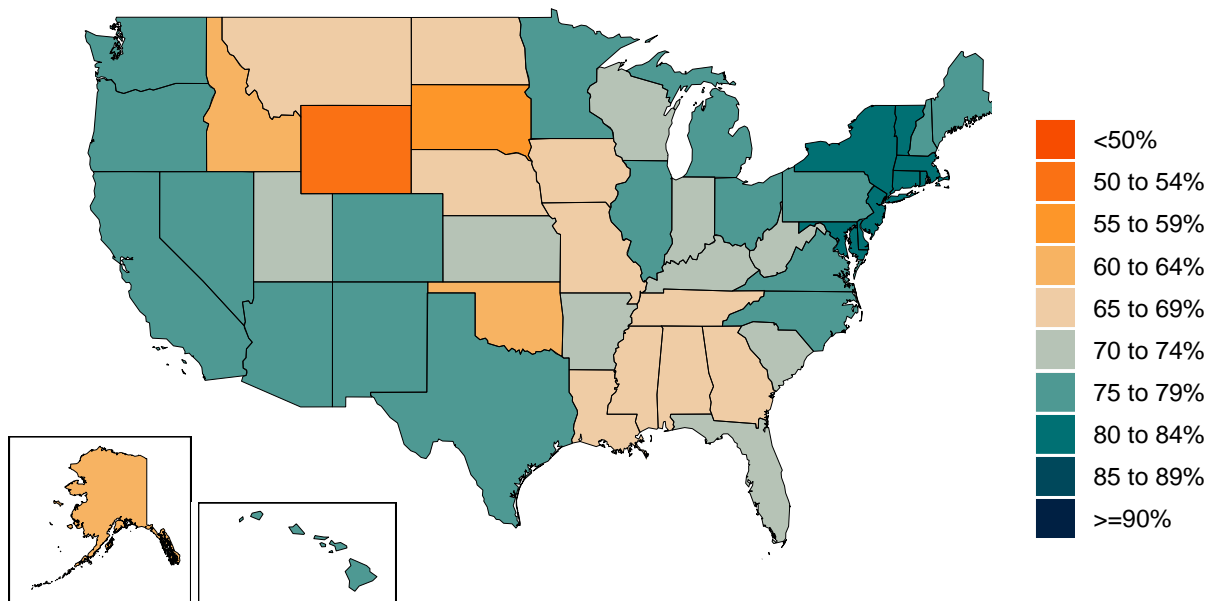


Figure 10a. Trend in COVID-19 diagnostic tests per 100,000 people

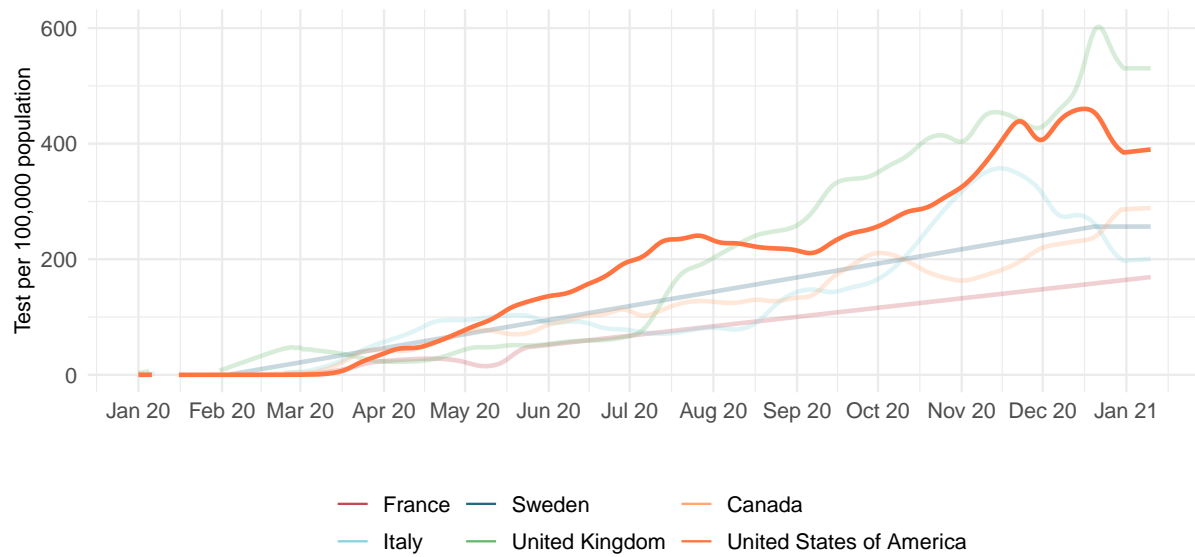


Figure 10b. COVID-19 diagnostic tests per 100,000 people on December 31, 2020

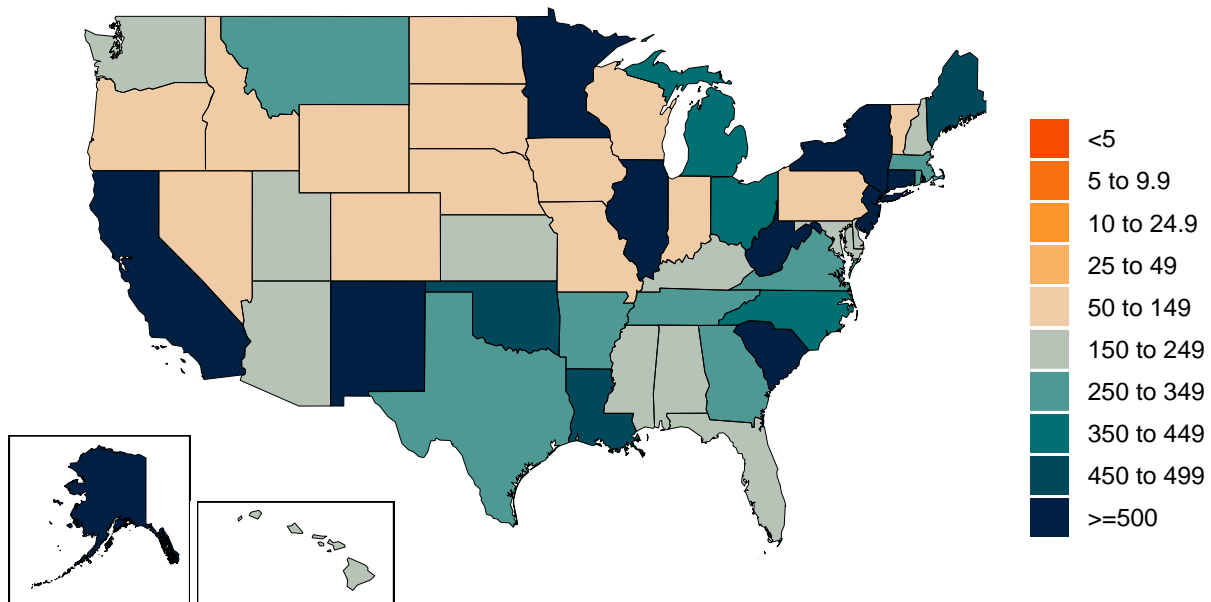


Figure 11. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

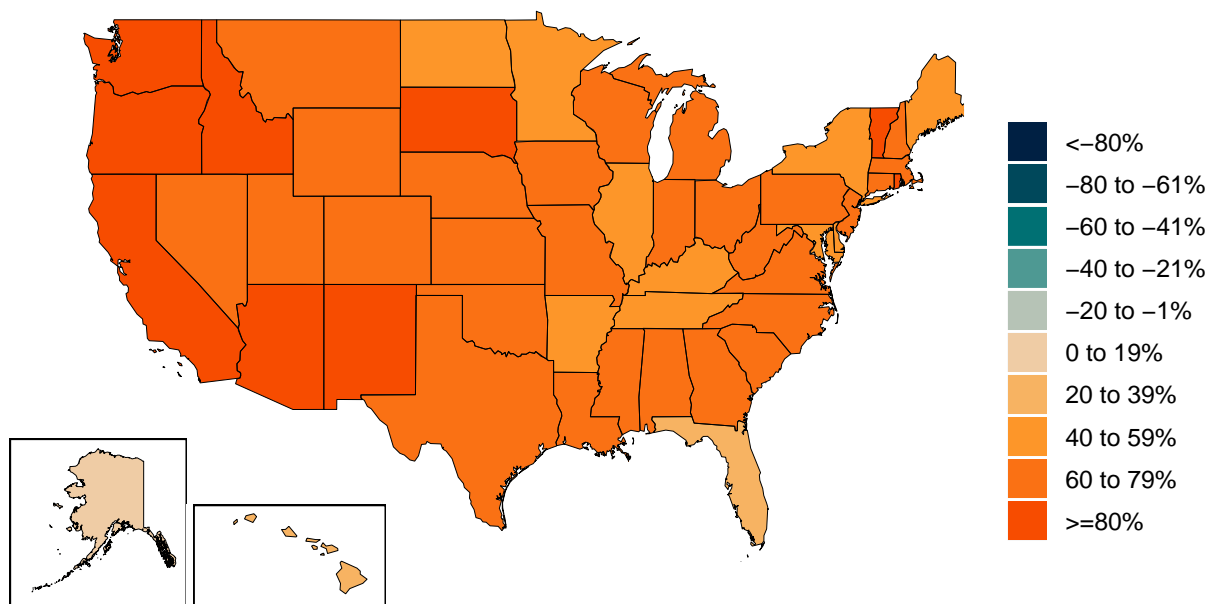


Figure 12. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and unsure).

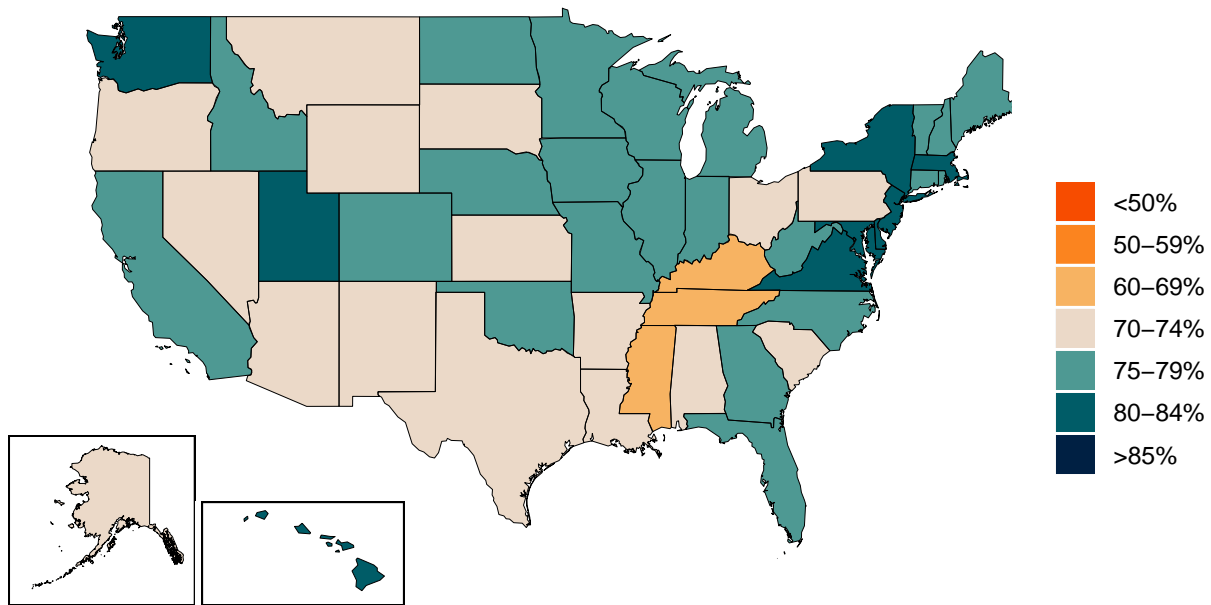
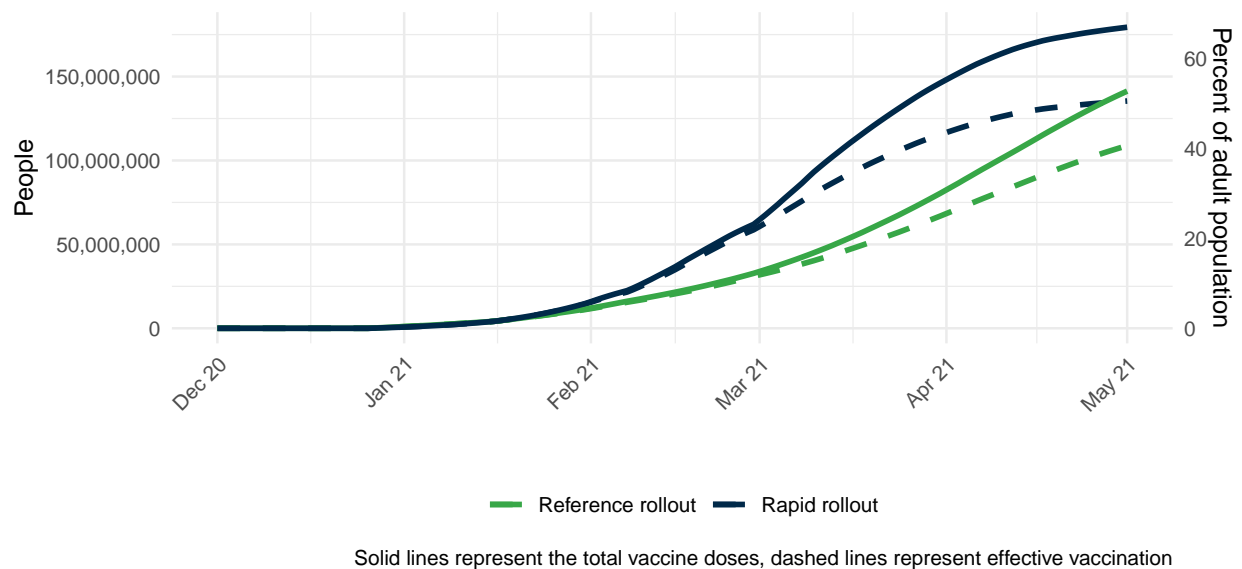


Figure 13. The number of people who receive any vaccine and those who are immune, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses.



Projections and scenarios

We produce 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 May 01, 2021 for six scenarios

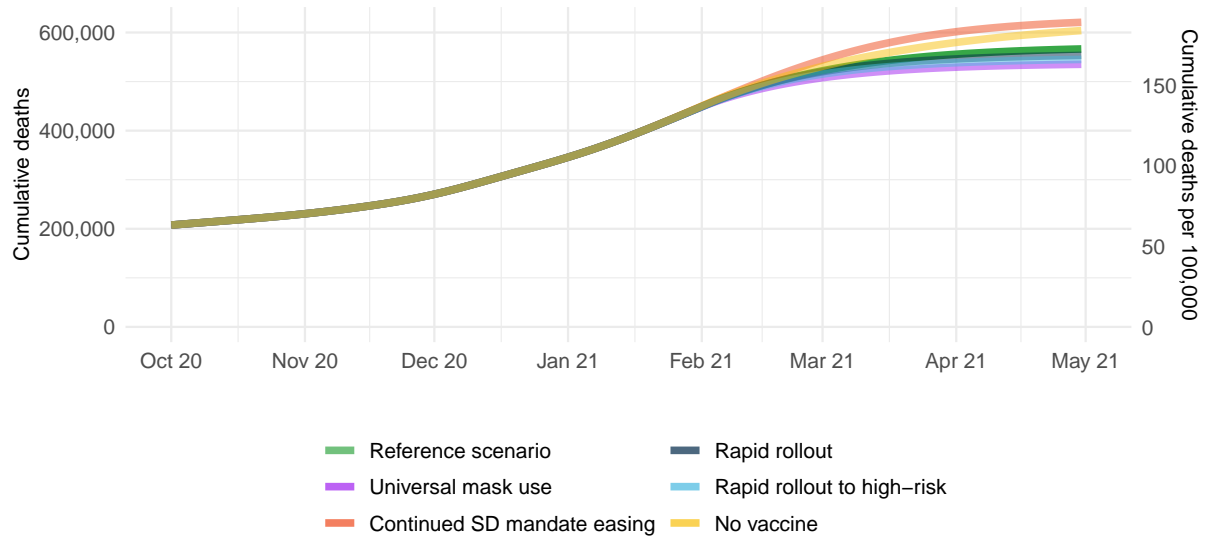


Figure 15. Daily COVID-19 deaths until May 01, 2021 for six scenarios

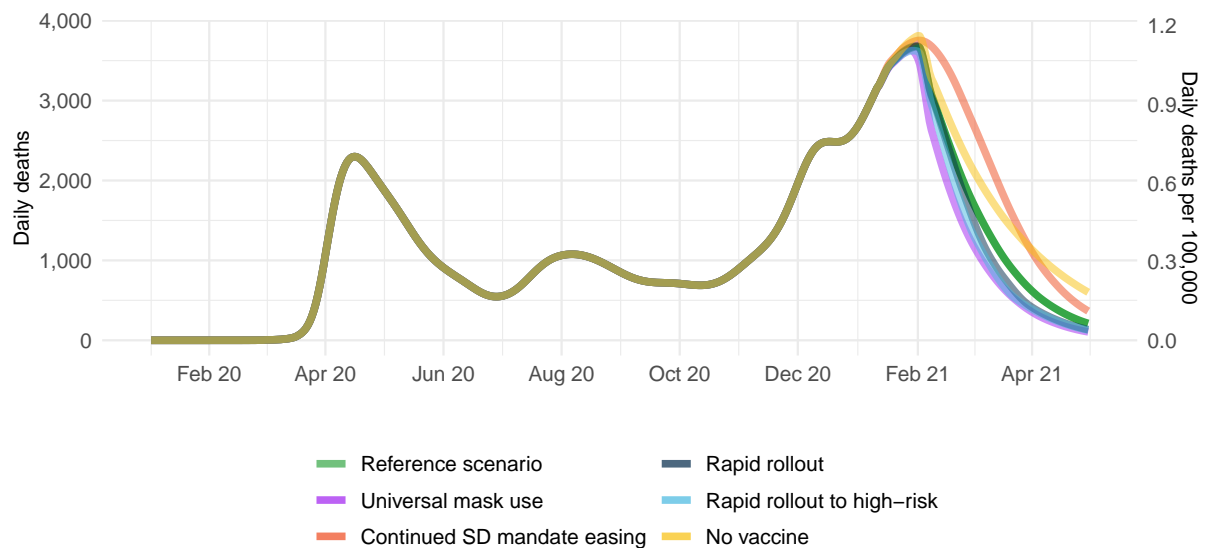


Figure 16. Daily COVID-19 infections until May 01, 2021 for six scenarios

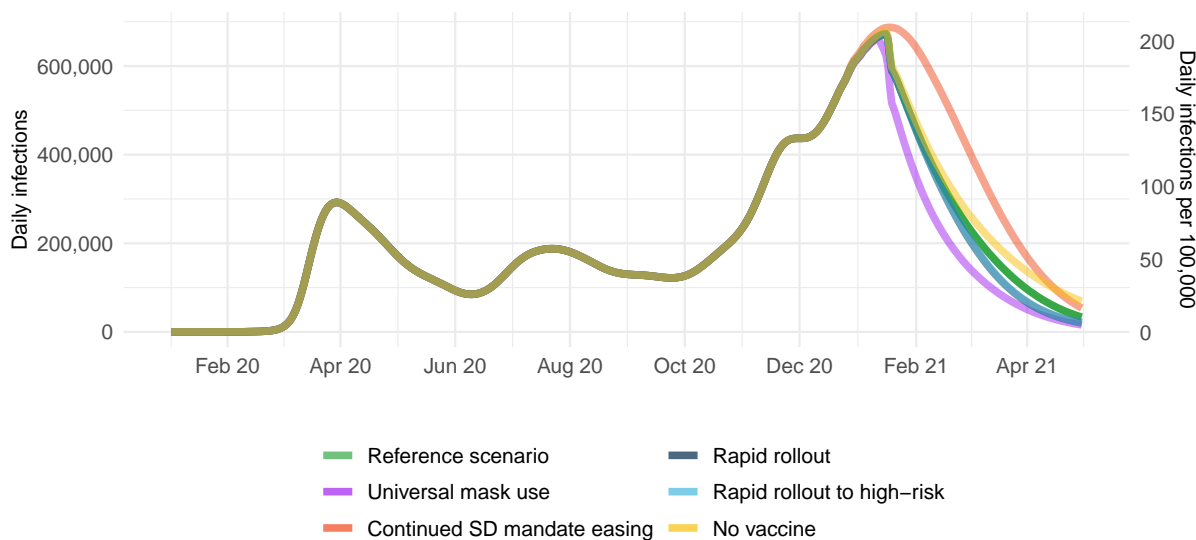


Figure 17. Susceptible population, accounting for infections and people immune through vaccination

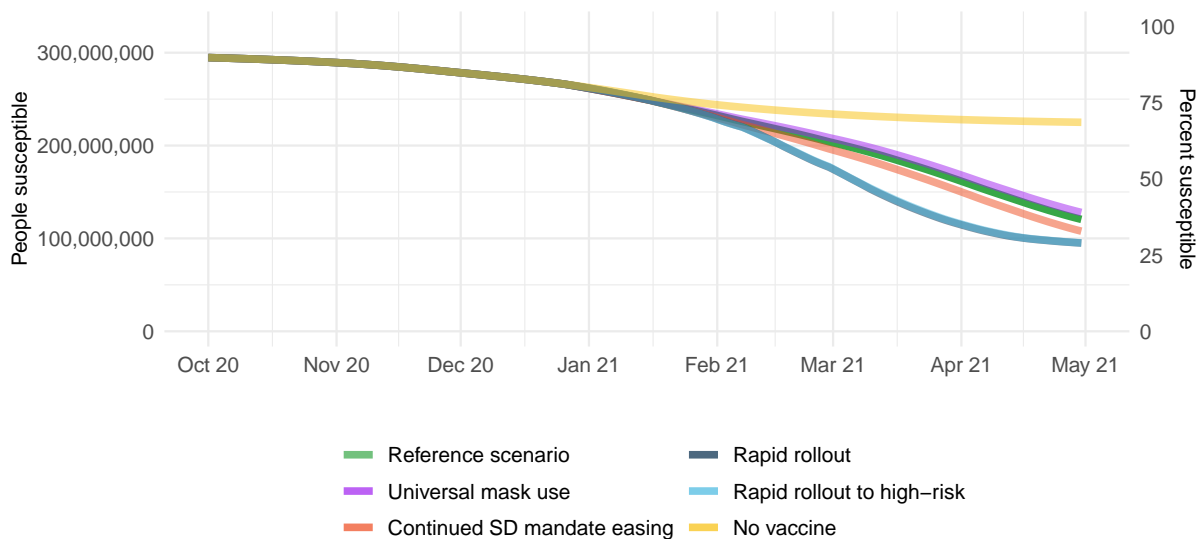


Figure 18. Month of assumed mandate re-implementation. (Month when daily death rate passes 8 per million, when reference scenario model assumes mandates will be re-imposed.)

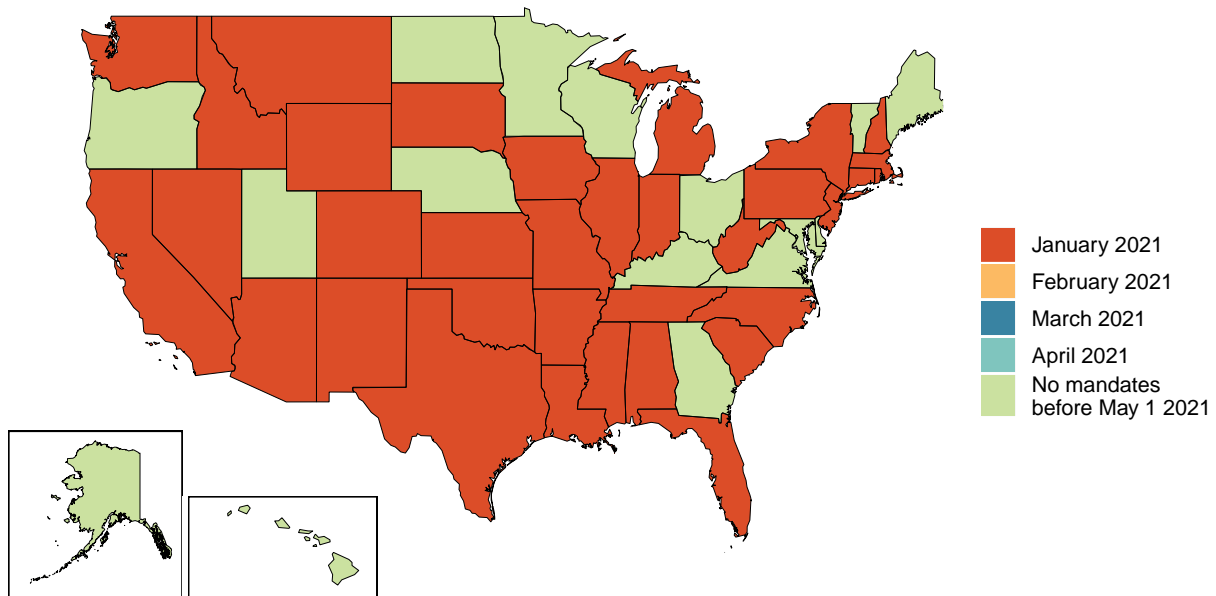


Figure 19. Forecasted percent infected with COVID-19 on May 01, 2021

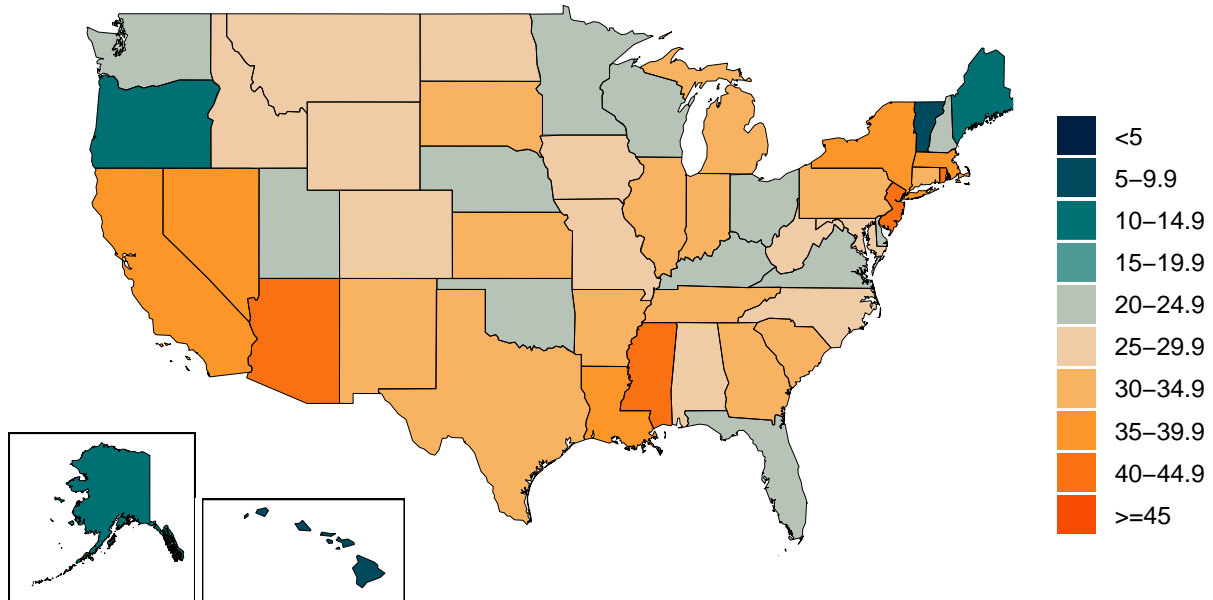


Figure 20. Daily COVID-19 deaths per million forecasted on May 01, 2021 in the reference scenario

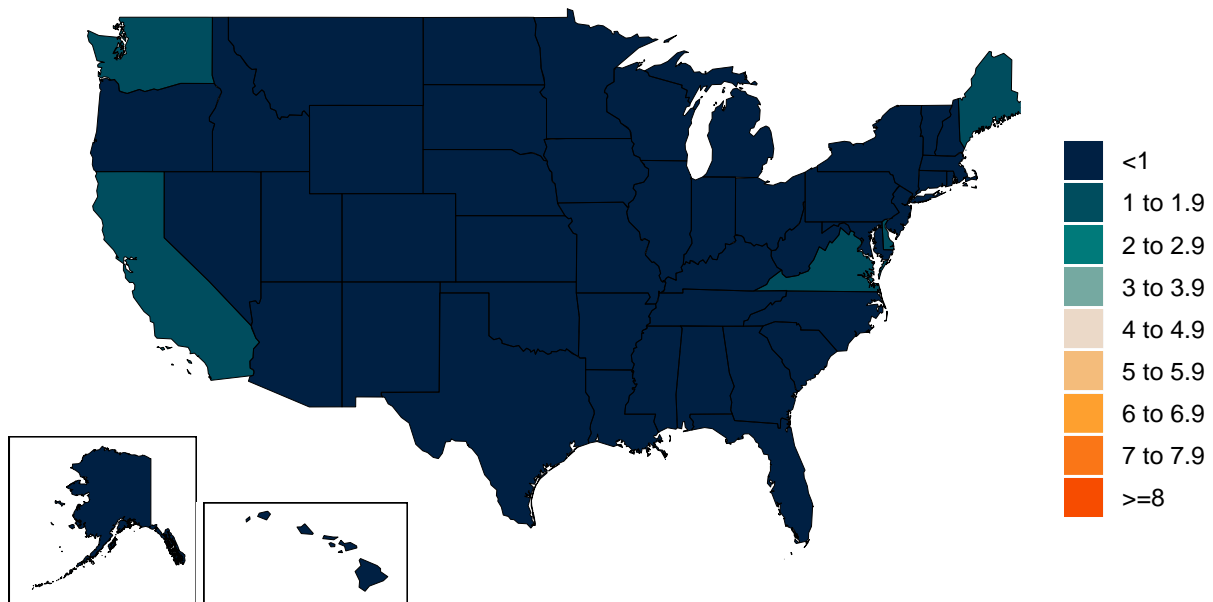


Figure 21. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachusetts Institute of Technology (Delphi; <https://www.covidanalytics.io/home>),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

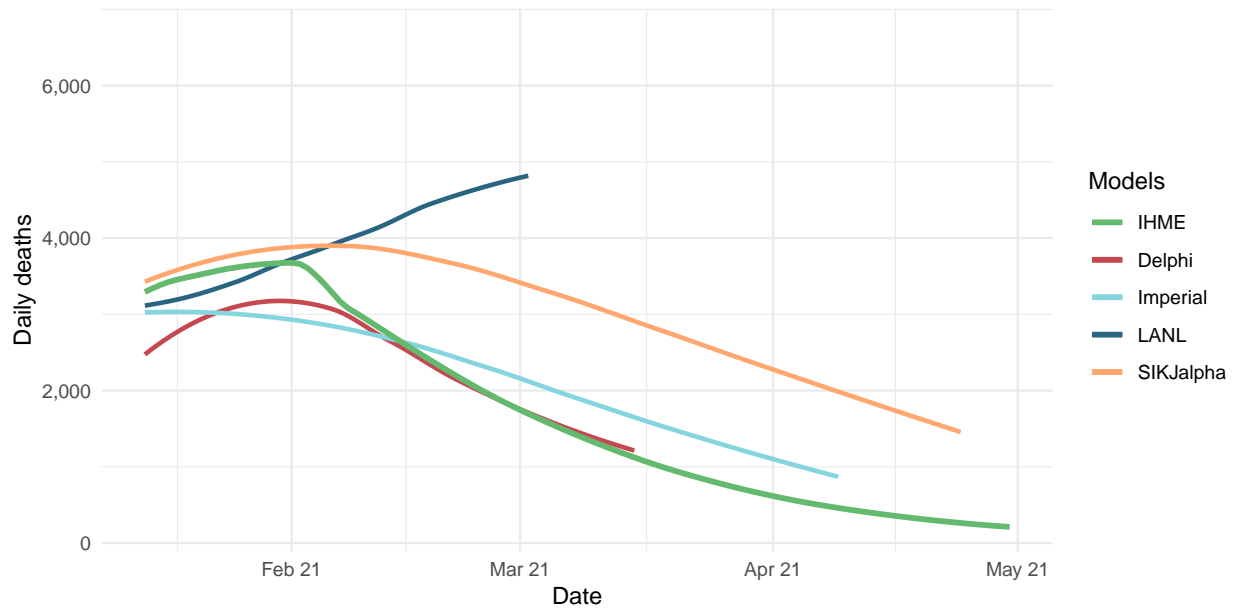


Figure 22. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate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

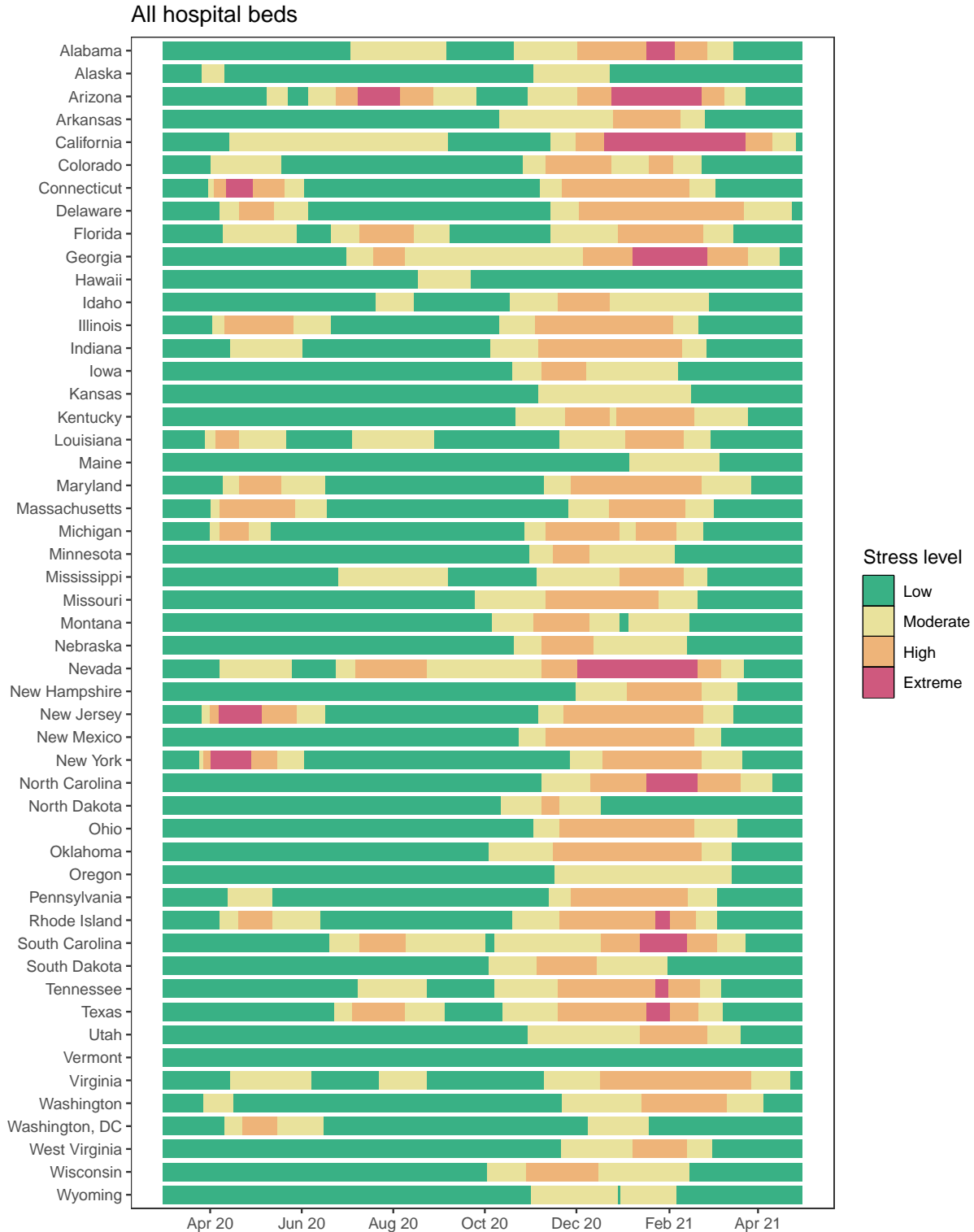


Figure 23. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered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

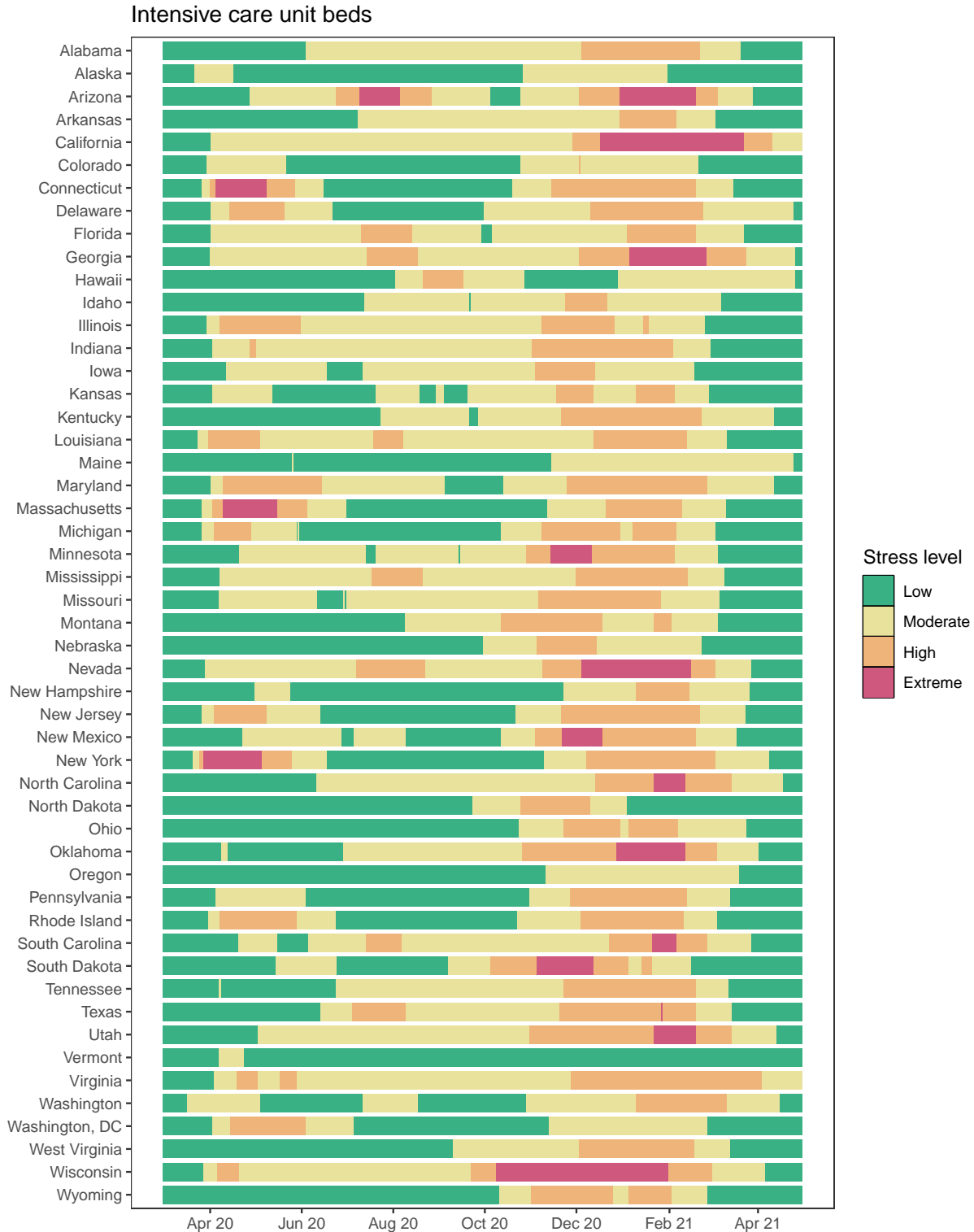


Table 3. Ranking of COVID-19 among the leading causes of mortality in the full year 2020. Deaths from COVID-19 are projections of cumulative deaths on Jan 1, 2021 from the reference scenario. Deaths from other causes are from the Global Burden of Disease study 2019 (rounded to the nearest 100).

Cause name	Annual deaths	Ranking
Ischemic heart disease	557,600	1
COVID-19	345,807	2
Tracheal, bronchus, and lung cancer	206,200	3
Chronic obstructive pulmonary disease	195,800	4
Stroke	189,500	5
Alzheimer's disease and other dementias	143,900	6
Chronic kidney disease	107,000	7
Colon and rectum cancer	84,000	8
Lower respiratory infections	81,900	9
Diabetes mellitus	77,700	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>.