COVID-19 Results Briefing

The United States of America

February 20, 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 20, 2021, with data through February 16, 2021.

Infections, hospitalizations, and deaths are steadily declining in the US. The main driver of this decline is seasonality, aided by expanding levels of vaccination. Counteracting the combined effect of seasonality and vaccination is the spread of the B.1.1.7 variant, which likely accounts for less than 20% of infections today but will increase to 80% by late April. The most uncertain driver of the trajectory of the epidemic over the next four months is how individuals will respond to steady declines in daily cases and deaths. If most individuals remain careful, maintaining mask-wearing through until April or longer, we expect that there will be a further 103,000 deaths from now until June 1, leading to a cumulative death total of 589,000. More rapid increases in mobility or reductions in mask use can easily lead to increasing cases and deaths in many states in April. So far, reported mask use remains high at 77%, but mobility has started to increase. Managing the epidemic in the next four months depends critically on scaling up vaccination, trying to increase the fraction of adults willing to be vaccinated above three-quarters, and strongly encouraging continued mask use and avoiding situations where transmission is likely, such as indoor dining, going to bars, or indoor gatherings with individuals outside the household. Despite the favorable trends in the epidemic, we do not expect to reach herd immunity prior to next winter.

Current situation

- Daily reported cases in the last week decreased to 92,500 per day on average compared to 118,900 the week before (Figure 1).

- Daily deaths in the last week decreased to 2,300 per day on average compared to 2,690 the week before (Figure 2). This makes COVID-19 the number 1 cause of death in the United States of America this week (Table 1).

- The daily death rate is greater than 4 per million in 30 states (Figure 3).

- We estimated that 18% of people in the US have been infected as of February 16 (Figure 4).

- Effective R, computed using cases, hospitalizations, and deaths, is less than 1 in all states (Figure 5).

- The infection-detection rate remains around 55% over the last week.

Trends in drivers of transmission

- New mandates on gyms were introduced in Massachusetts and Michigan, and on restaurants in Texas. Mandates were lifted in Colorado, Idaho, Illinois, and Rhode Island.

- Mobility last week was 28% 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 16 states.

- As of February 16, we estimated that 77% of people always wore a mask when leaving their home, the same as last week (Figure 9). Lowest mask use was in Wyoming.

- There were 396 diagnostic tests per 100,000 people on February 16 (Figure 11).

- In the US, 74% of people say they would accept or would probably accept a vaccine for COVID-19. The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 59% in Wyoming to 85% in Massachusetts (Figure 14).

- In our current reference scenario, we expect that 156.06 million will be vaccinated by June 1 (Figure 15).

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 589,000 cumulative deaths on June 1, 2021. This represents 103,000 additional deaths from February 16 to June 1 (Figure 16). Daily deaths have peaked and are expected to steadily decline, reaching below 500 a day prior to June 1 (Figure 17).

- By June 1, 2021, we project that 117,200 lives will be saved by the projected vaccine rollout.

- If **universal mask coverage (95%)** were attained in the next week, our model projects 17,000 fewer cumulative deaths compared to the reference scenario on June 1, 2021 (Figure 16).

- Under our **worse scenario**, our model projects 616,000 cumulative deaths on June 1, 2021 (Figure 16). This represents 27,000 more deaths than in the reference scenario. Daily deaths remain near 1,000 a day on June 1 in the worse scenario.

- Daily infections in the reference scenario are expected to decline from now until June 1, although the spread of variants, especially B.1.1.7, will lead to slower declines in the number of infections in March. In the worse scenario, with more rapid spread of B.1.351, daily infections could increase in March and early April.

- Figure 19 compares our reference scenario forecasts to other publicly archived models. All models forecast steady declines in daily deaths with the exception of the Los Alamos National Labs model, which has increases in late March.

- At some point from February through June 1, 18 states will have high or extreme stress on hospital beds (Figure 20). At some point from February through June 1, 18 states will have high or extreme stress on ICU capacity (Figure 21).

Model updates

We have updated our model that predicts the spread of the new variants, which is used in the reference scenario in two ways. First, the speed of scale-up of the new variants is now based on data from more than 15 locations, whereas previously we only had data from London. Second, we now use observed data on the presence of new variants (B.1.1.7, B.1.351, or P1) in all locations with reported community transmission and more than five cases of those variants sequenced.

Figure 1. Reported daily COVID-19 cases

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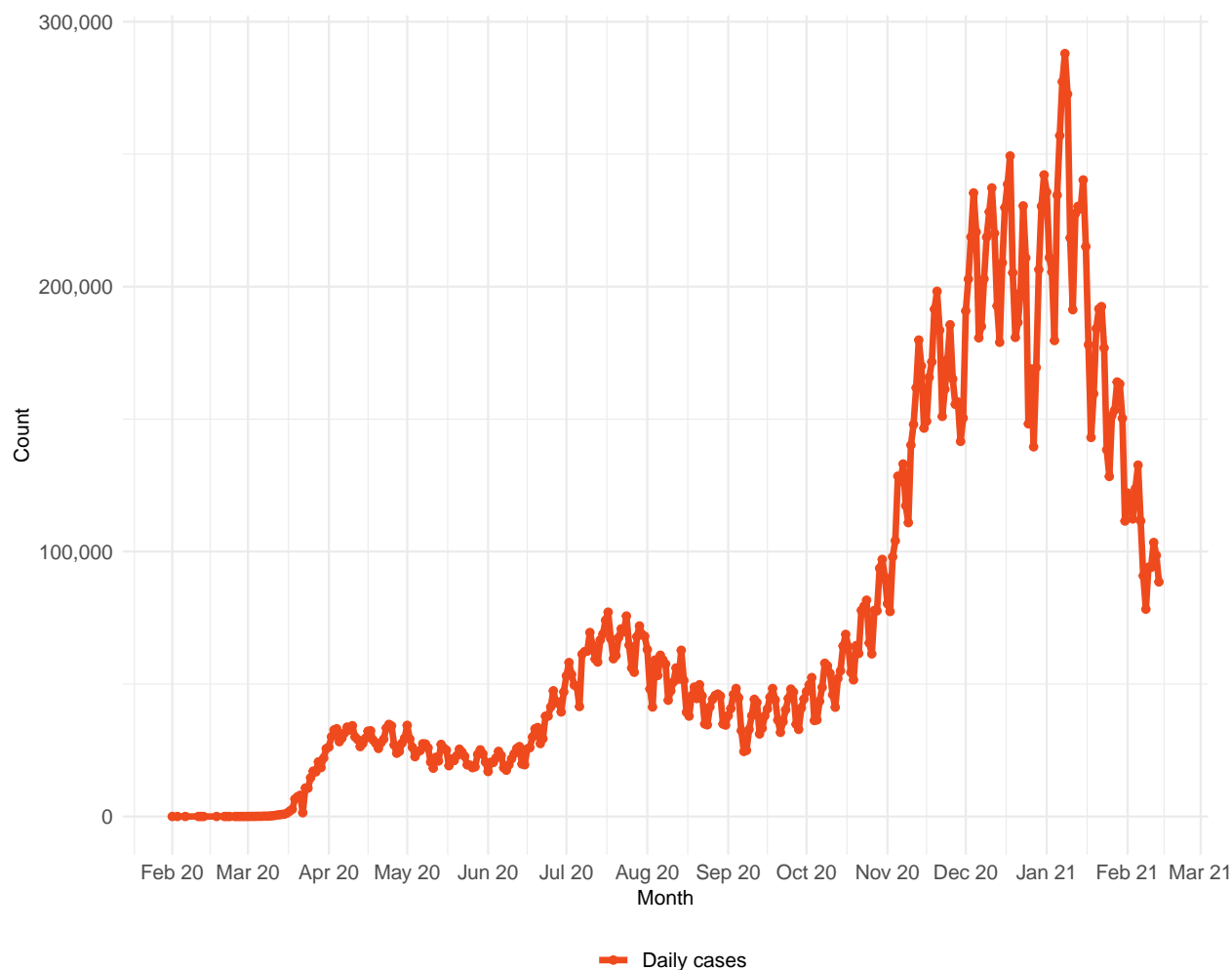
Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	16,078	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 2. Reported daily COVID-19 deaths
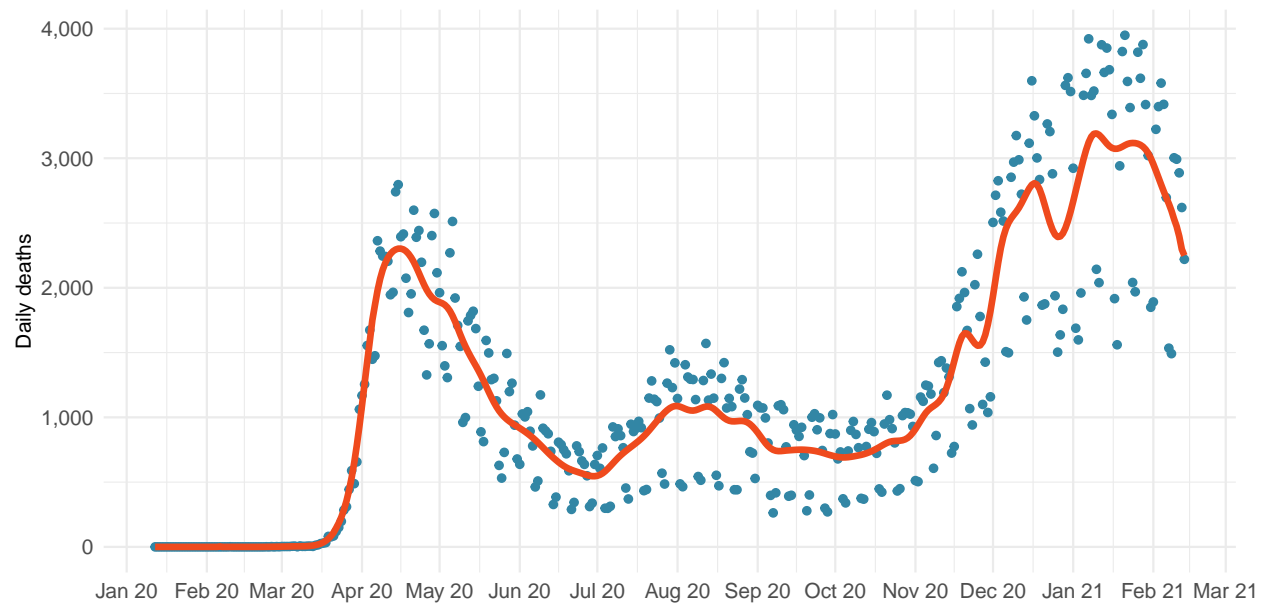
Figure 3. Daily COVID-19 death rate per 1 million on February 16, 2021
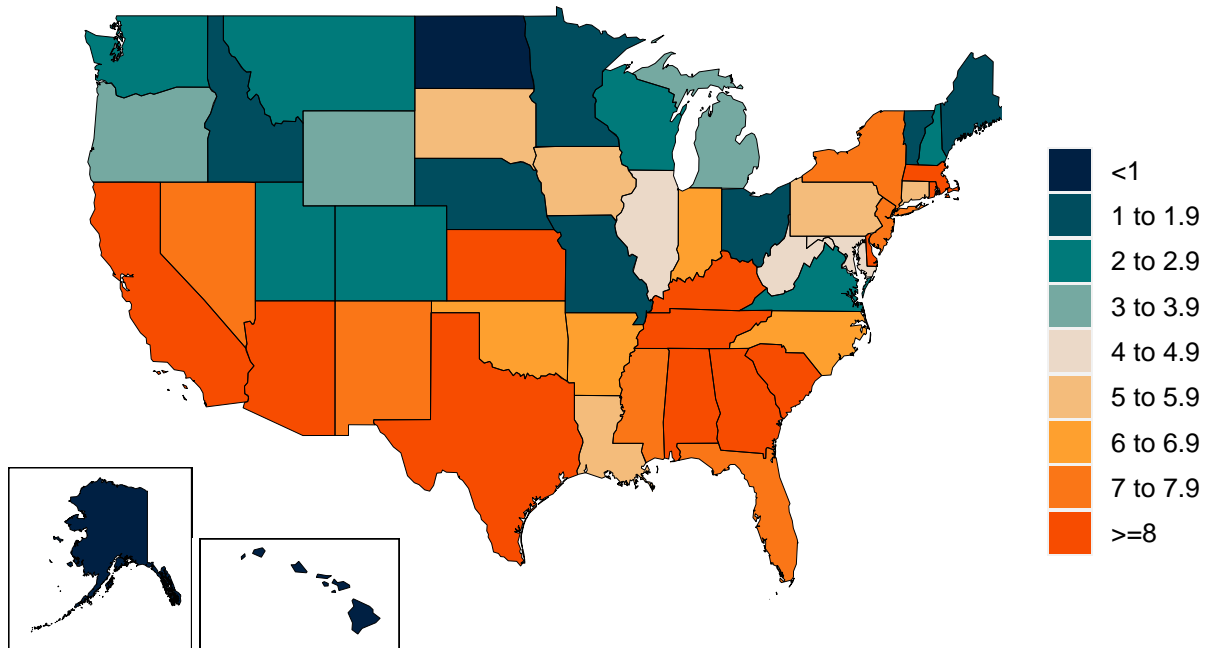
Figure 4. Estimated percent of the population infected with COVID-19 on February 16, 2021
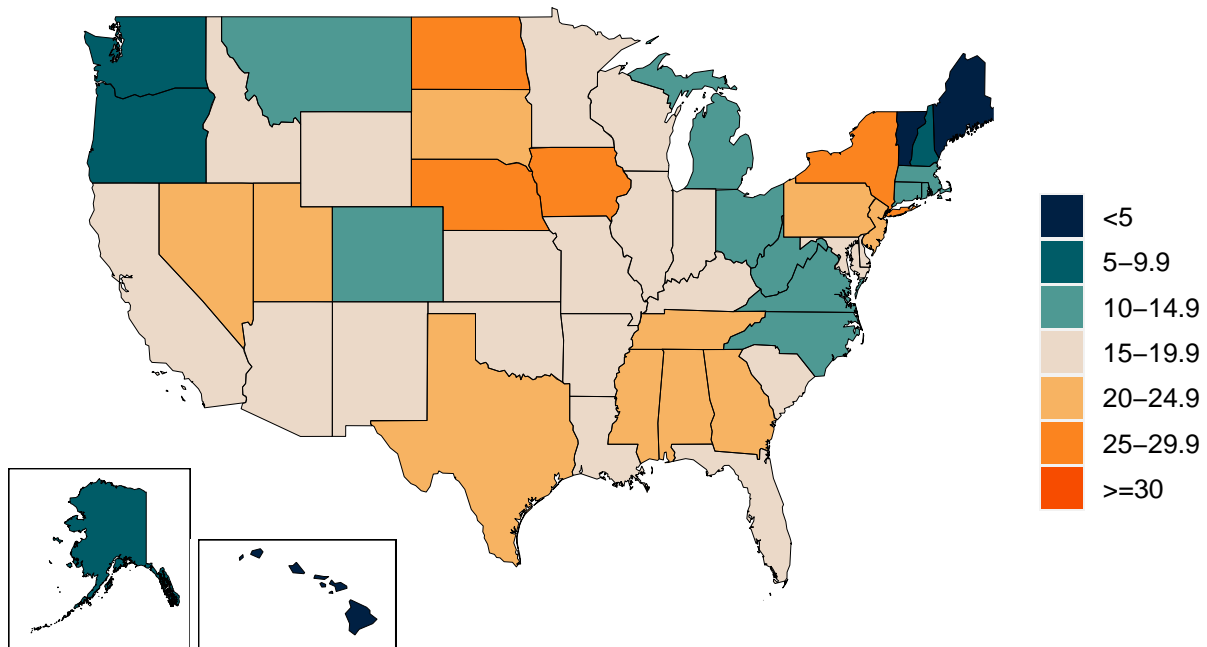
Figure 5. Mean effective R on February 05, 2021. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline, all other things being held the same.
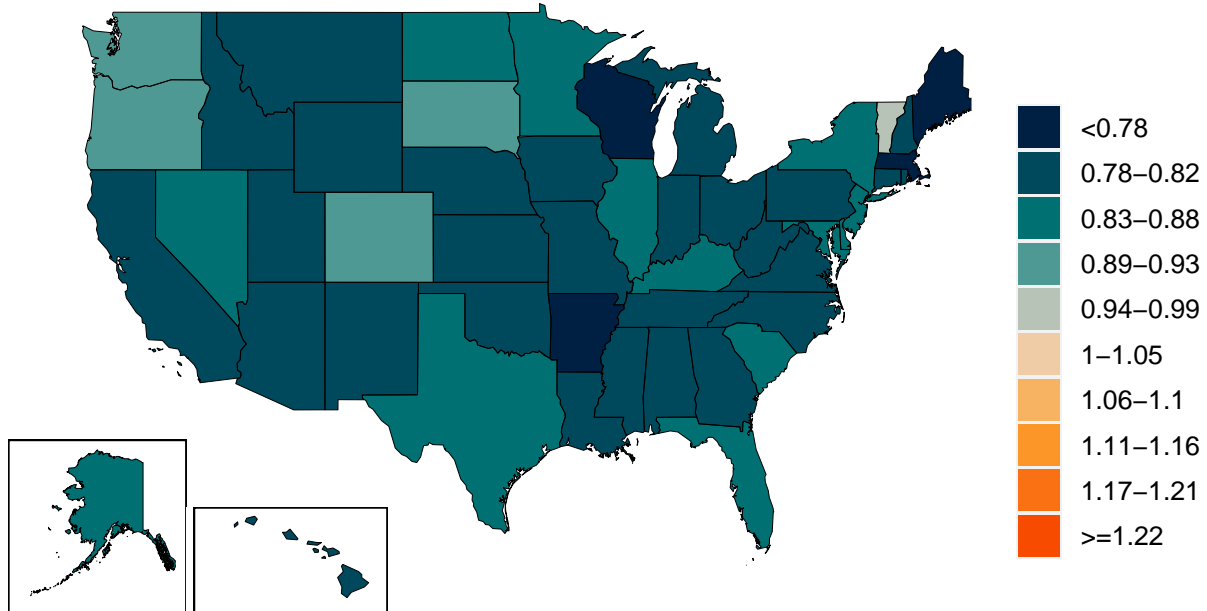
Figure 6. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.
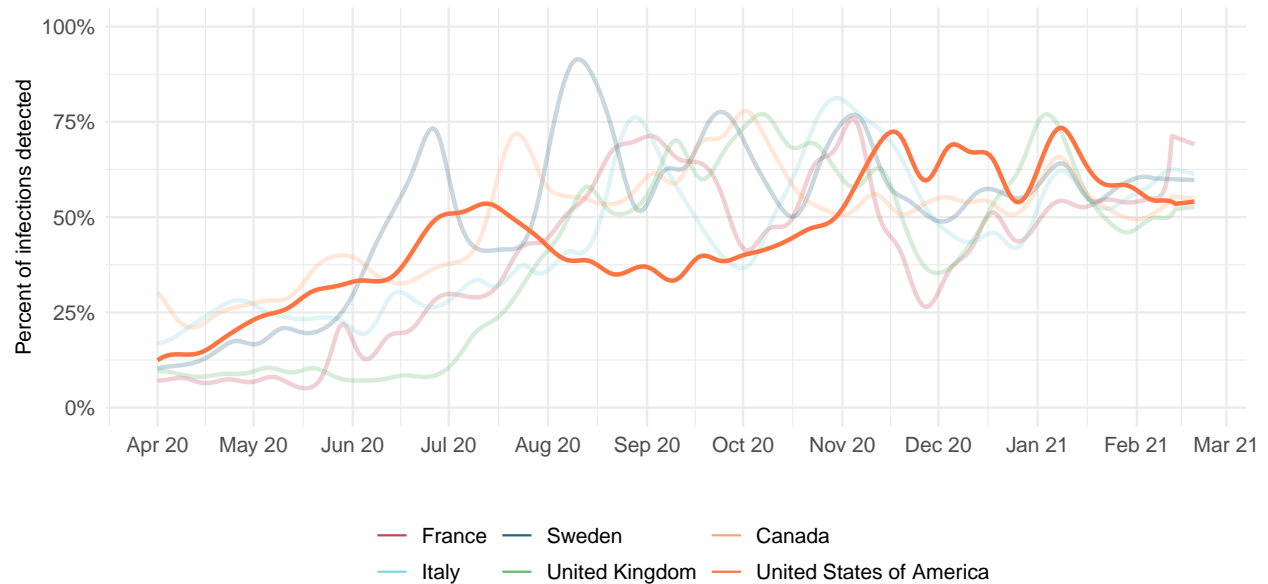
*Due to measurement errors in cases and testing rates, the infection to detection rate (IDR) can exceed 100% at particular points in time.

Critical drivers

Table 2. Current mandate implementation
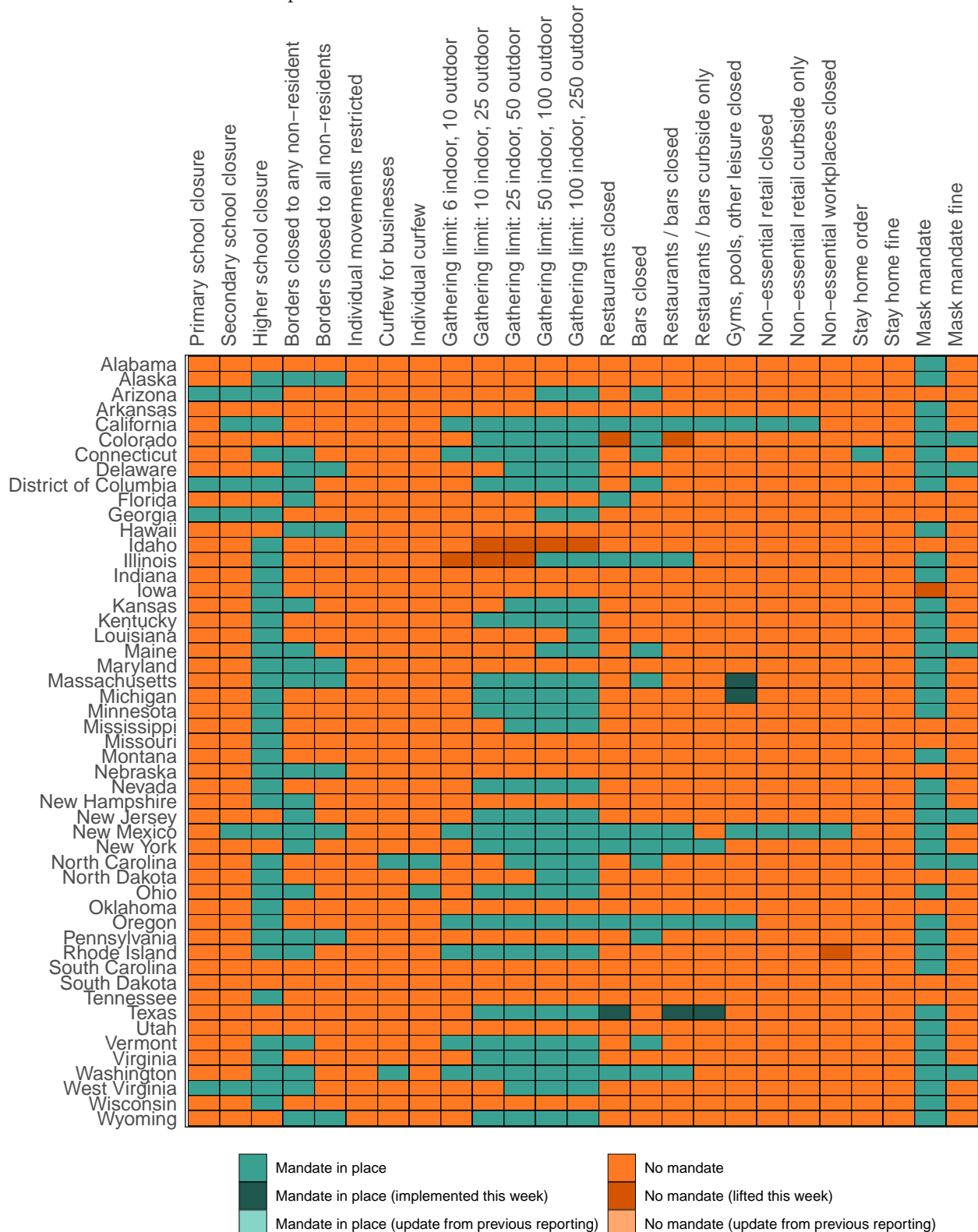
*Not all locations are measured at the subnational level.

Figure 7. Trend in mobility as measured through smartphone app use compared to January 2020 baseline
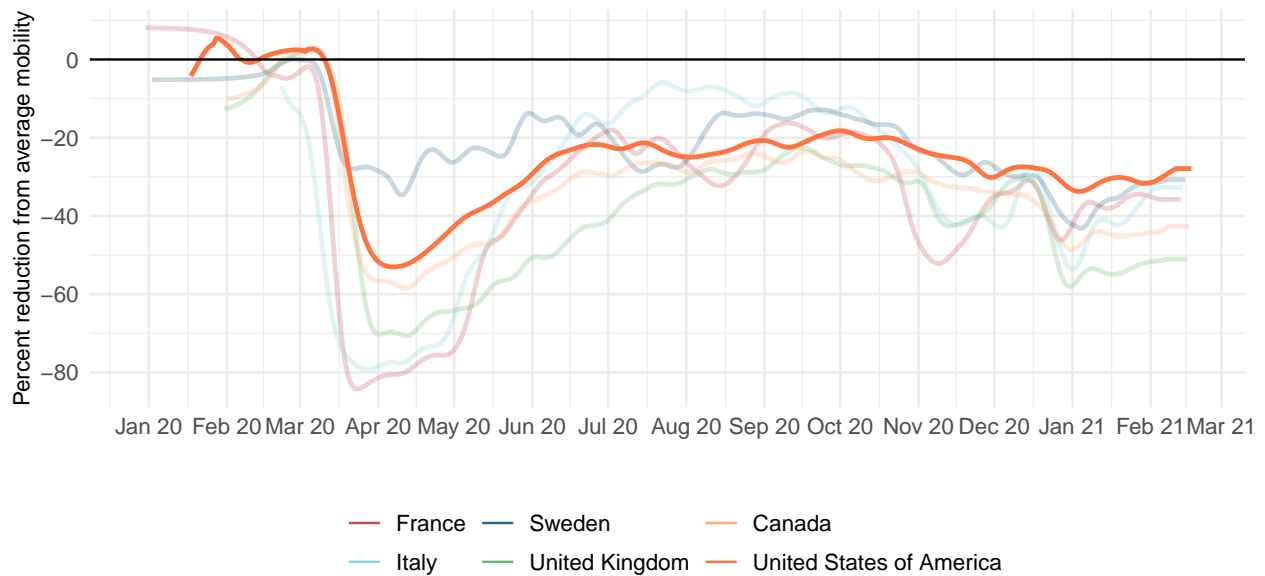
Figure 8. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on February 16, 2021
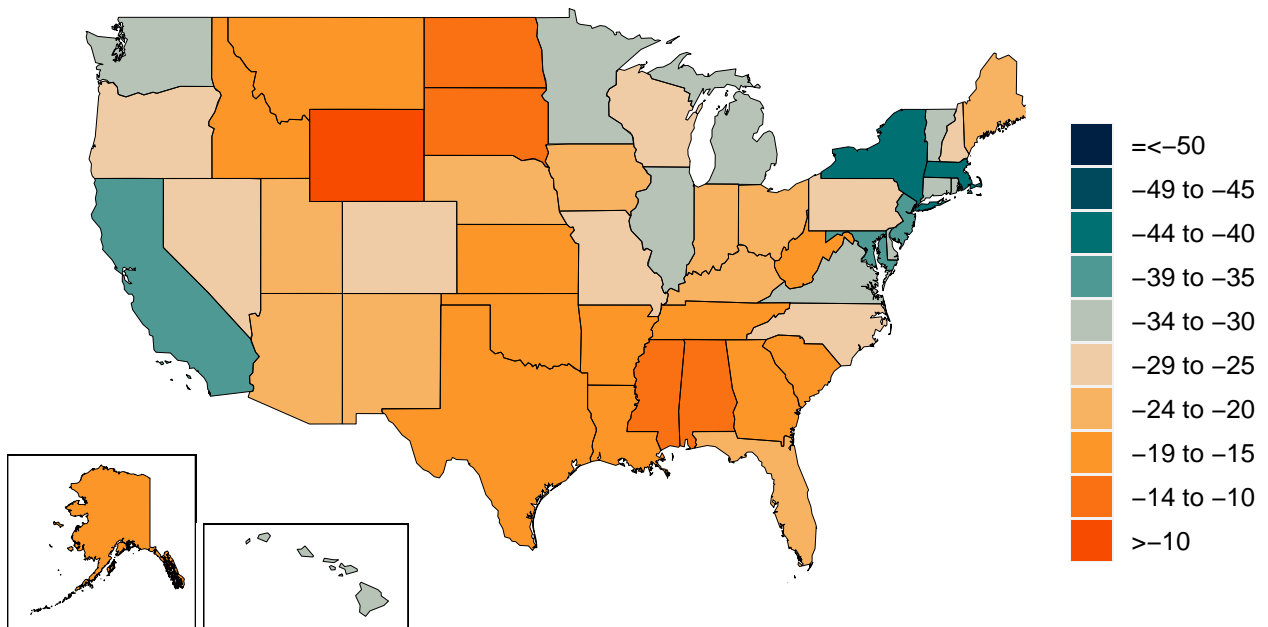
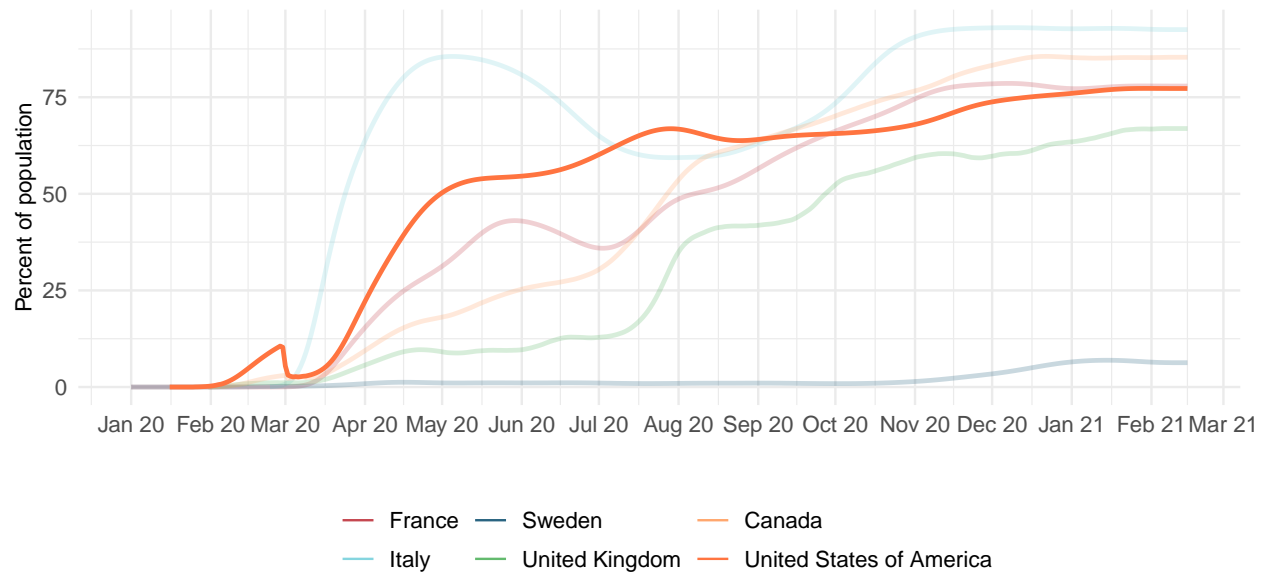**Figure 9.** Trend in the proportion of the population reporting always wearing a mask when leaving home

Figure 10. Proportion of the population reporting always wearing a mask when leaving home on February 16, 2021
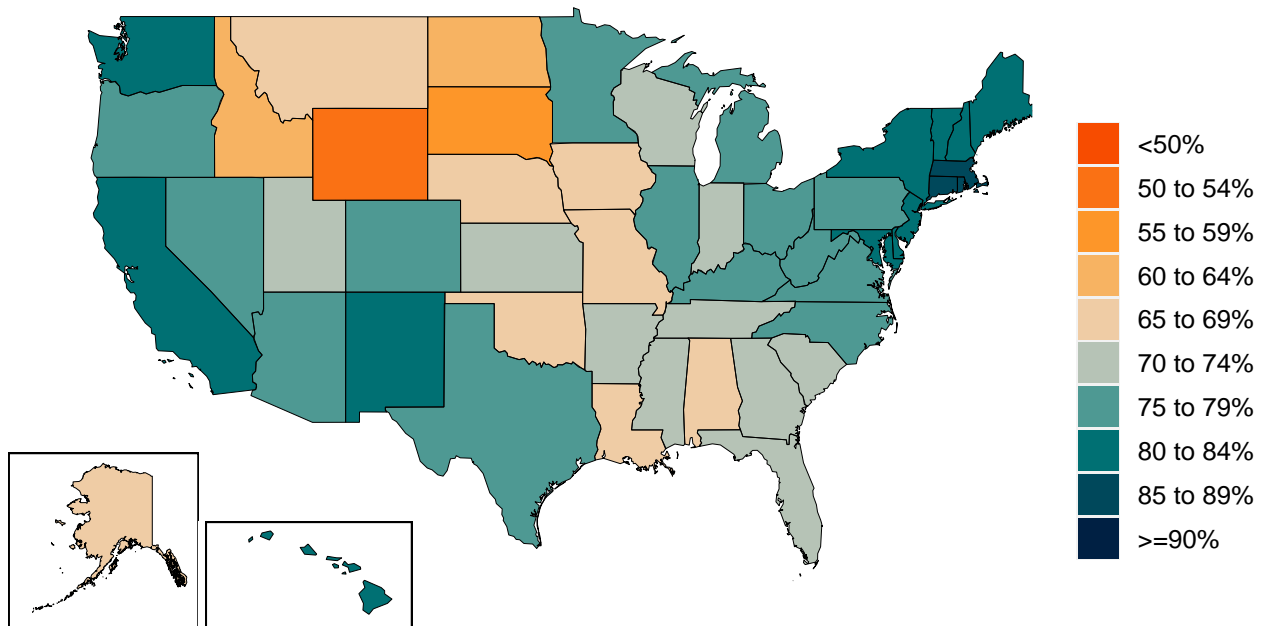
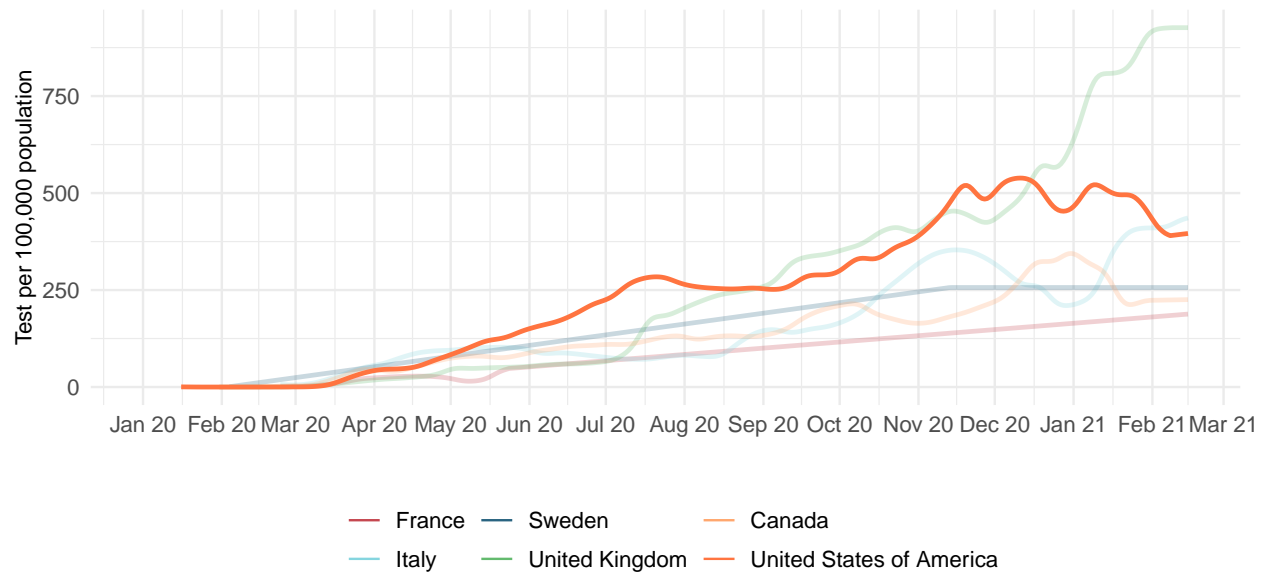**Figure 11.** Trend in COVID-19 diagnostic tests per 100,000 people

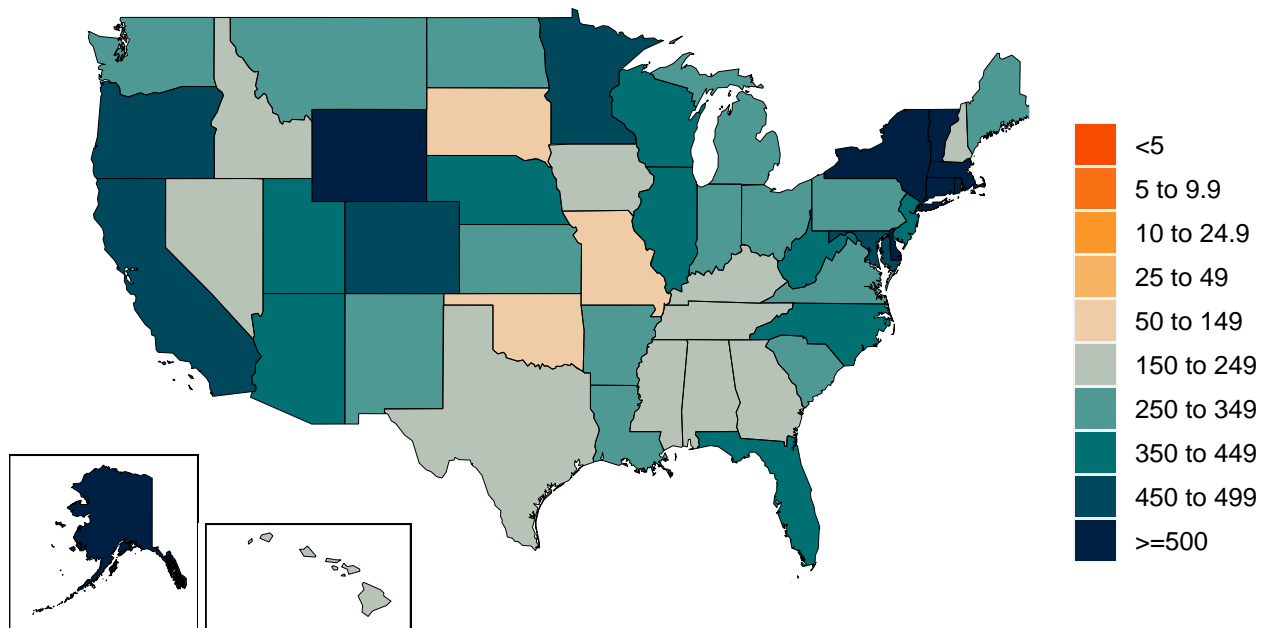**Figure 12.** COVID-19 diagnostic tests per 100,000 people on February 08, 2021

Figure 13. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020
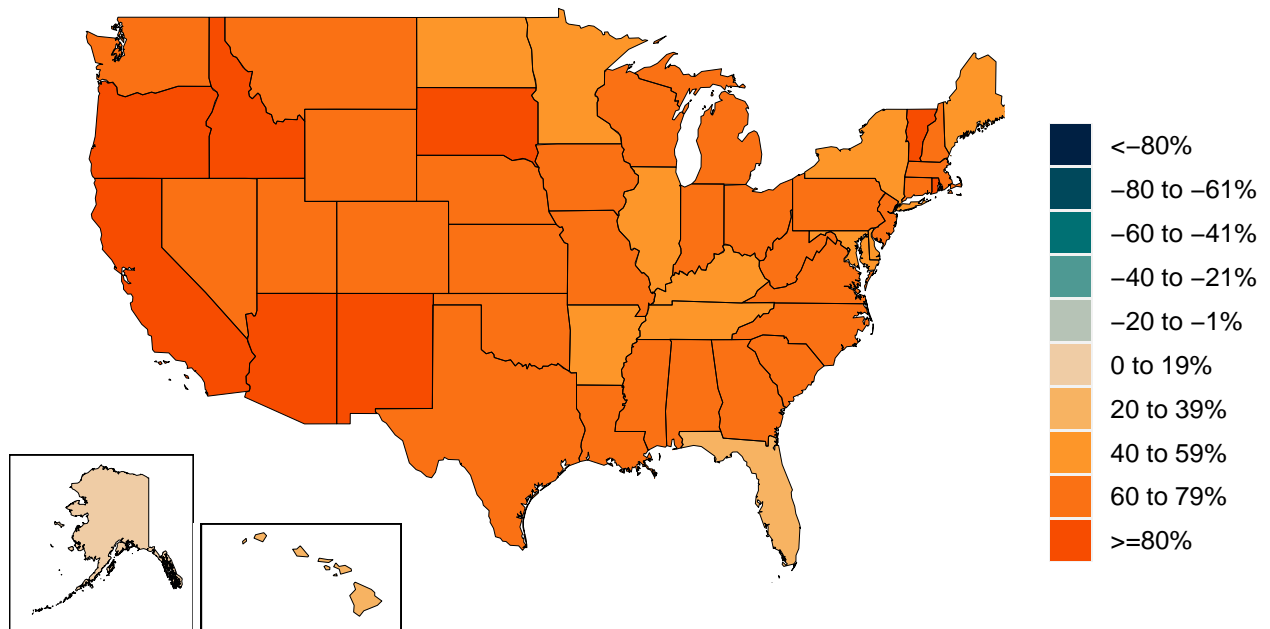
Figure 14. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and unsure).
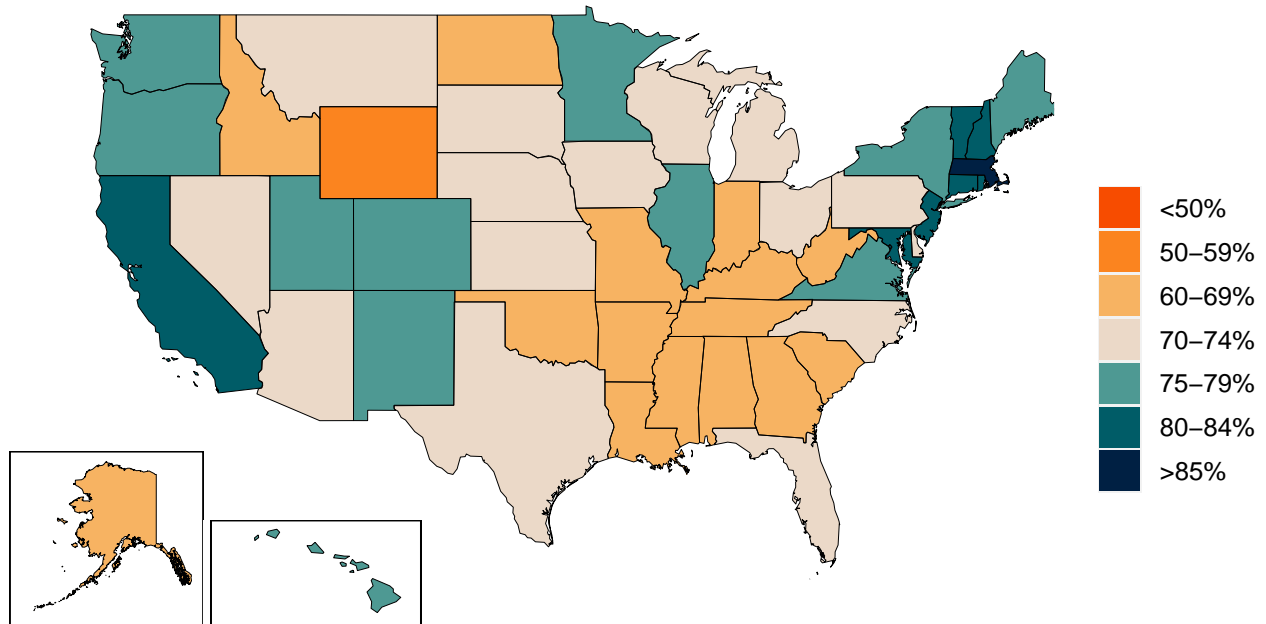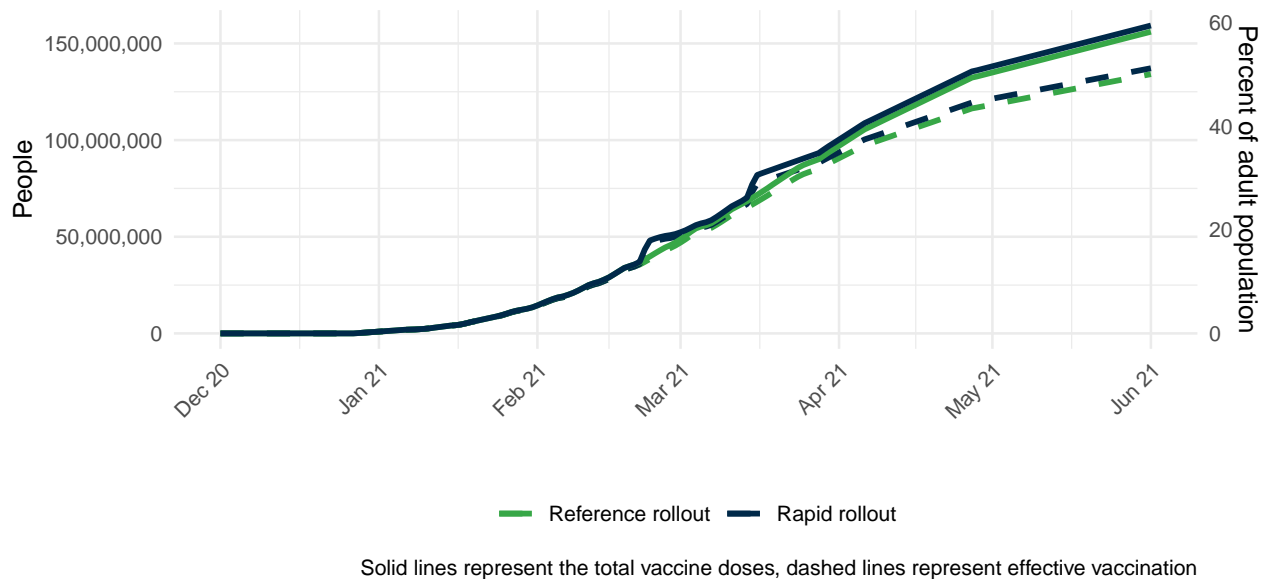

	<50%
	50–59%
	60–69%
	70–74%
	75–79%
	80–84%
	>85%

Figure 15. 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.

Reference rollout — Rapid rollout

Solid lines represent the total vaccine doses, dashed lines represent effective vaccination

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 UK.
- In one-quarter of those vaccinated, mobility increases toward pre-COVID-19 levels.

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

- First, it assumes that variants B.1.351 or P1 begin to spread within 2 weeks in all locations that do not already have B.1.351 or P1 community transmission.
- Second, it also 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.

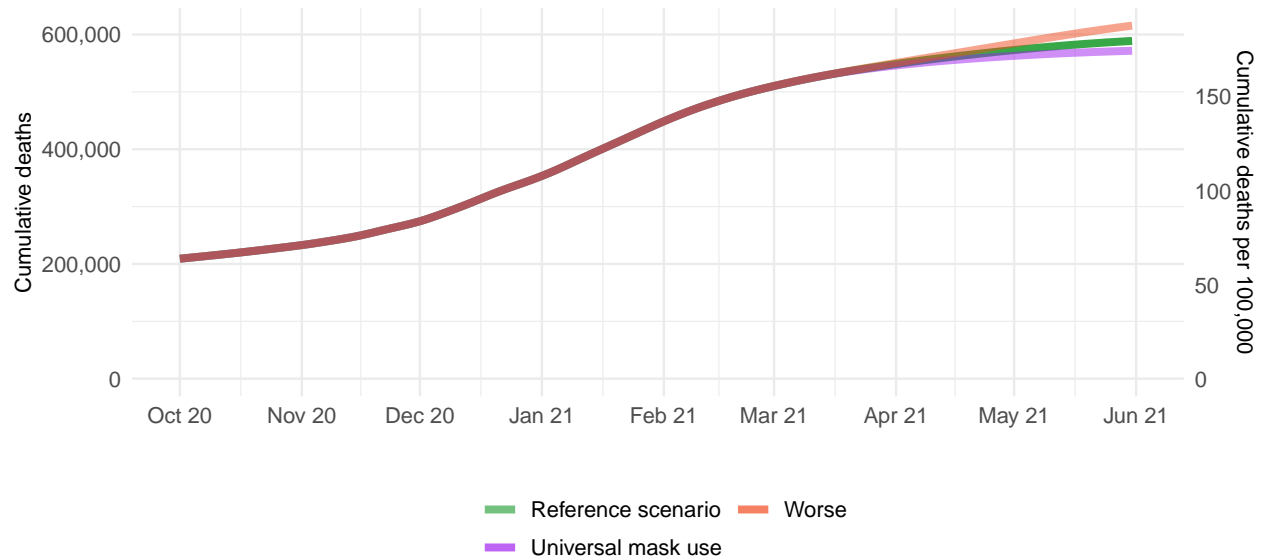**Figure 16.** Cumulative COVID-19 deaths until June 01, 2021 for three scenarios

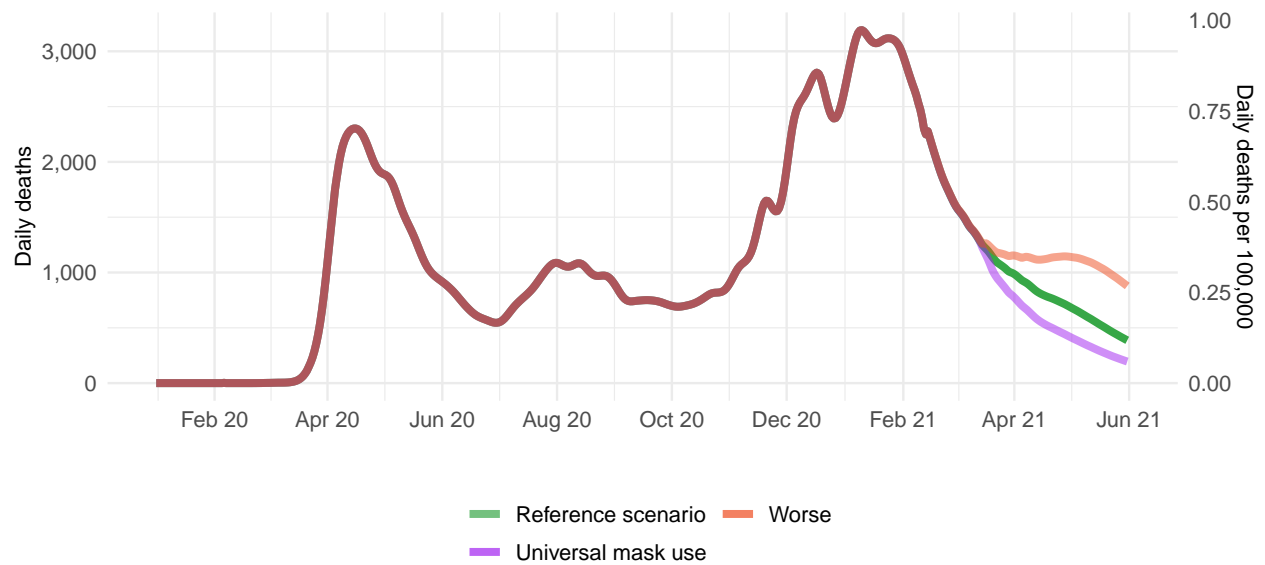**Figure 17.** Daily COVID-19 deaths until June 01, 2021 for three scenarios

Figure 18. Daily COVID-19 infections until June 01, 2021 for three scenarios
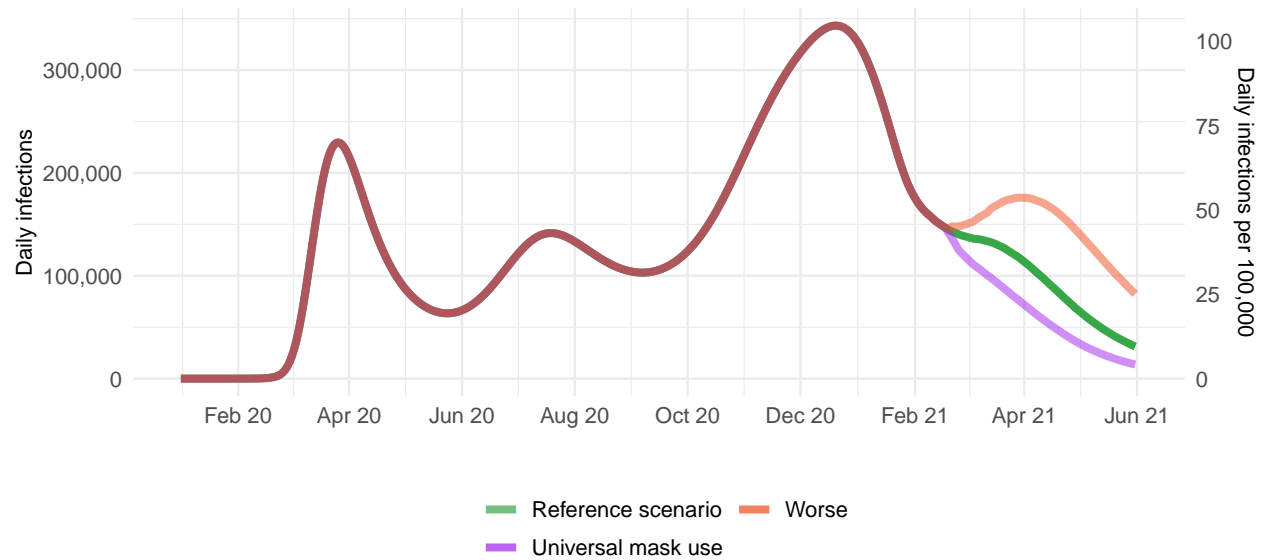
Figure 19. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), 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.
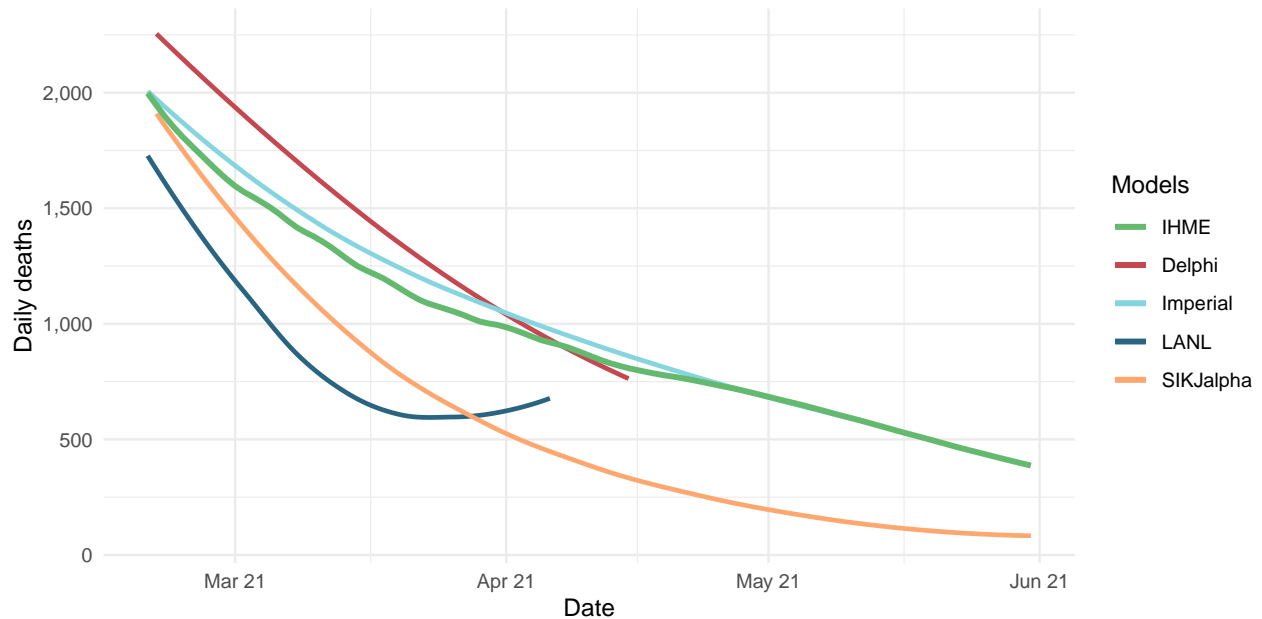
Figure 20. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and greater than 20% is considered *extreme stress*.
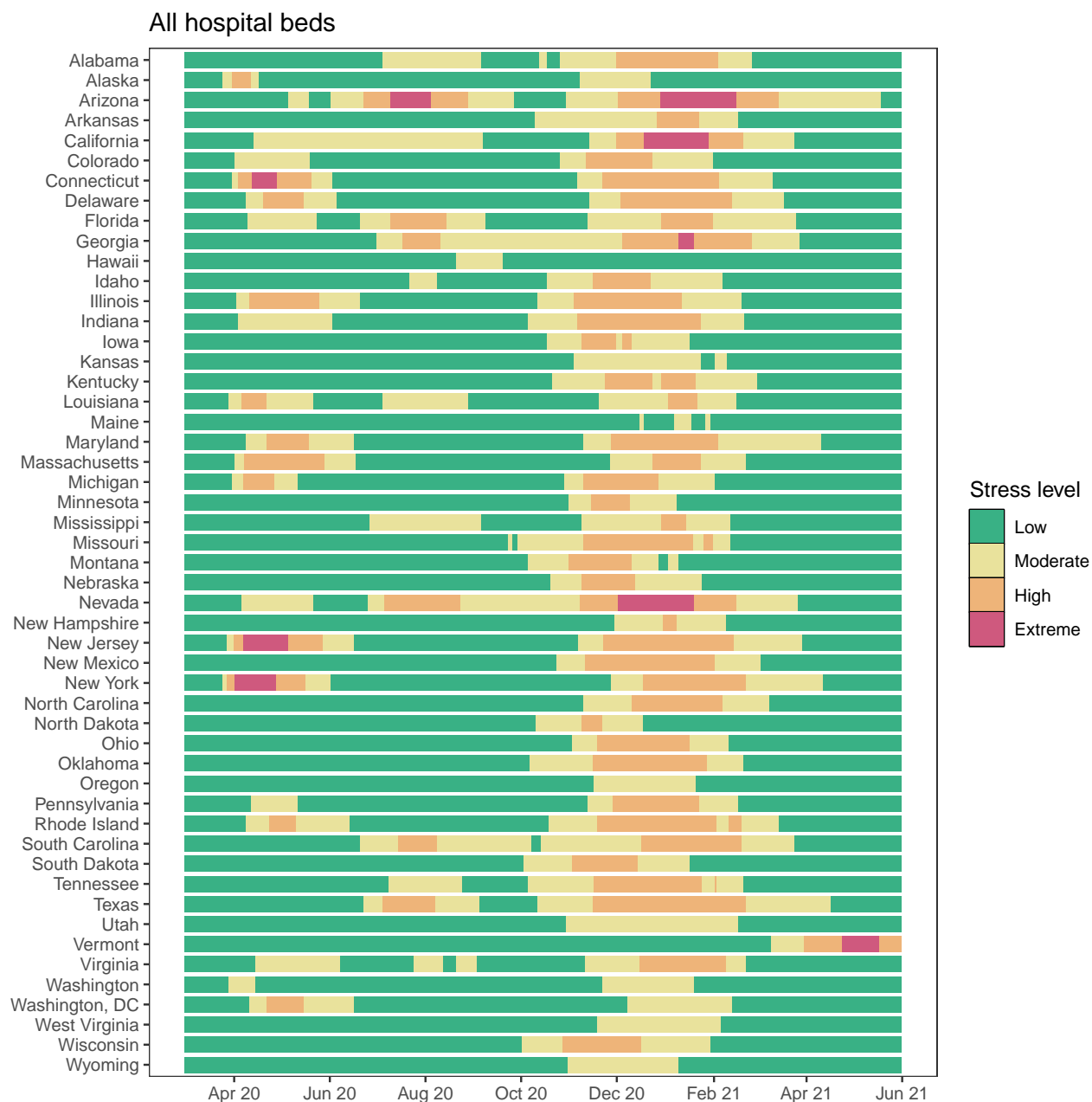

All hospital beds

Figure 21. 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*.
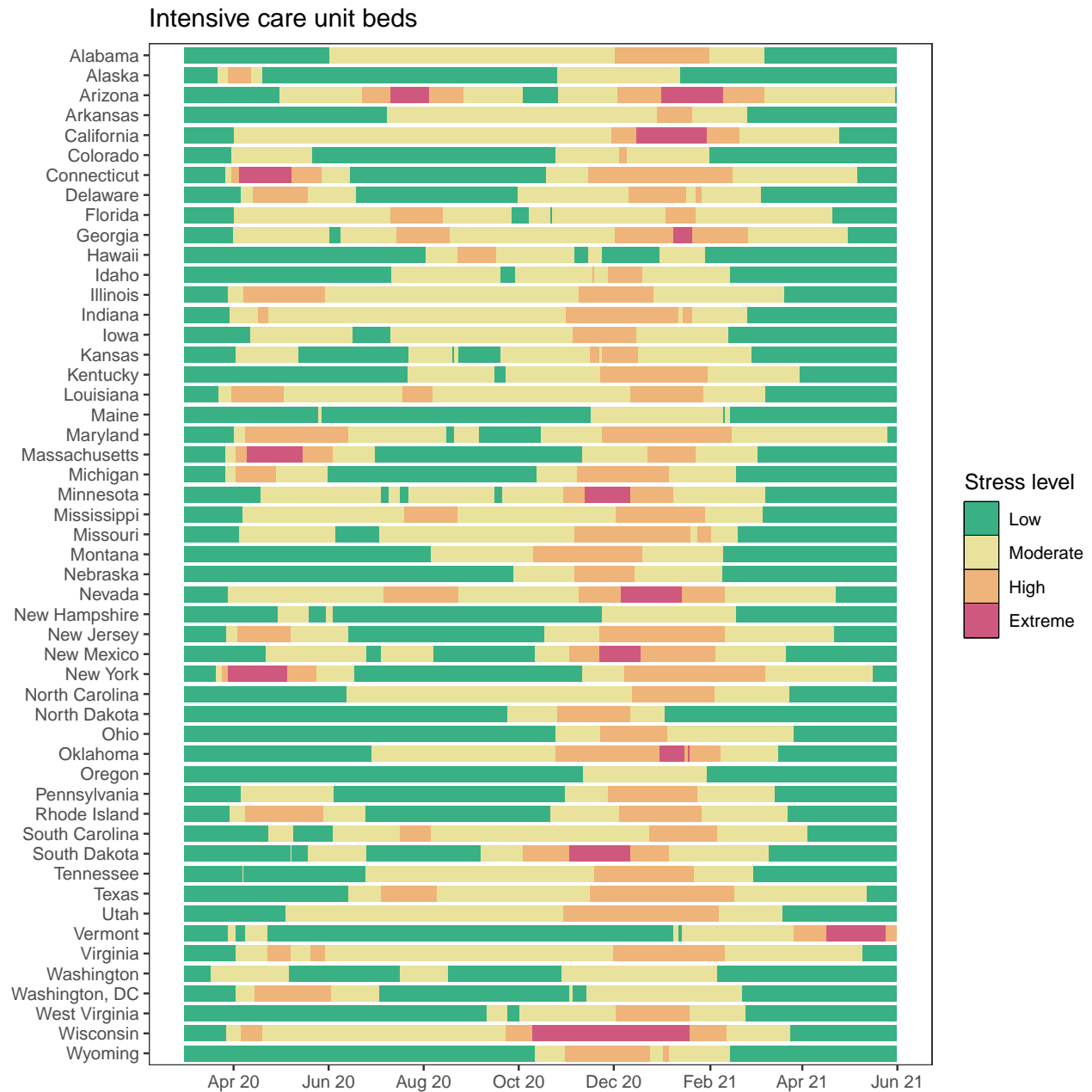
More information

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.