COVID-19 remained steady in the US over the last week while mobility and mask use continued to worsen. We expect a major surge in daily cases and deaths in November and December driven by seasonality and decreased vigilance.

Current situation

- The decline in national case numbers seen since late July flattened in the last week (Figure 1).
- Daily deaths have been relatively constant around 850 per day over the past week so that COVID-19 remains the number two cause of death in the US (Figure 2 and Table 1).
- States where the combination of data on cases, hospitalizations, and deaths suggest that transmission is increasing has shifted to Alabama, Colorado, Hawaii, Kansas, Missouri, New Jersey, New York, Virginia, and West Virginia (Figure 3).
- States where the COVID-19 death rate is over 4 per million are in a contiguous block from Texas through to South Carolina (Figure 6).

Trends in key drivers of transmission (mobility, mask use, testing, and seasonality)

- Evidence is consistently emerging that the US is becoming less vigilant. Mobility has been rising since August 1, albeit slowly (Figure 8).
- Mask use, as measured in the PREMISE surveys based on the response category of "always wear a mask when leaving home," has also been declining steadily since August 1. Only six states have mask use over 50% at this point: Alaska, California, Florida, Hawaii, Texas, and Virginia (Figure 9).

Projections

- We expect the daily death rate in the US, because of seasonality and declining public vigilance, to reach nearly 3,000 a day in December. Cumulative deaths expected by January 1 are 415,090; this is 222,522 deaths from now until the end of the year.
- The large increase in daily deaths expected in late November and December is driven by continued increases in mobility, declines in mask use, and – most importantly – seasonality. We estimate the likely impact of seasonality by examining the trends in the Northern and Southern Hemisphere. For example, Southern Hemisphere countries such as Argentina, Chile, southern Brazil, and South Africa had much larger epidemics than expected based on mobility, testing, and mask use. The statistical association between COVID-19 transmission rates and pneumonia seasonality patterns is strong and is the basis for our estimate of the magnitude of the seasonal increase that is expected.
- If a herd immunity strategy is pursued, meaning no further government intervention is taken from now to January 1, then the death toll could increase to 611,784 by January 1. Compared to the reference scenario, this would be 196,694 more deaths from now to the end of the year.
- Increasing mask use remains an extraordinary opportunity for the US. Increasing mask use to the levels seen in Singapore would decrease the cumulative US death toll to 298,589, or 116,501 lives saved compared to the reference scenario.

Model updates

- Clinical experience suggests that case management of COVID-19 has improved through oxygenation/ventilation methods and use of dexamethasone and remdesivir. This improved management would manifest itself as a reduction in the infection-fatality rate at each age. We have looked for statistical evidence of this shift in two ways. First, we have examined the COVID-19 admission-fatality rate – the number of deaths divided by hospital admissions. To date, the admission-fatality rate has remained constant since April. This could be explained by

two possible factors: either there is no change in the infection-fatality rate or the infection-fatality rate has declined and hospitals are admitting only more severe patients over time. Second, we have looked at the directly measured infection-fatality rate using seroprevalence studies. To date, we have not detected any statistically significant decrease in the infection-fatality rate. We will continue testing on a regular basis for statistical evidence of the infection-fatality rate declining.

COVID-19 Results Briefing: United States of America

Institute for Health Metrics and Evaluation (IHME)

September 11, 2020

This briefing contains summary information on the latest projections from the IHME model on COVID-19 in United States of America. The model was run on September 10, 2020.

Model updates

Updates to the model this week include additional data on deaths, cases, and updates on covariates.

Current situation

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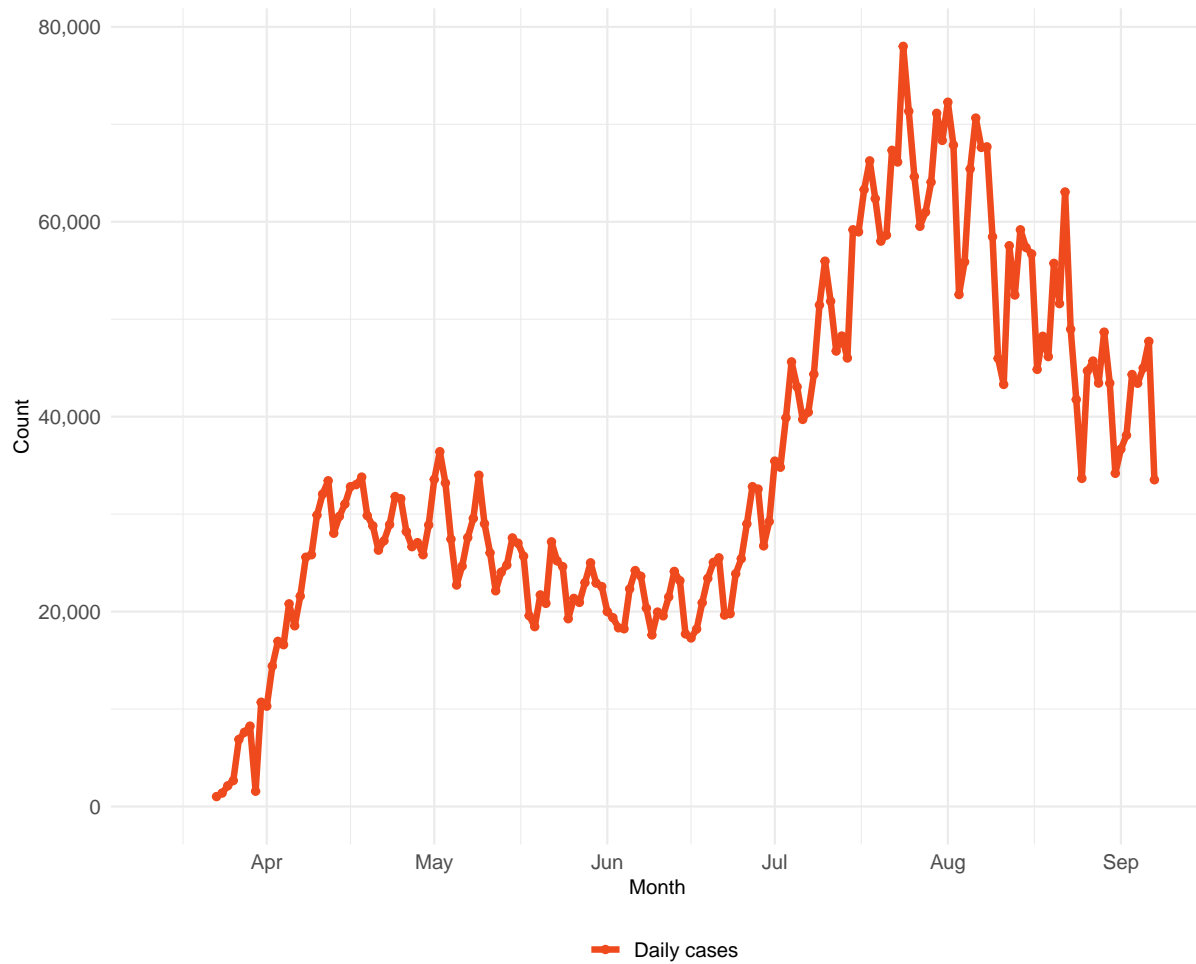
Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	10,724	1
COVID-19	5,984	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 and smoothed trend estimate
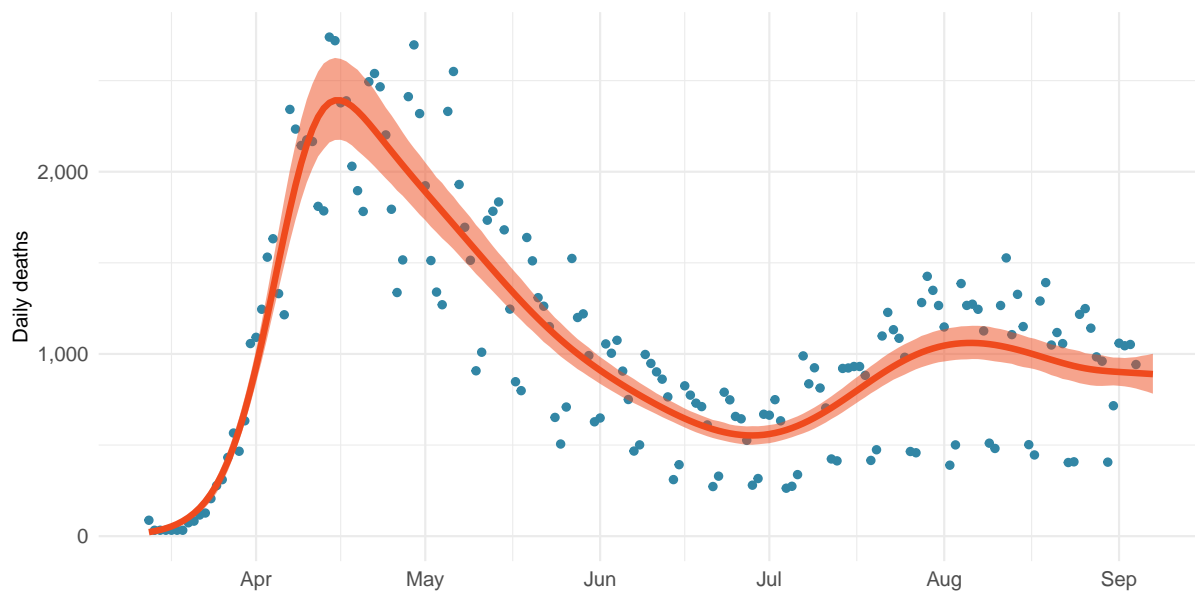
Figure 2b. Estimated cumulative deaths by age group
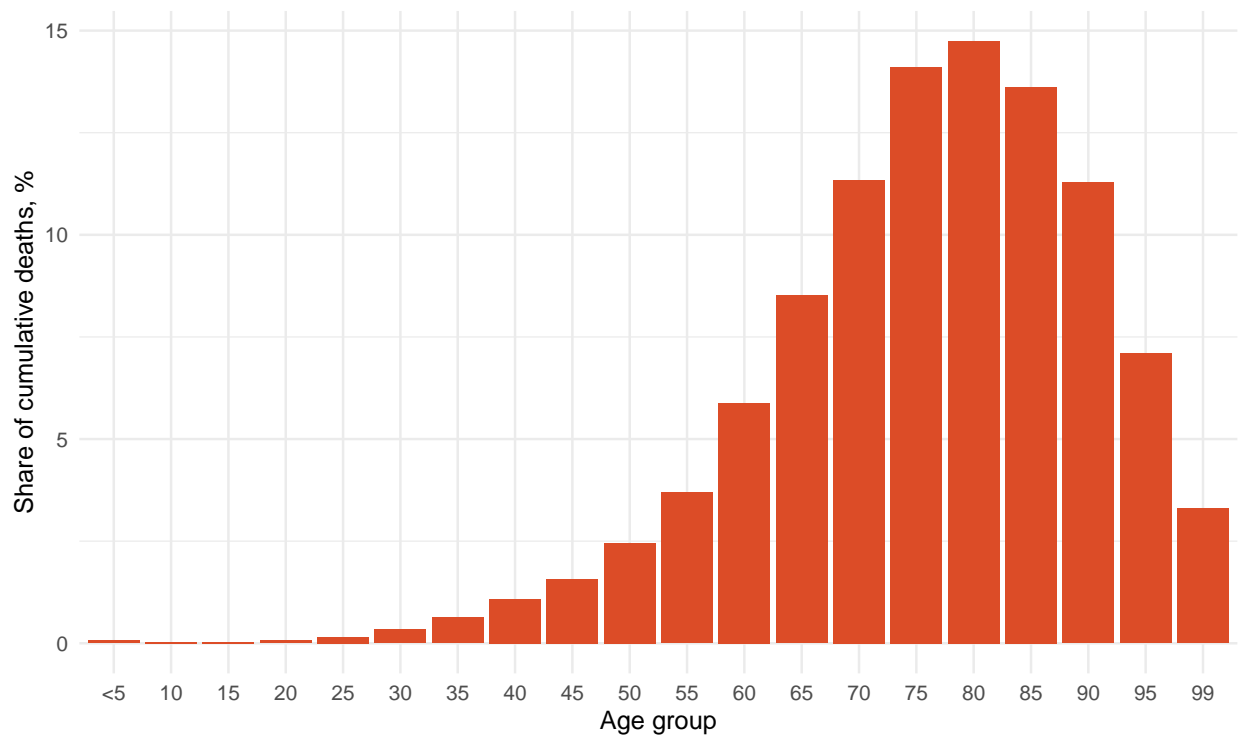
Figure 3. Mean effective R on August 28, 2020. The estimate of effective R is based on the combined analysis of deaths, case reporting and hospitalizations where available. Current reported cases reflect infections 11-13 days prior so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline all other things being held the same.
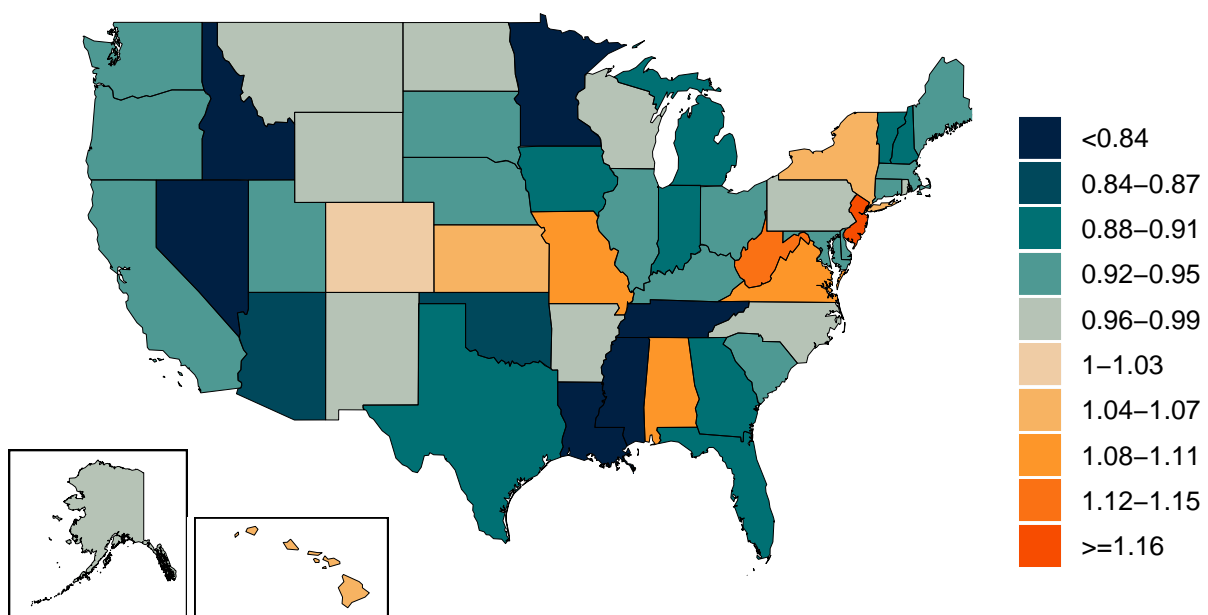
Figure 4. Estimated percent infected with COVID-19 on September 08, 2020
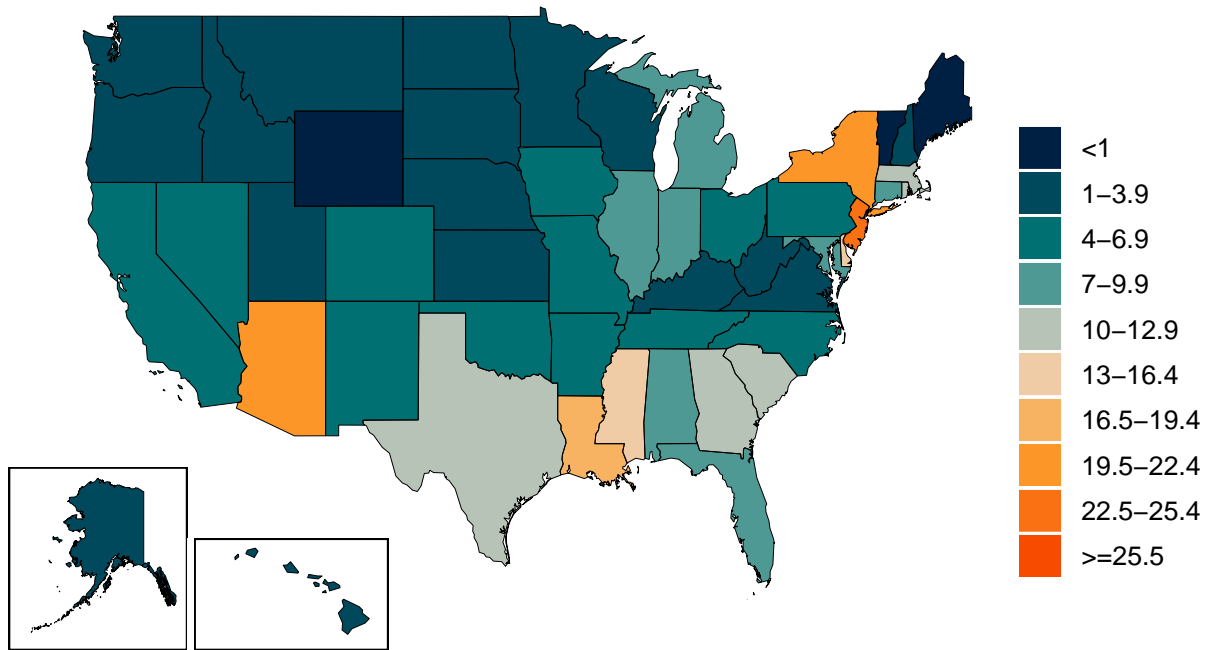
Figure 5. Percent of COVID-19 infections detected. This is estimated as the ratio of reported COVID-19 cases to estimated COVID-19 infections based on the SEIR model.
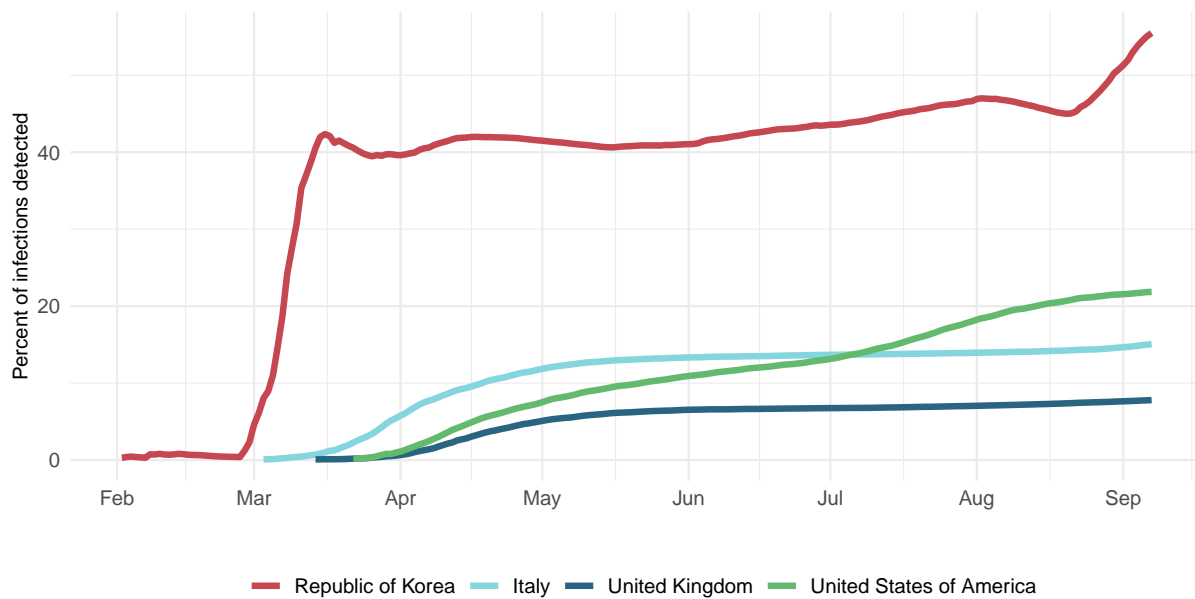
Figure 6. Daily COVID-19 death rate per 1 million on September 08, 2020
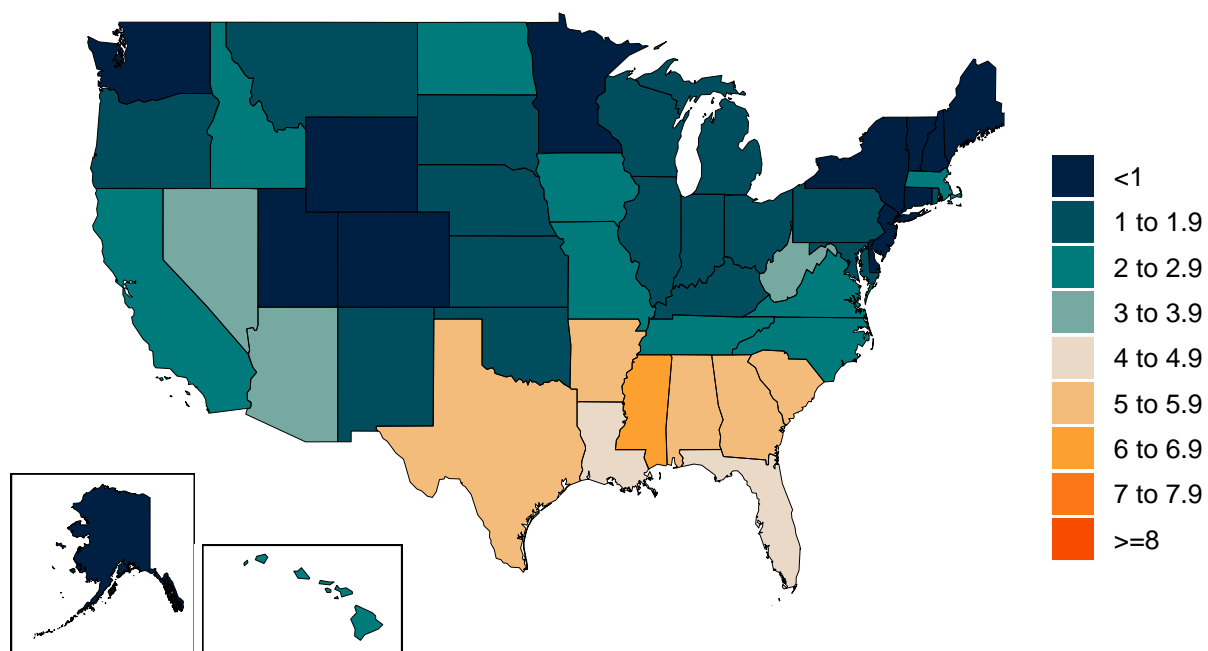
Critical drivers

Table 2. Current mandate implementation

Figure 7. Total number of mandates

Mandate imposition timing
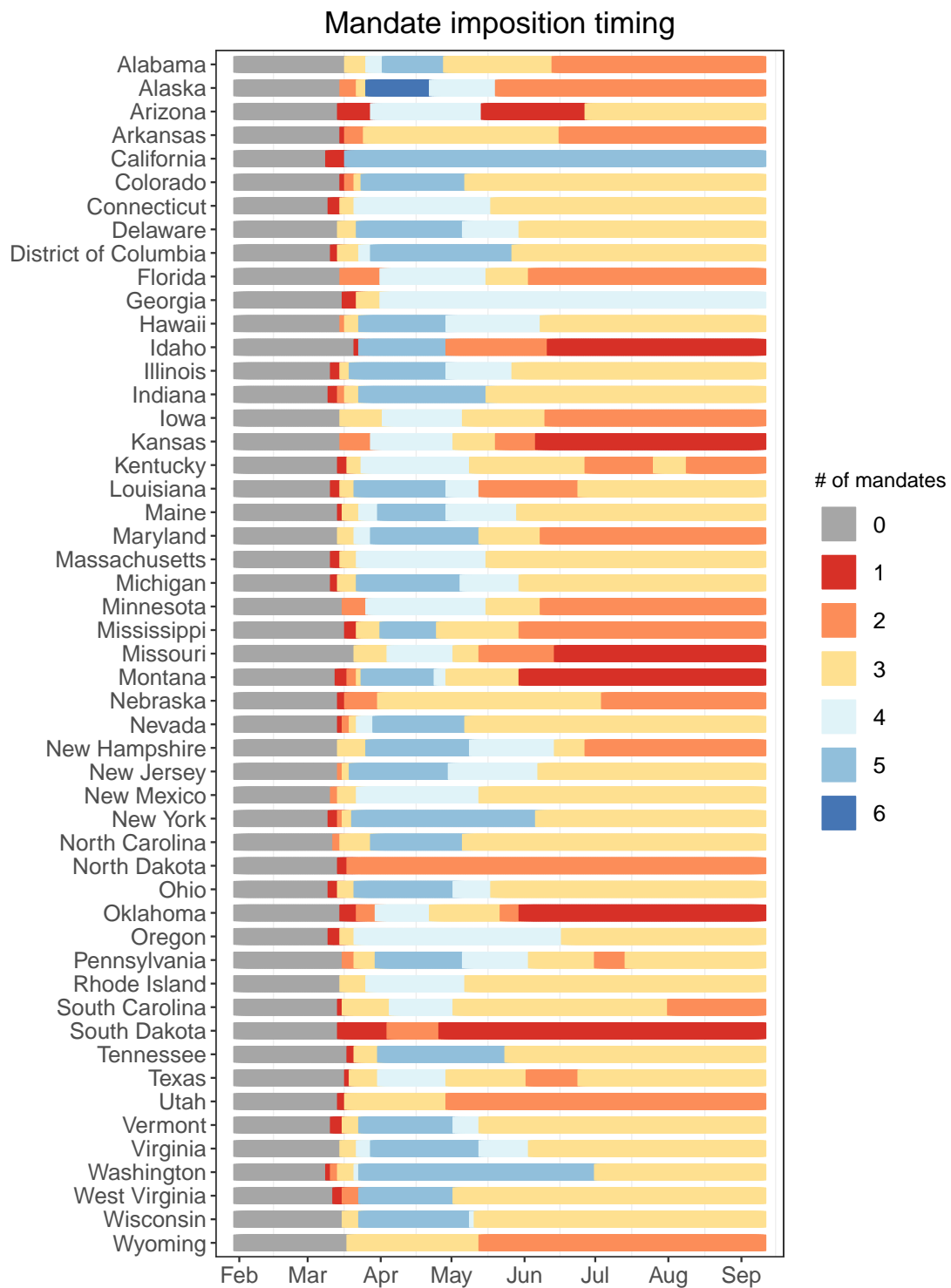
Figure 8a. Trend in mobility as measured through smartphone app use compared to January 2020 baseline
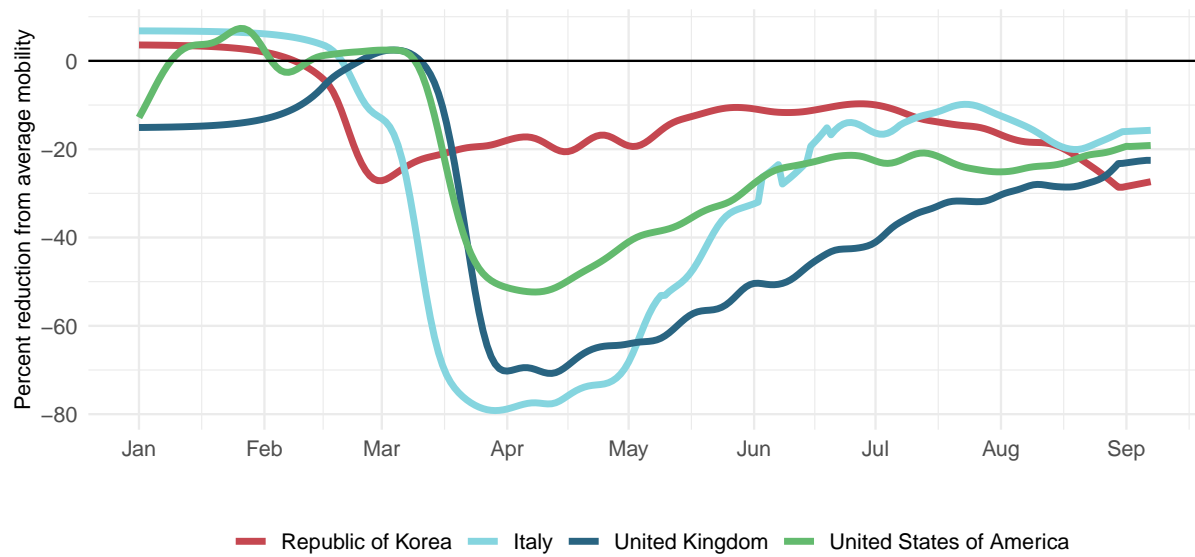
Figure 8b. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent)
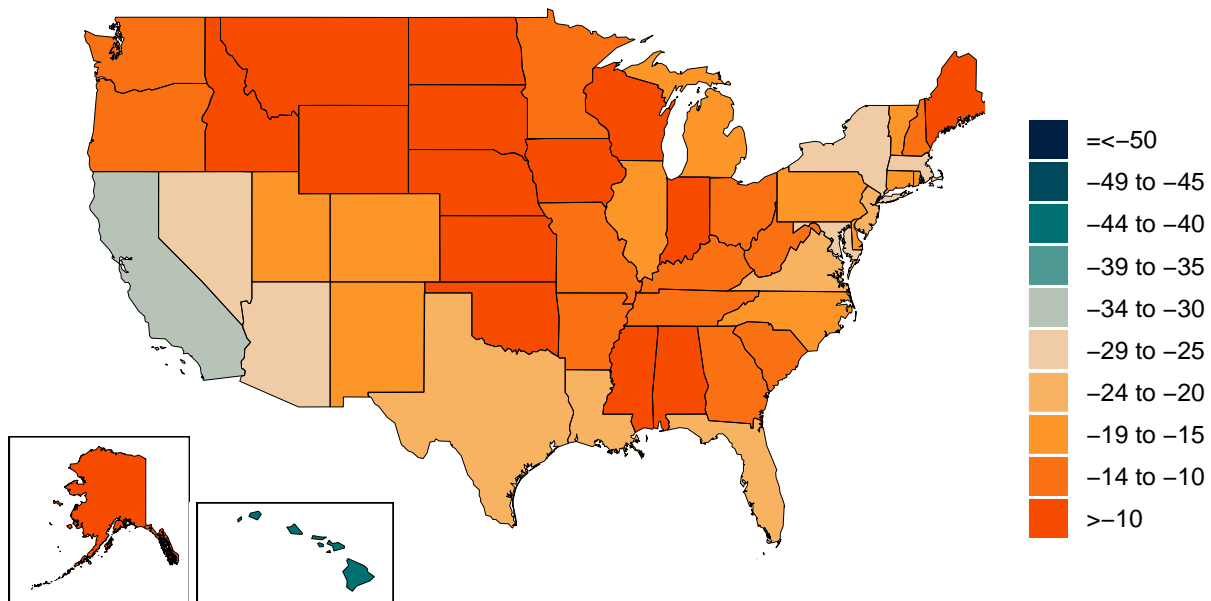
Figure 9a. Trend in the proportion of the population reporting always wearing a mask when leaving home
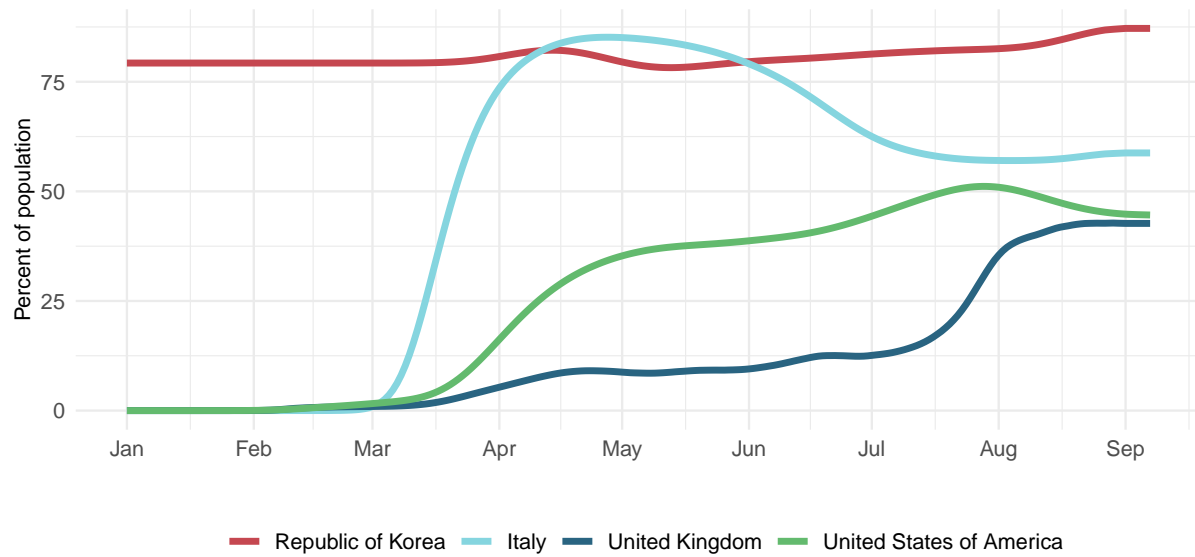
Figure 9b. Proportion of the population reporting always wearing a mask when leaving home on September 08, 2020
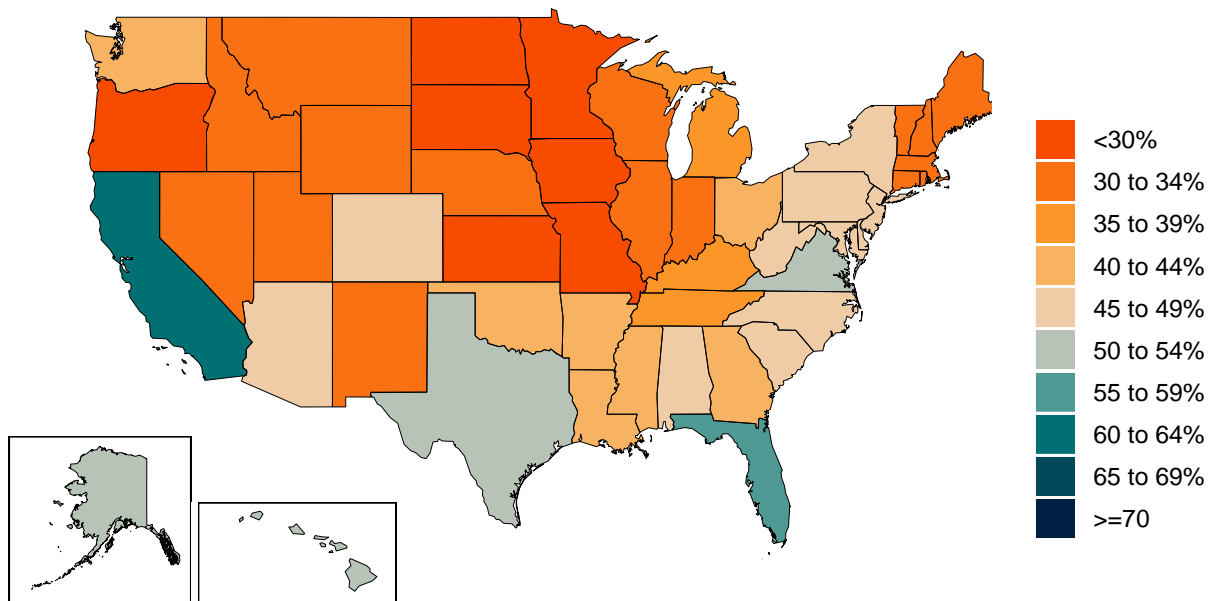
Figure 10a. Trend in COVID-19 diagnostic tests per 100,000 people
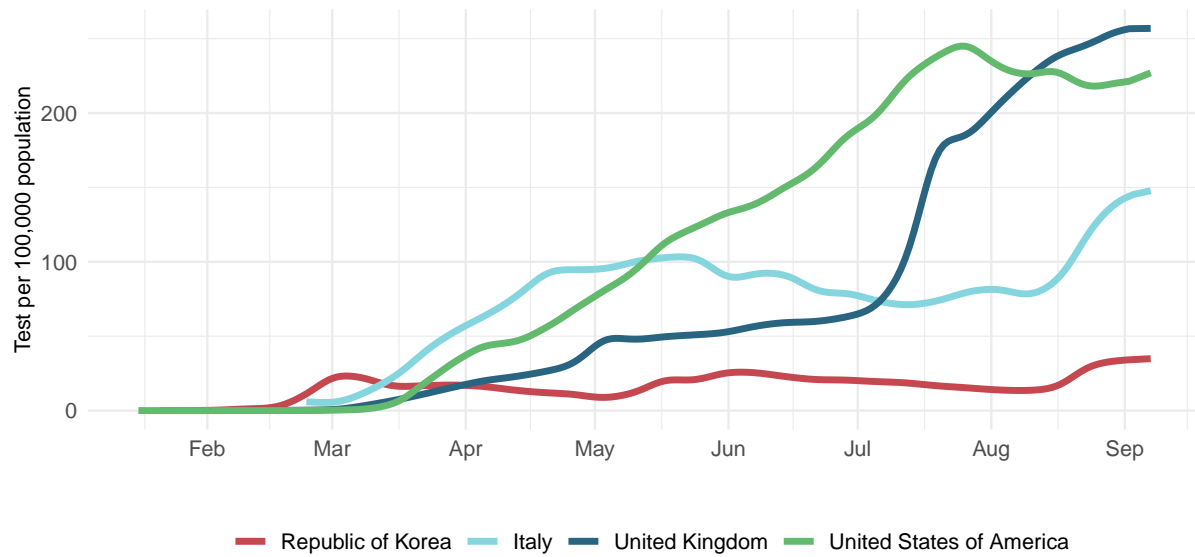
Figure 10b. COVID-19 diagnostic tests per 100,000 people on September 03, 2020
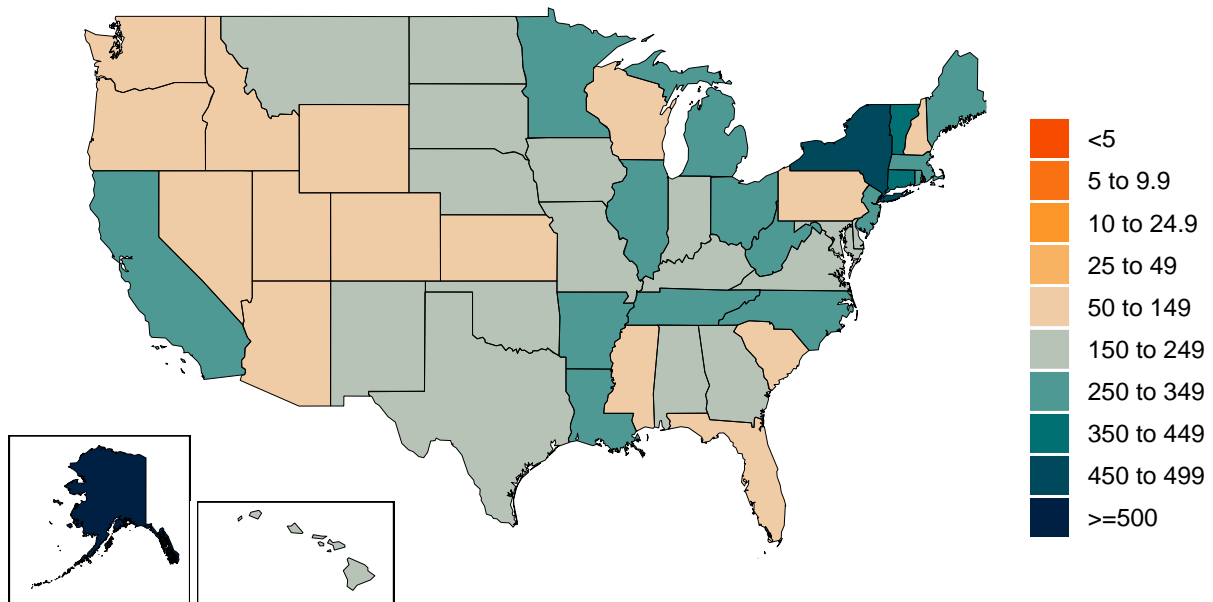
Figure 11. Increase in the risk of death due to pneumonia on February 1 compared to August 1
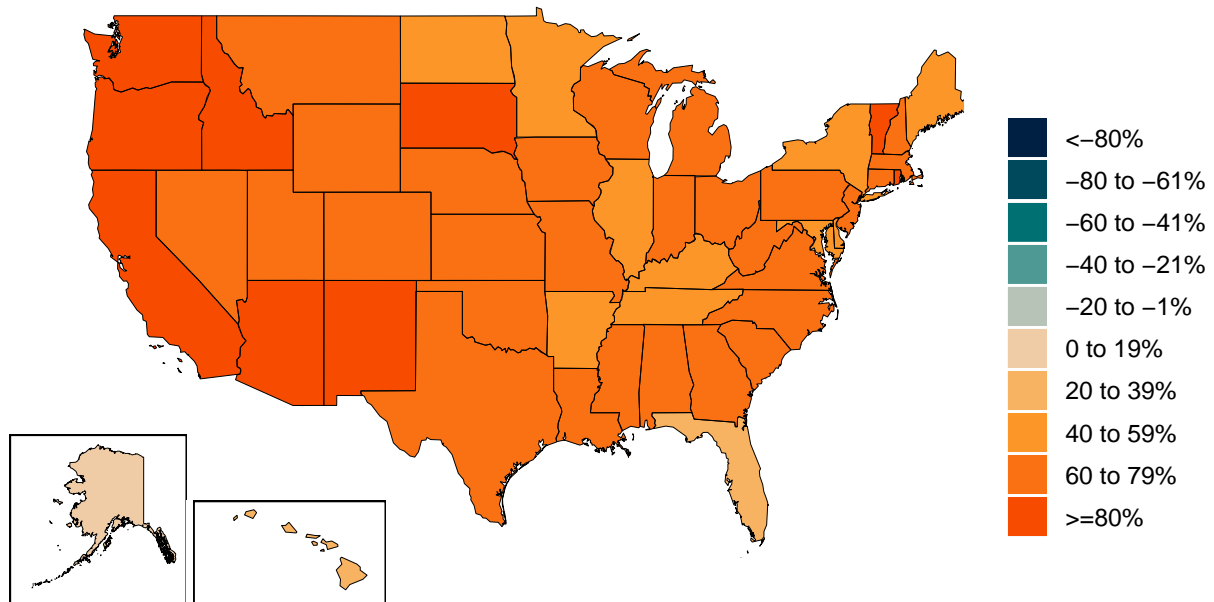
Projections and scenarios

We produce three scenarios when projecting COVID-19. The reference scenario is our forecast of what we think is most likely to happen. 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.

Figure 12. Cumulative COVID-19 deaths until January 01, 2021 for three scenarios.
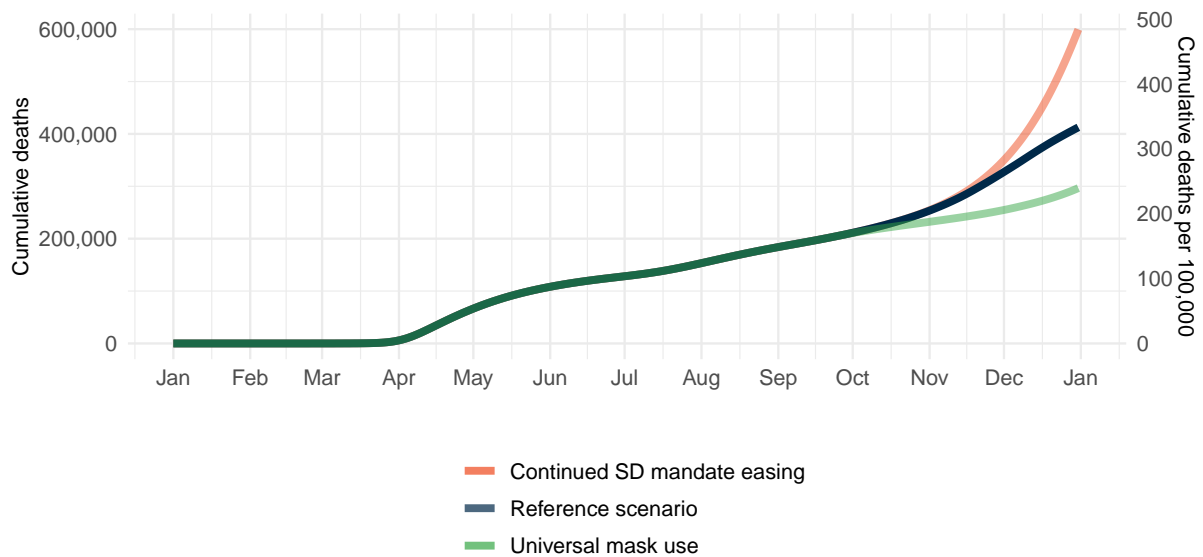
Fig 13. Daily COVID-19 deaths until January 01, 2021 for three scenarios.
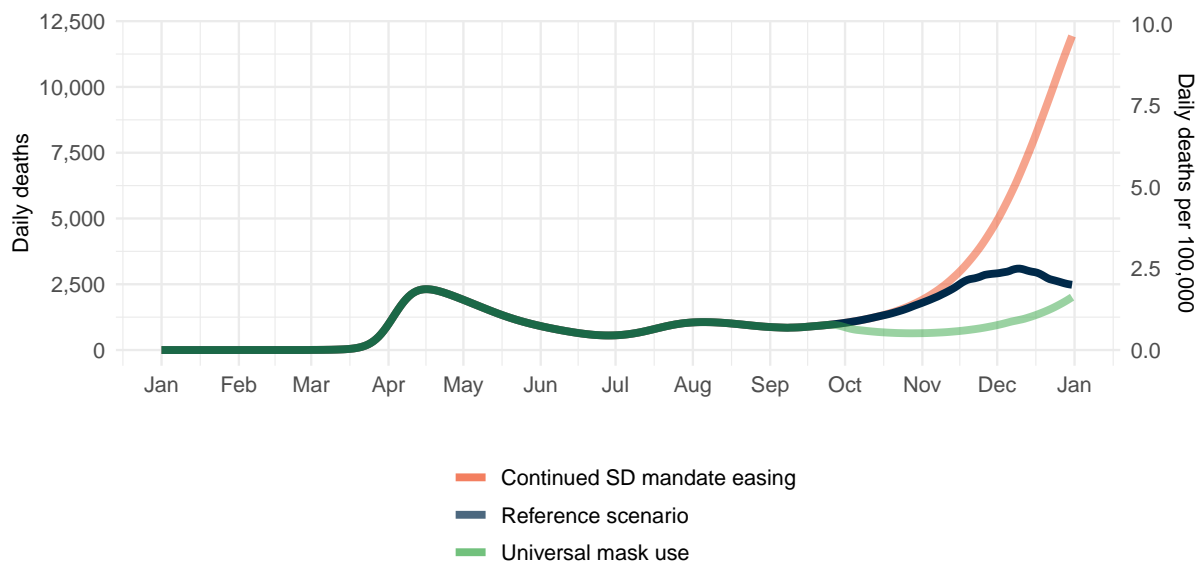
Fig 14. Daily COVID-19 infections until January 01, 2021 for three scenarios.

- Continued SD mandate easing
- Reference scenario
- Universal mask use
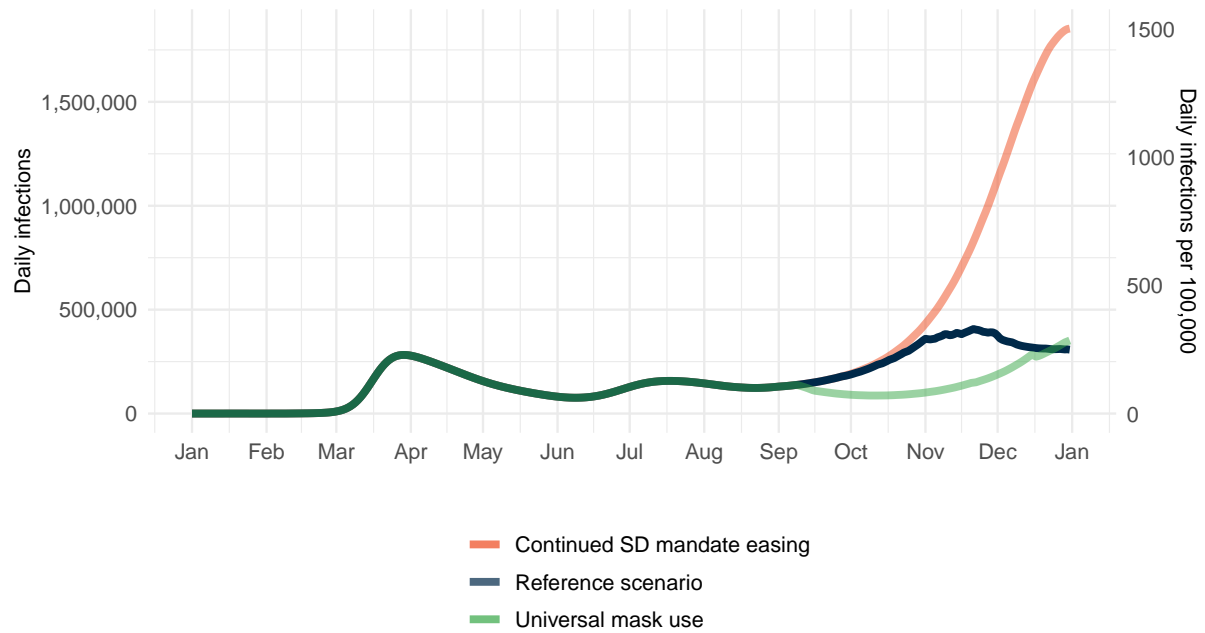
Fig 15. Month of assumed mandate re-implementation. (Month when daily death rate passes 8 per million, when reference scenario model assumes mandates will be re-imposed.)

- September
- October
- November
- December
- No mandates before Jan 1
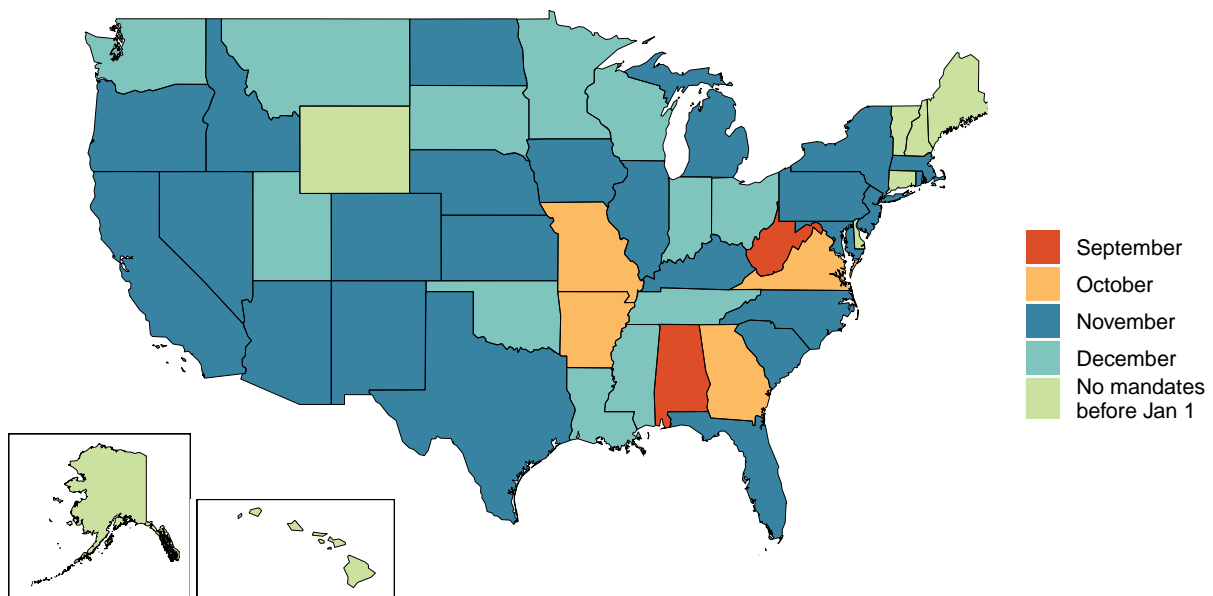
Figure 16. Forecasted percent infected with COVID-19 on January 01, 2021
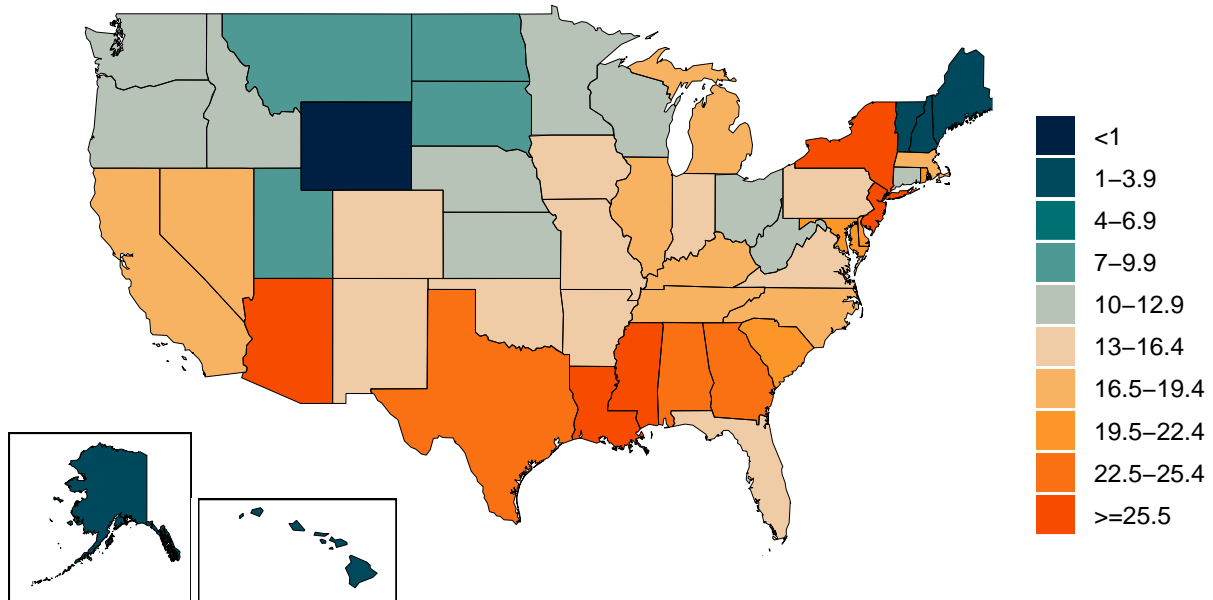
Figure 17. Daily COVID-19 deaths per million forecasted on January 01, 2021 in the reference scenario

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).

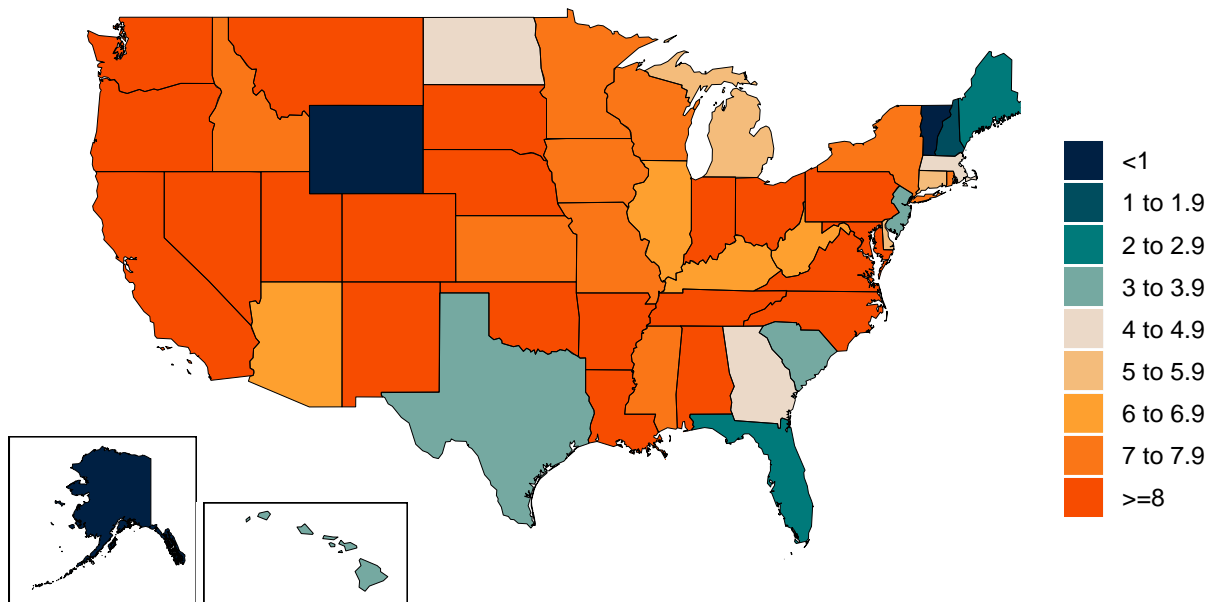| Cause name	Annual deaths	Ranking
Ischemic heart disease	557,600	1
COVID-19	415,090	2
Tracheal, bronchus, and lung cancer	206,200	3
Chronic obstructive pulmonary disease	195,800	4
Stroke	189,500	5
Alzheimer's disease and other dementias	143,900	6
Chronic kidney disease	107,000	7
Colon and rectum cancer	84,000	8
Lower respiratory infections	81,900	9
Diabetes mellitus	77,700	10

Mask data source: Premise; Facebook Global symptom survey (This research is based on survey results from University of Maryland Social Data Science Center); Kaiser Family Foundation; YouGov COVID-19 Behaviour Tracker survey

A note of thanks:

We would like to extend a special thanks to the Pan American Health Organization (PAHO) for key data sources; our partners and collaborators in Argentina, Brazil, Bolivia, Chile, Colombia, Cuba, the Dominican Republic, Ecuador, Egypt, Honduras, Israel, Japan, Malaysia, Mexico, Moldova, Panama, Peru, the Philippines, Russia, Serbia, South Korea, Turkey, and Ukraine for their support and expert advice; and to the tireless data collection and collation efforts of individuals and institutions throughout the world.

In addition, we wish to express our gratitude for efforts to collect social distancing policy information in Latin America to University of Miami Institute for Advanced Study of the Americas (Felicia Knaul, Michael Touchton), with data published here: http://observcovid.miami.edu/; Fundación Mexicana para la Salud (Héctor Arreola-Ornelas) with support from the GDS Services International: Tómatelo a Pecho A.C.; and Centro de Investigaciones en Ciencias de la Salud, Universidad Anáhuac (Héctor Arreola-Ornelas); Lab on Research, Ethics, Aging and Community-Health at Tufts University (REACH Lab) and the University of Miami Institute for Advanced Study of the Americas (Thalia Porteny).

Further, IHME is grateful to the Microsoft AI for Health program for their support in hosting our COVID-19 data visualizations on the Azure Cloud. We would like to also extend a warm thank you to the many others who have made our COVID-19 estimation efforts possible.