COVID-19 Results Briefing

India

May 1, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in India. The model was run on April 30, 2021 with case and death data through April 25, 2021 and covariate data through April 26, 2021.

COVID-19 was the leading cause of death in India last week. India currently has the highest number of daily COVID-19 cases and deaths of any country in the world. After the declining trend in the number of daily COVID-19 cases and deaths in India from September 2020 to mid-February 2021, there has been a sharp reversal of this trend, with a dramatic rise in April. Last week, the daily COVID-19 cases were more than three times and the daily COVID-19 deaths over twice the number in the previous peak in September 2020. The daily cases increased steeply, by 47%, and the daily deaths increased by a staggering 78% last week in India compared with the week before. Without drastic measures to bolster the health system to deal with this onslaught, decreased social mixing, and increased effective face mask use, the situation currently looks quite grim for India. IHME's reference scenario forecasts 1,019,000 COVID-19 deaths in India by August 1, 2021.

Current situation

- Daily reported cases increased to 320,000 per day on average between April 19 and 25, compared to 218,000 in the previous seven days (Figure 1).
- The estimated daily deaths in the last week increased to 4,800 per day on average compared to 2,700 the week before (Figure 2)[1]. This makes COVID-19 the number 1 cause of death in India last week (Table 1).
- The daily death rate is greater than 4 per million in 11 states and union territories (Figure 3).
- We estimated that 40% of people in India have been infected as of April 26 (Figure 4).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 29 states and union territories (Figure 5).
- The infection-detection rate in India was close to 4% on April 26 (Figure 6).

Trends in drivers of transmission

- Mobility last week was 40% lower than the pre-COVID-19 baseline (Figure 9). Mobility was near baseline (within 10%) in no states or union territories. Mobility was lower than 30% of baseline in 18 states and union territories (Figure 10).
- There were 140 diagnostic tests per 100,000 people on April 26 (Figure 13).

- In India 79% of people say they would accept or would probably accept a vaccine for COVID-19. This is up by 0.5 percentage points from last week. The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 60% in Manipur to 85% in Mizoram (Figure 17).
- In our current reference scenario, we expect that 674 million will be vaccinated by August 1 (Figure 18).

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 1,019,000 cumulative deaths by August 1. This represents 630,000 additional deaths from April 26 to August 1 (Figure 19). Daily deaths will peak at 12,200 on May 20 (Figure 20). These estimates are based in part on seroprevalence surveys.
- If **universal mask coverage (95%)** were attained in the next week, our model projects 73,000 fewer cumulative deaths compared to the reference scenario by August 1 (Figure 19).
- Under our **worse scenario**, our model projects 1,122,000 cumulative deaths by August 1, an additional 103,000 deaths compared to our reference scenario (Figure 19).
- By August 1, we project that 91,100 lives will be saved by the projected vaccine rollout.
- Figure 22 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.

Model updates

There are no major updates in the model this week.

[1] This estimate is derived from reported deaths and is adjusted with a 1.98 scalar to correct for the estimated under-reporting of COVID-19 deaths. More information is available in our FAQ.

Figure 1. Reported daily COVID-19 cases

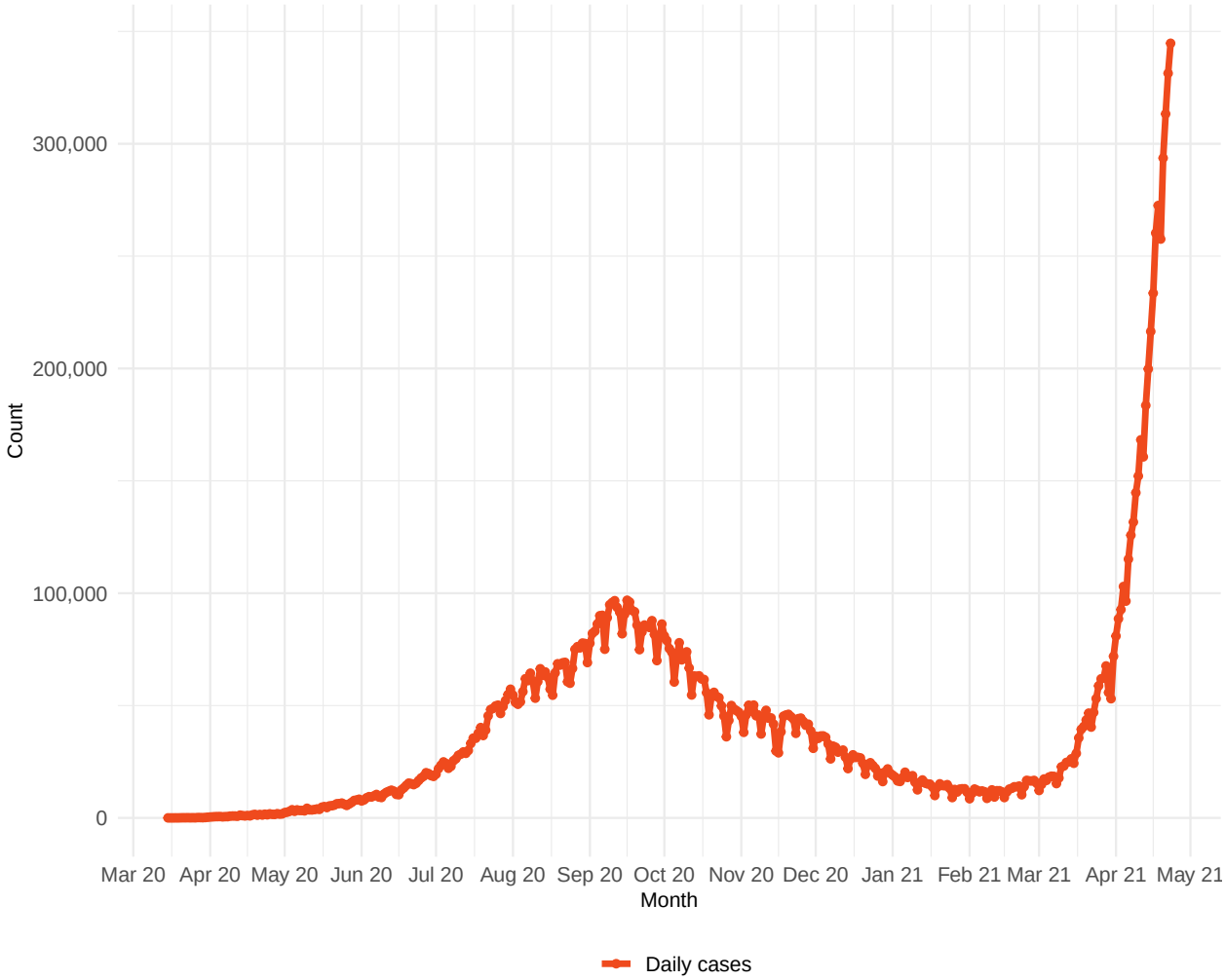


Table 1. Ranking of COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
COVID-19	33,460	1
Ischemic heart disease	29,214	2
Chronic obstructive pulmonary disease	17,278	3
Stroke	13,444	4
Diarrheal diseases	12,160	5
Neonatal disorders	8,423	6
Lower respiratory infections	8,340	7
Tuberculosis	8,128	8
Diabetes mellitus	5,252	9
Cirrhosis and other chronic liver diseases	5,193	10

Figure 2. Estimated daily COVID-19 deaths and smoothed trend estimate.

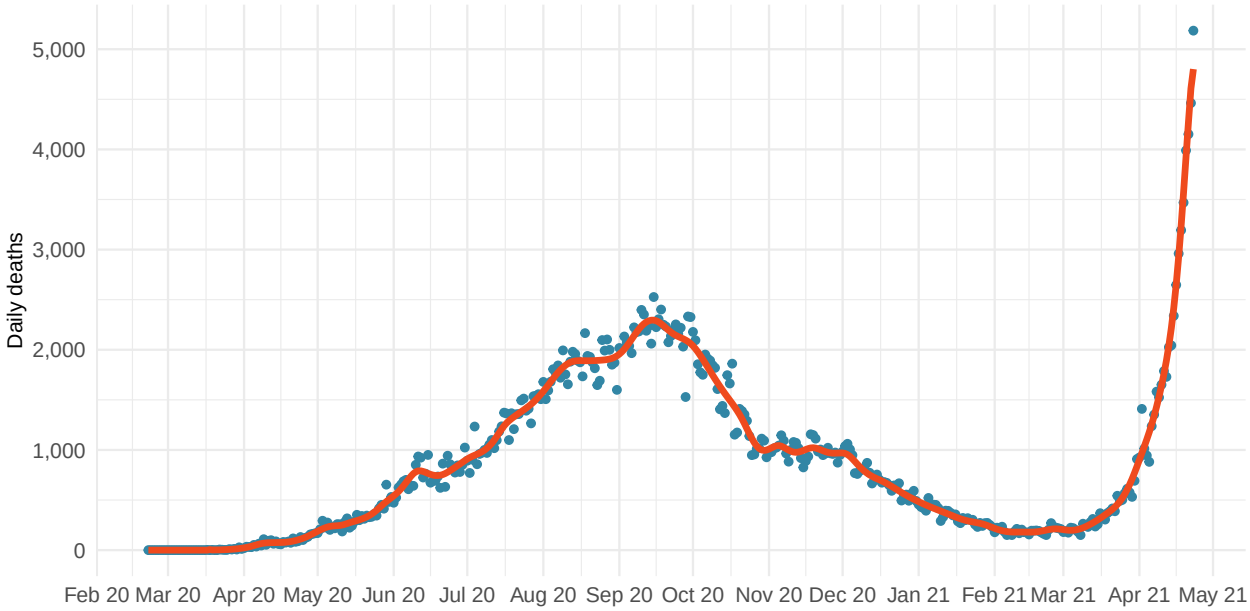


Figure 3. Daily COVID-19 death rate per 1 million on April 26, 2021

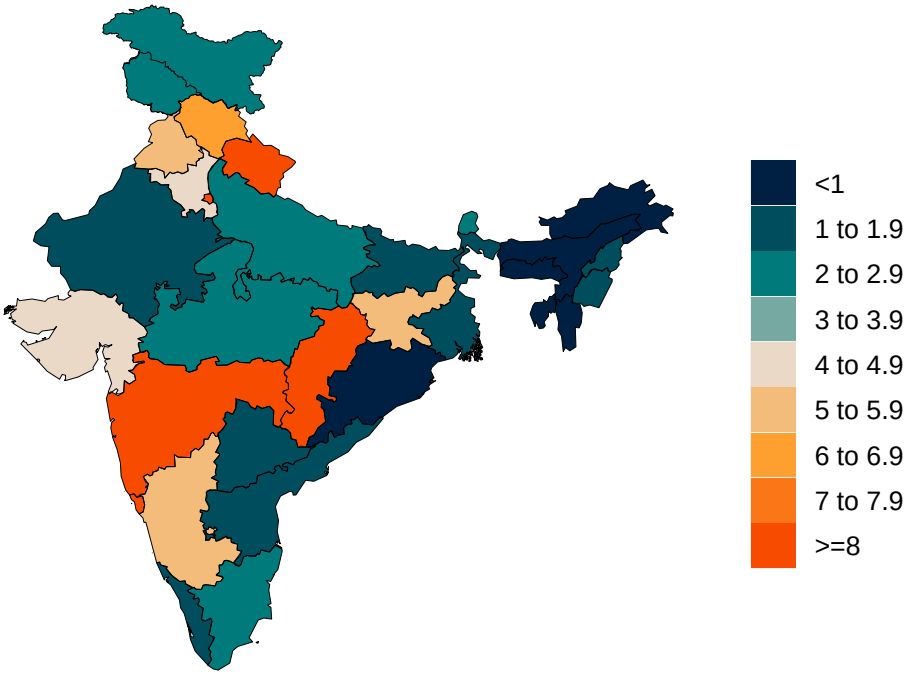


Figure 4. Estimated percent of the population infected with COVID-19 on April 26, 2021

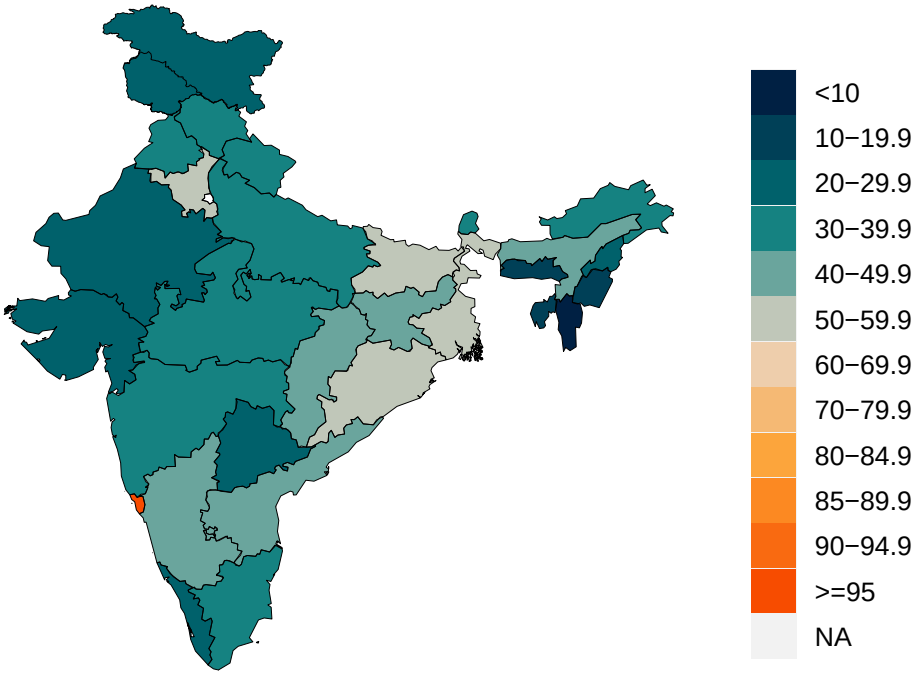


Figure 5. Mean effective R on April 15, 2021. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past. Effective R less than 1 means that transmission should decline, all other things being held the same.

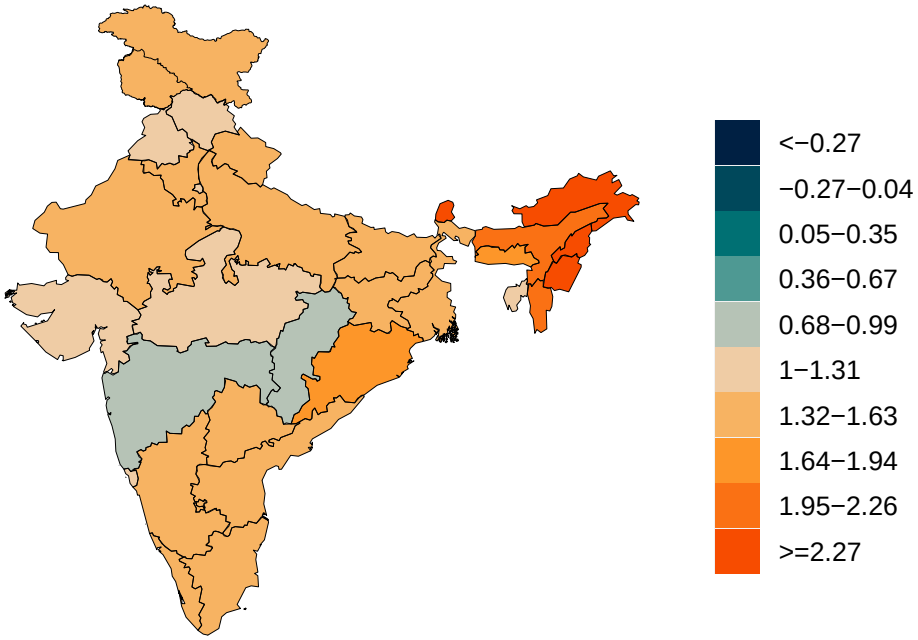
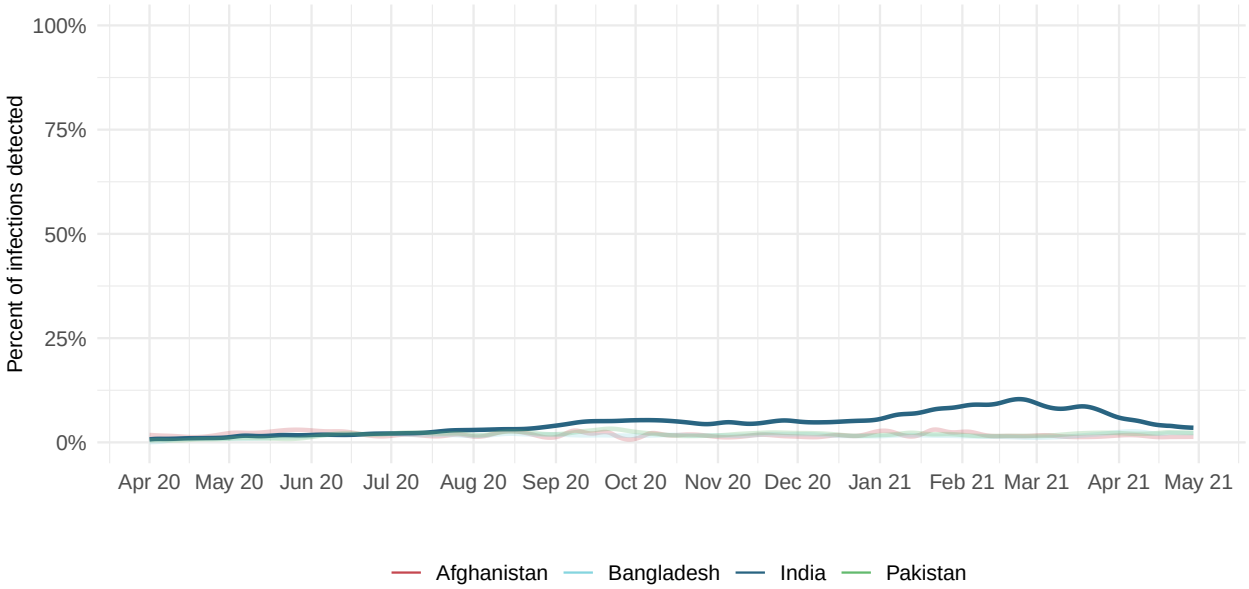


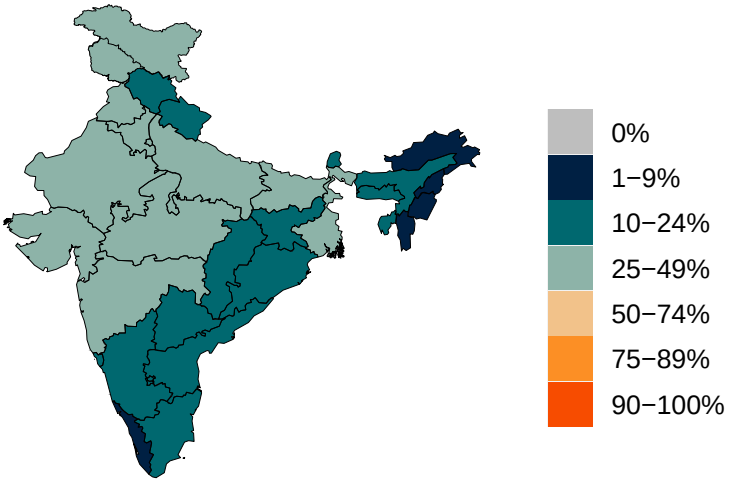
Figure 6. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model.



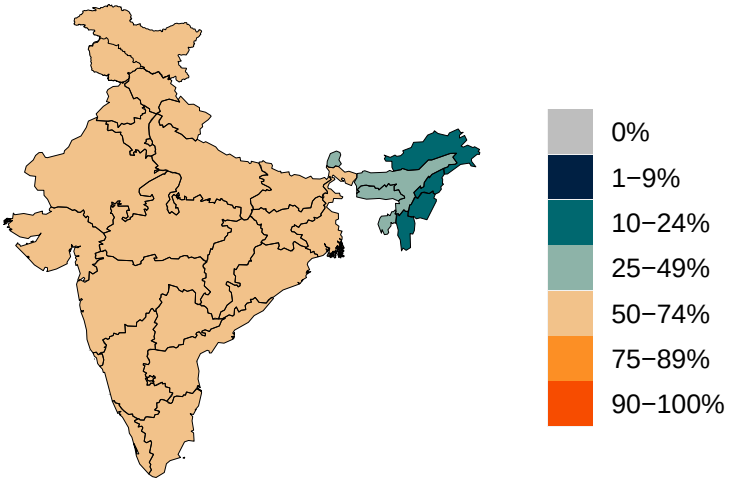
*Due to measurement errors in cases and testing rates, the infection to detection rate (IDR) can exceed 100% at particular points in time.

Figure 7. Percent of circulating SARS-CoV-2 for 3 primary variants on April 26, 2021.

A. Percent B.1.1.7 variant



B. Percent B.1.351 variant



C. Percent P1 variant

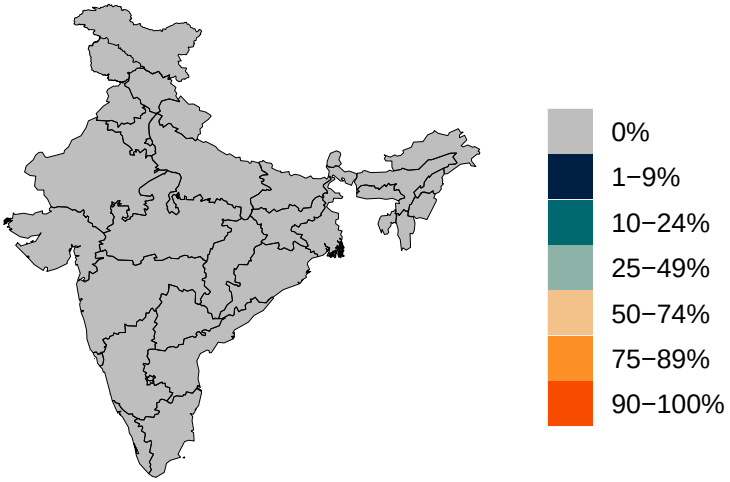
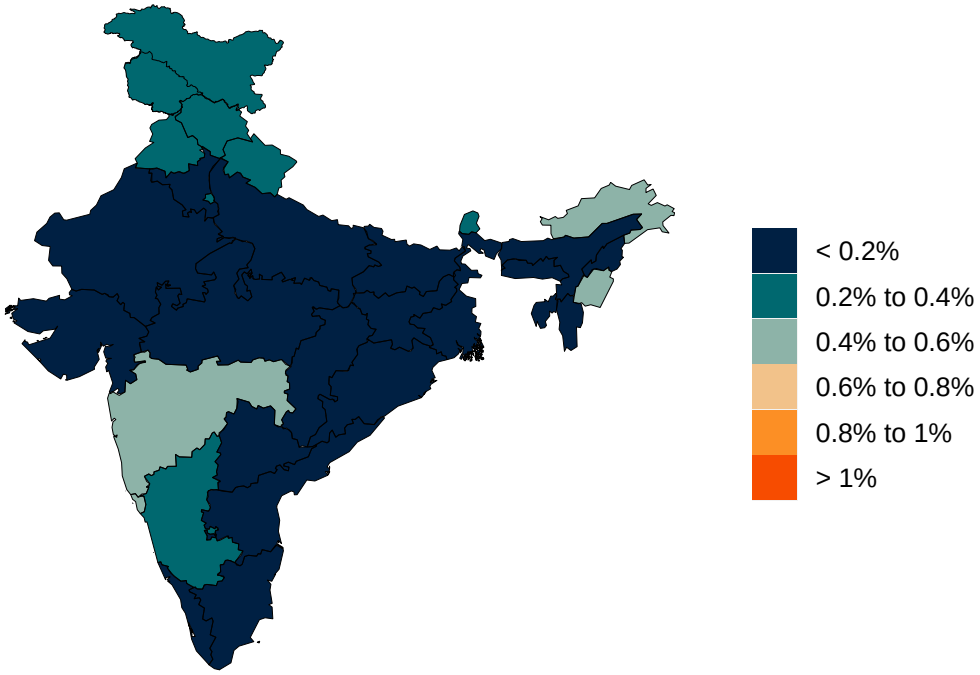
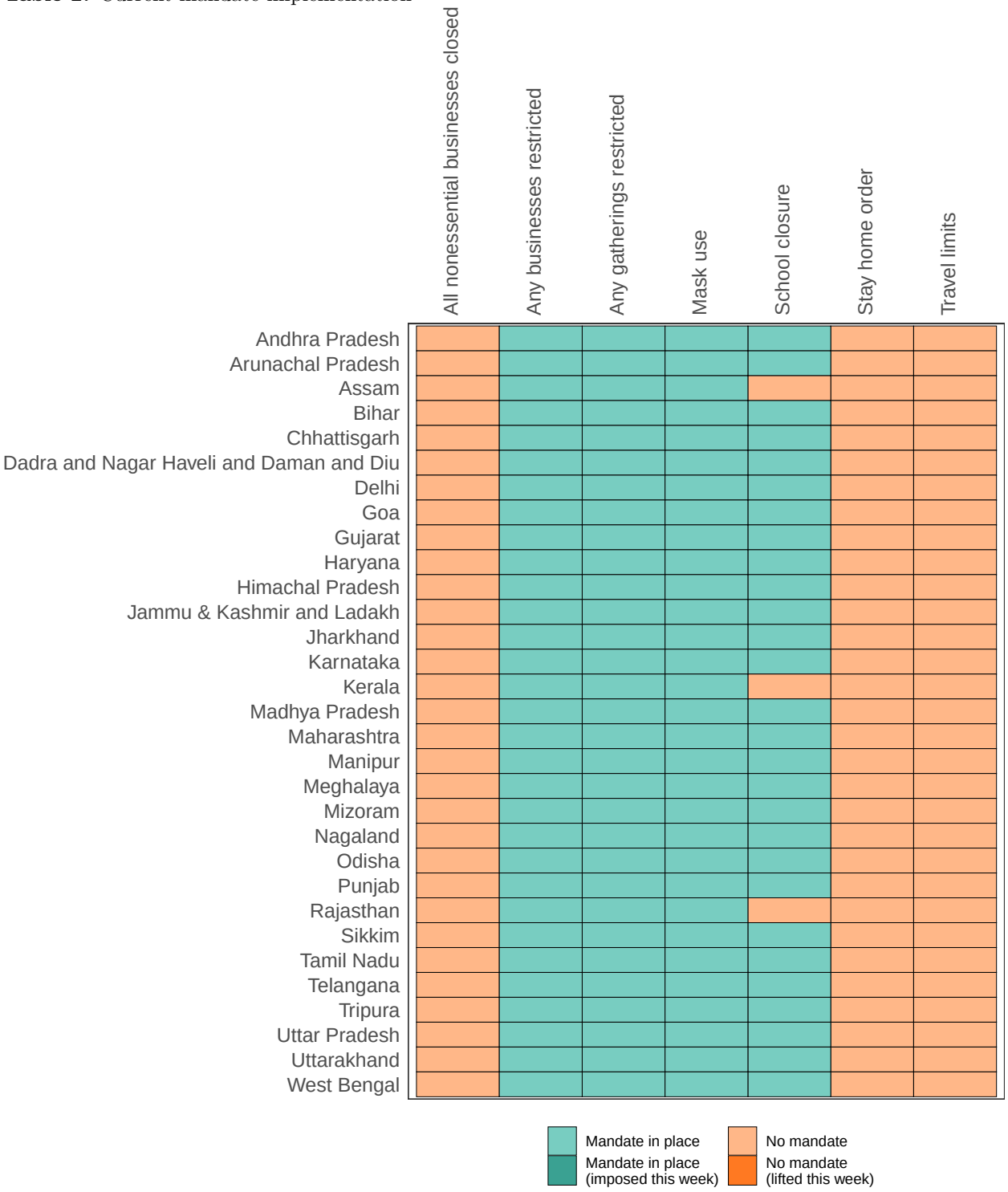


Figure 8. Infection fatality ratio on April 26, 2021. This is estimated as the ratio of COVID-19 deaths to infections based on the SEIR disease transmission model.



Critical drivers

Table 2. Current mandate implementation



*Not all locations are measured at the subnational level.

Figure 9. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

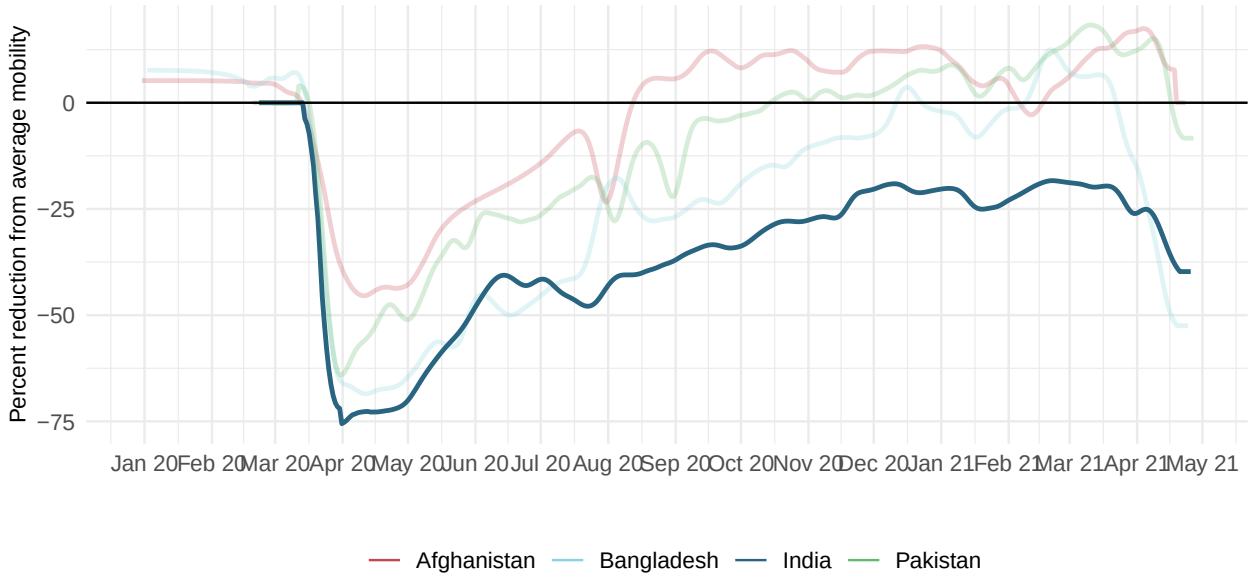


Figure 10. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on April 26, 2021

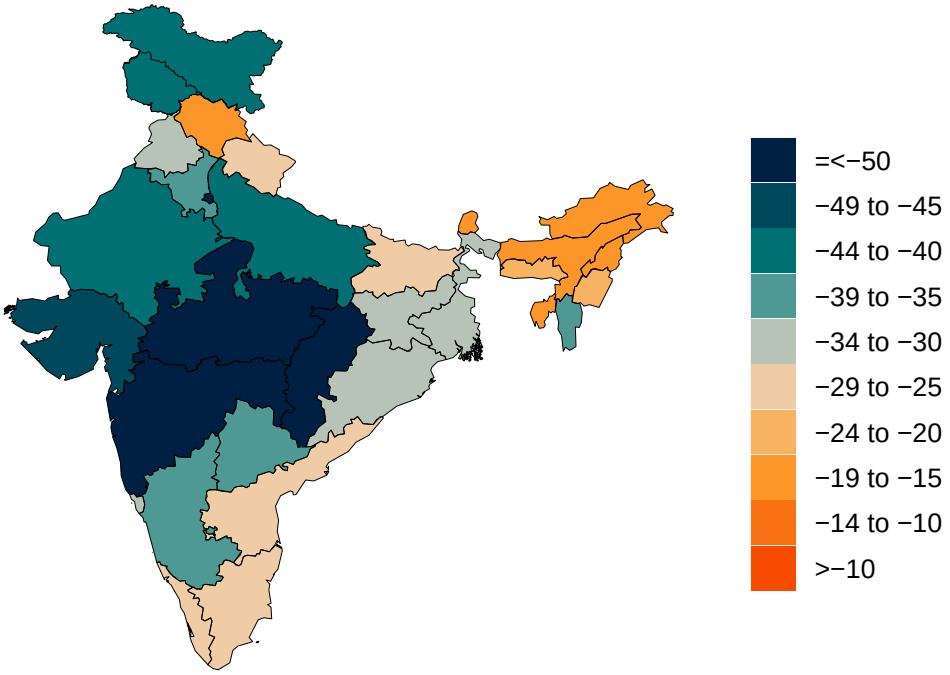


Figure 11. Trend in the proportion of the population reporting always wearing a mask when leaving home

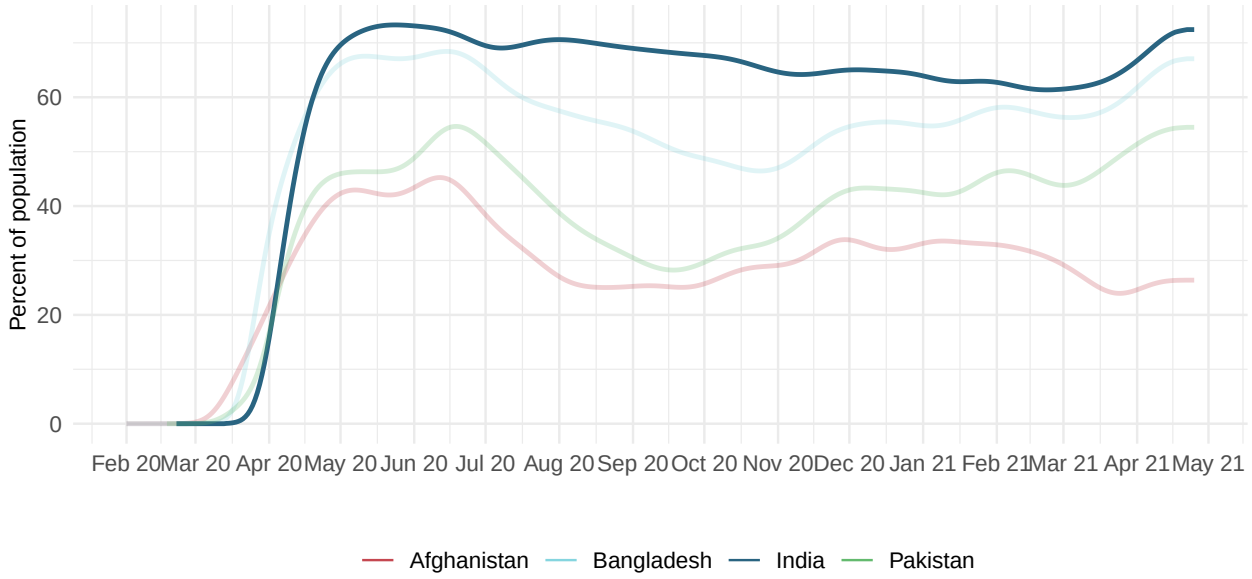


Figure 12. Proportion of the population reporting always wearing a mask when leaving home on April 26, 2021

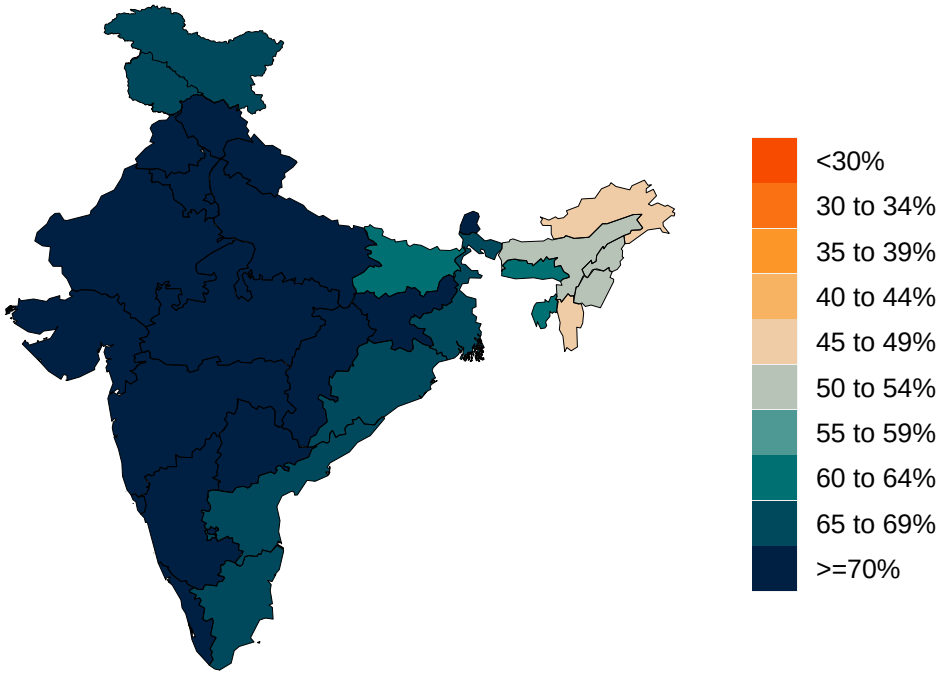


Figure 13. Trend in COVID-19 diagnostic tests per 100,000 people

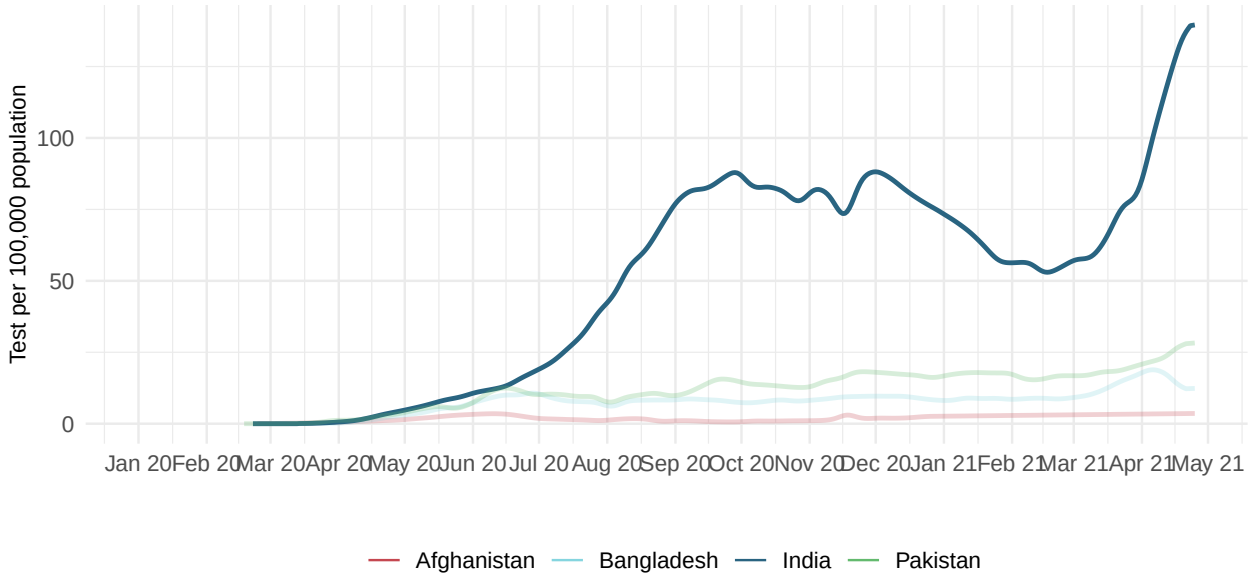


Figure 14. COVID-19 diagnostic tests per 100,000 people on April 23, 2021

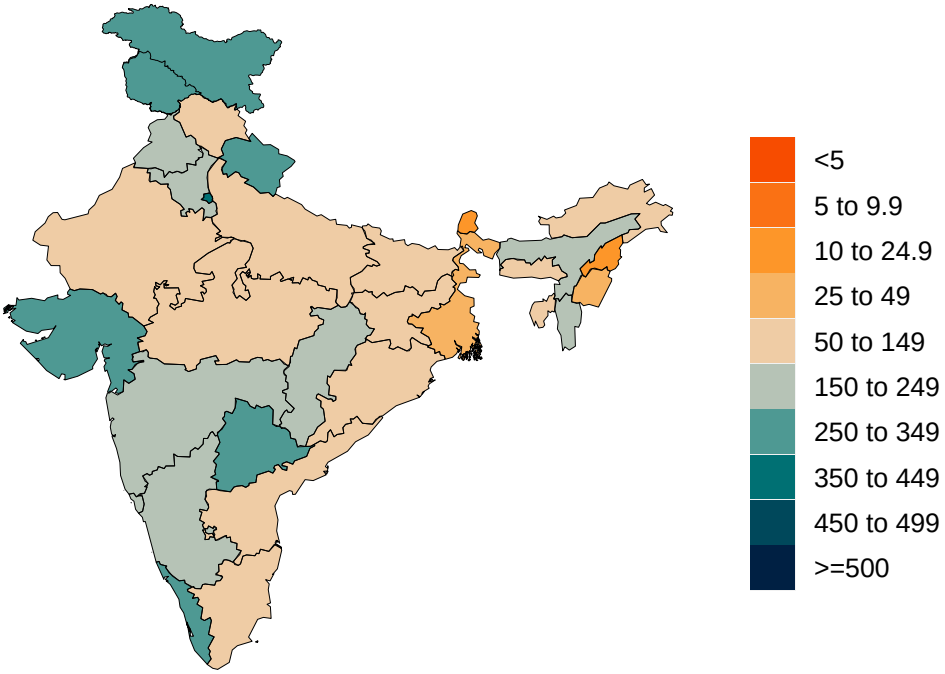


Figure 15. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020

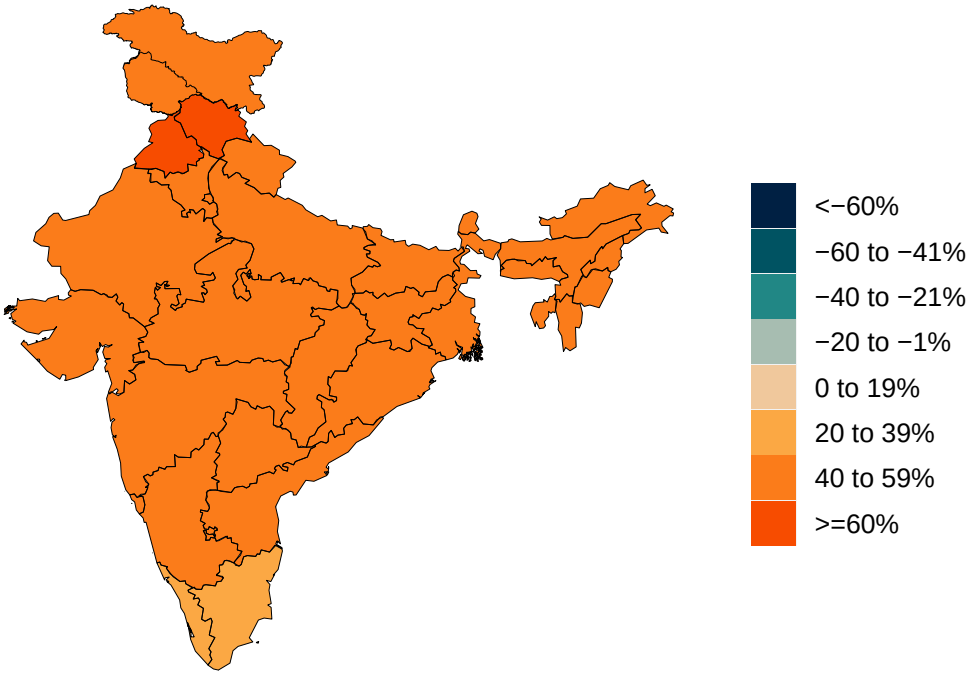


Table 3. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our website (http://www.healthdata.org/node/8584).

Vaccine	Efficacy at preventing disease: D614G & B.1.1.7	Efficacy at preventing infection: D614G & B.1.1.7	Efficacy at preventing disease: B.1.351 & P.1	Efficacy at preventing infection: B.1.351 & P.1
AstraZeneca	75%	52%	10%	6%
CoronaVac	50%	43%	38%	25%
Janssen	72%	72%	64%	42%
Moderna	94%	85%	72%	47%
Novavax	89%	77%	49%	32%
Pfizer/BioNTech	91%	86%	69%	45%
Sinopharm	73%	63%	56%	36%
Sputnik-V	92%	80%	70%	45%
Tianjin CanSino	66%	57%	50%	32%
Other vaccines	75%	65%	57%	37%
Other vaccines (mRNA)	95%	83%	72%	47%

Figure 16. Trend in the estimated proportion of the adult (18+) population that have been vaccinated or is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and yes, probably).

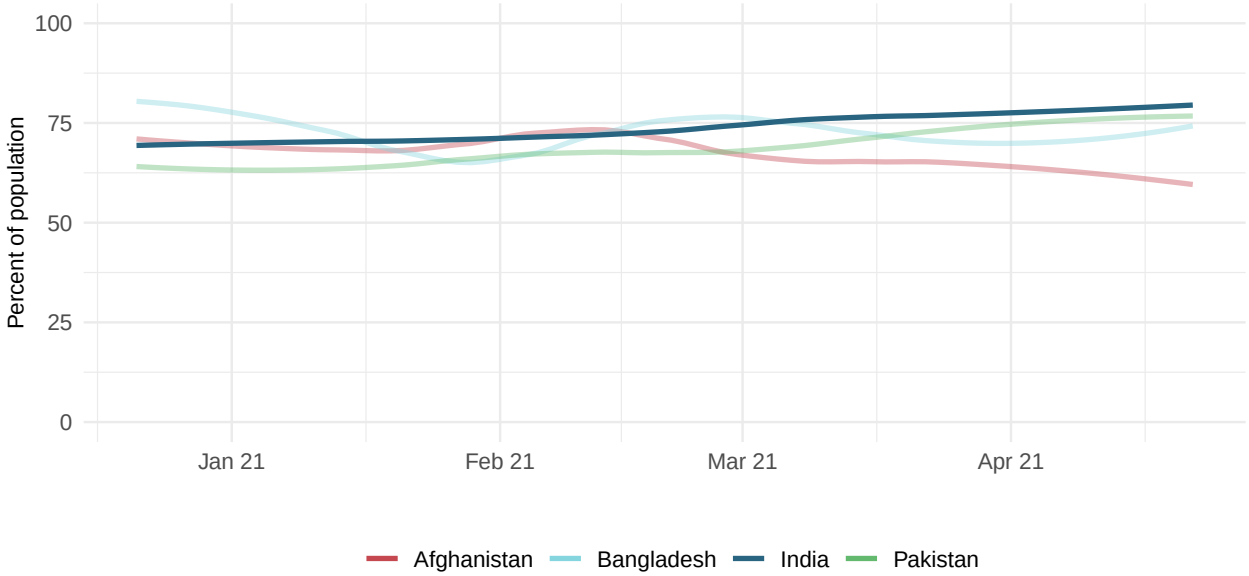


Figure 17. This figure shows the estimated proportion of the adult (18+) population that has been vaccinated or is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and yes, probably).

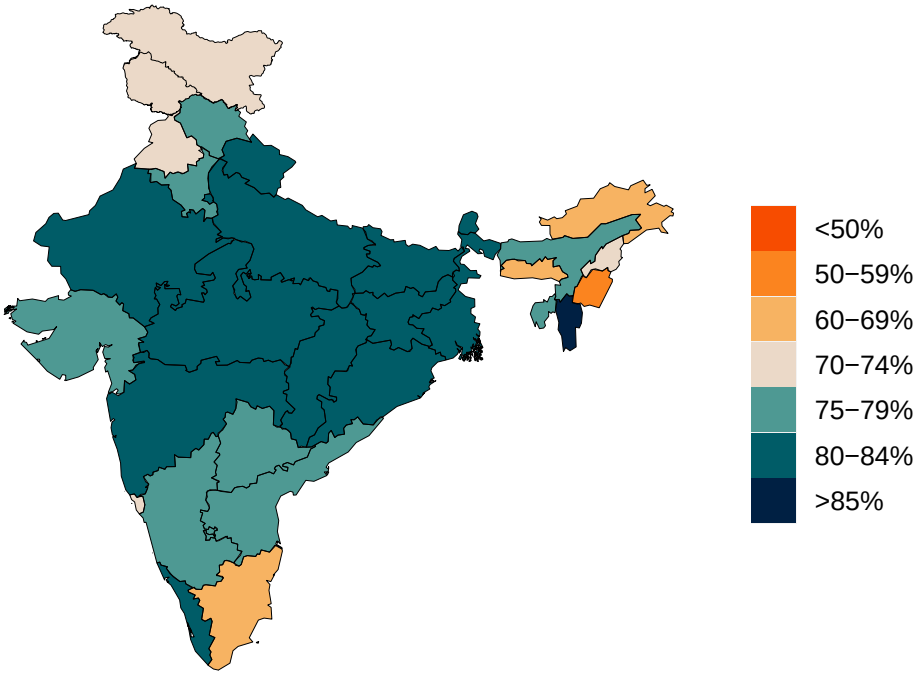
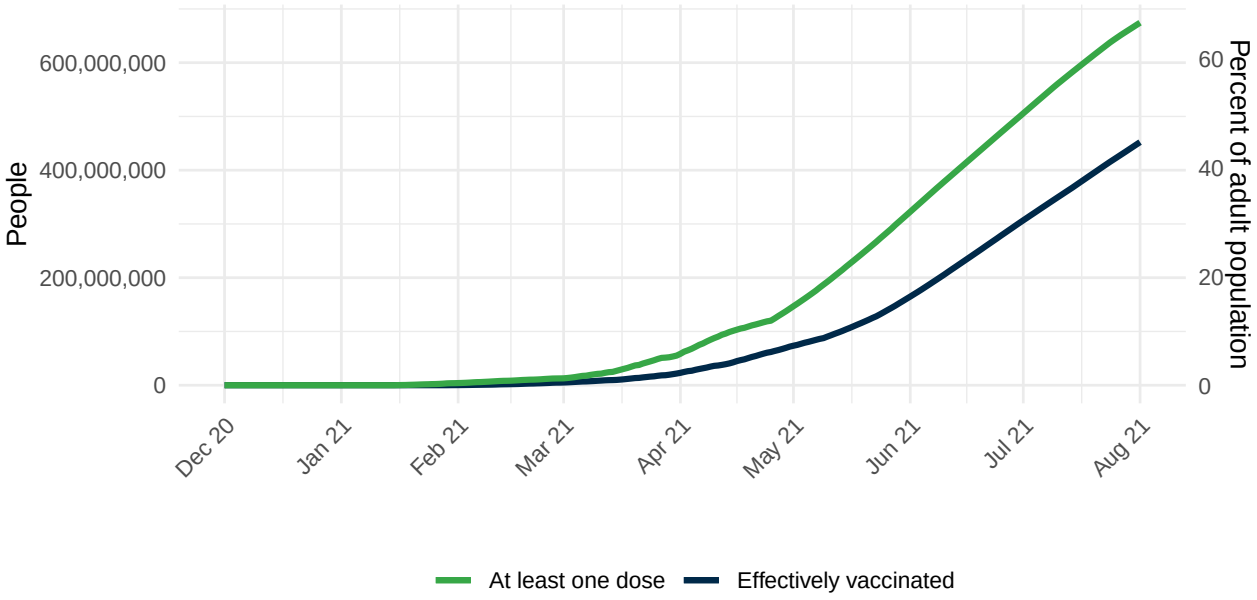


Figure 18. The number of people who receive any vaccine and those who are effectively vaccinated and protected against disease, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses.



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 three ways:

- First, it assumes that variants B.1.351 or P1 begin to spread within 3 weeks in adjacent locations that do not already have B.1.351 or P1 community transmission.
- Second, it assumes that all those vaccinated increase their mobility toward pre-COVID-19 levels.
- Third, it assumes that among those vaccinated, mask use starts to decline exponentially one month after completed vaccination.

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 19. Cumulative COVID-19 deaths until August 01, 2021 for three scenarios

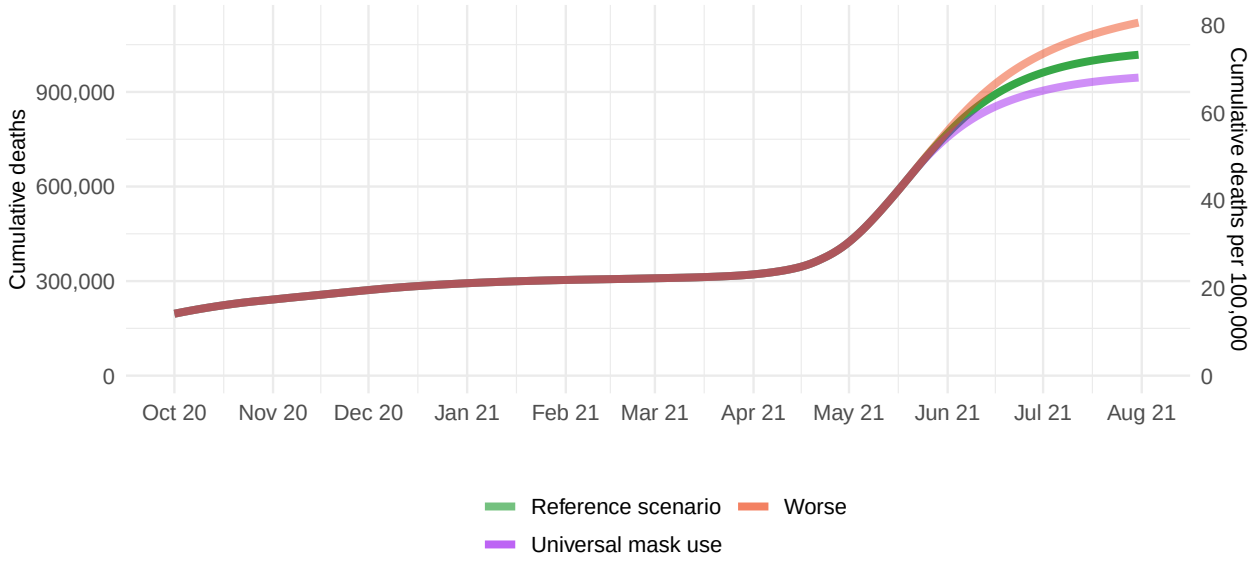


Figure 20. Daily COVID-19 deaths until August 01, 2021 for three scenarios,

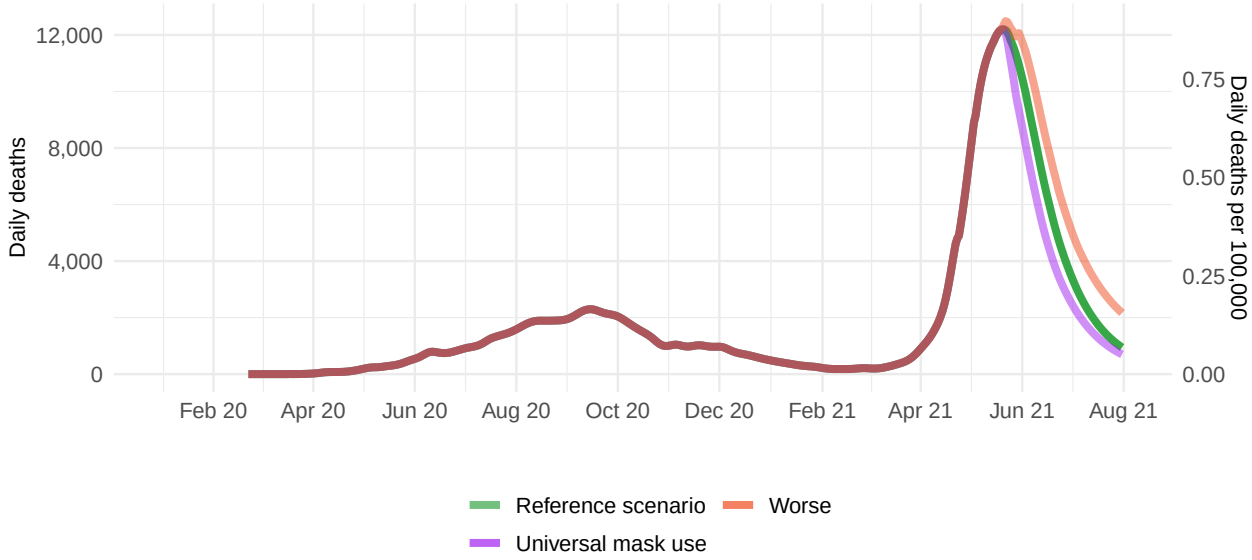


Figure 21. Daily COVID-19 infections until August 01, 2021 for three scenarios.

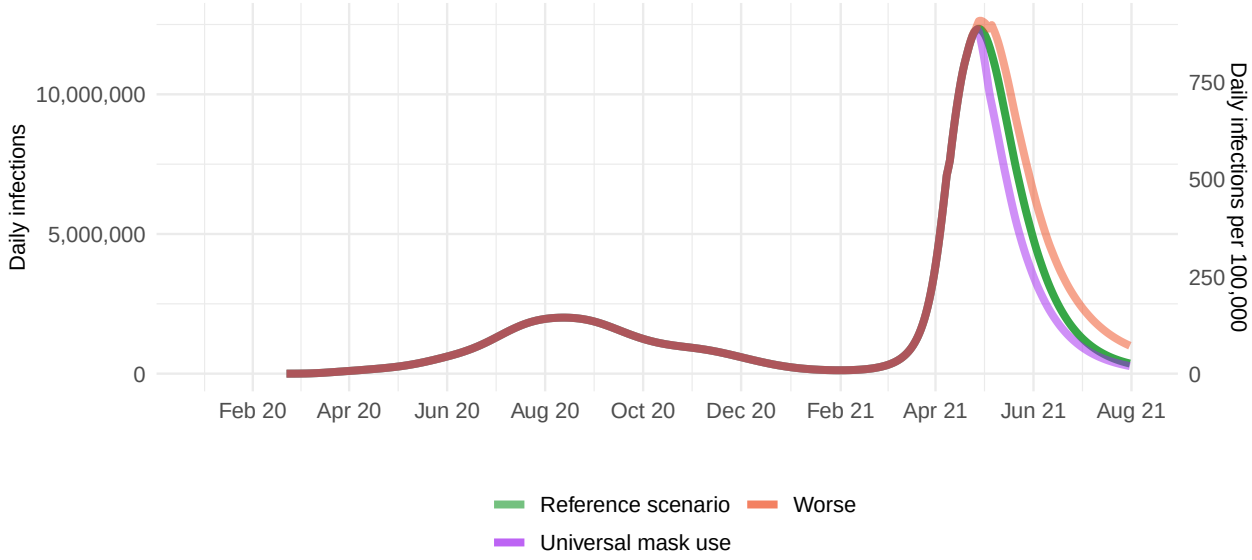
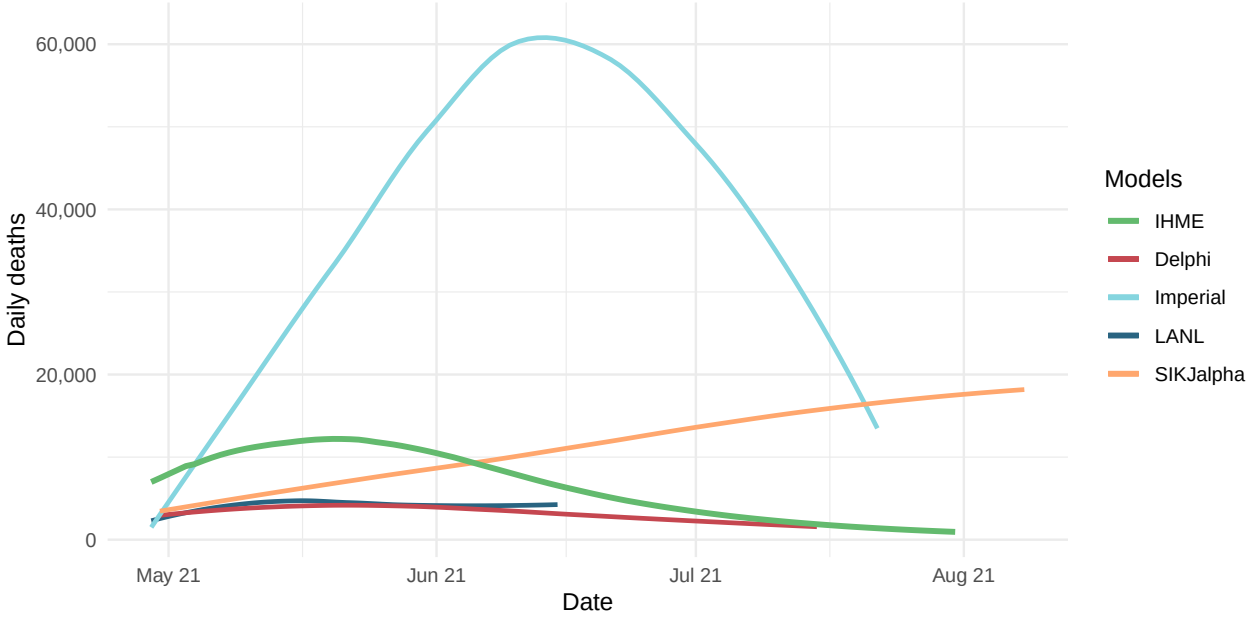


Figure 22. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available: Delphi from the Massachussets Institute of Technology (Delphi; https://www.covidanalytics.io/home), 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 available locations in that region.



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/).

Vaccine hesitancy data are from the Facebook Global Symptom Survey (This research is based on survey results from University of Maryland Social Data Science Center), the Facebook United States Symptom Survey (in collaboration with Carnegie Mellon University), and from the Facebook COVID-19 Beliefs, Behaviors, and Norms Study conducted by the Massachusetts Institute of Technology.

Genetic sequence and metadata are primarily from the GISAID Initiative. Further details available on the COVID-19 model FAQ page.

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.