COVID-19 Results Briefing

Global

September 15, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 globally. The model was run on September 14, 2021, with data through September 13, 2021.

At the global level, the key indicators including estimated daily infections, reported cases, hospitalizations, and reported deaths are all declining. The global decline is driven by peaks and subsequent declines in most parts of Southeast Asia with the exception of the Philippines, peaks and declines in most Mexican states and southern states in the US, and continued declines in most of the western parts of Europe. Despite the overall positive trends, there are many places where Delta surges are still unfolding such as Australia and Serbia. In our reference forecasts, we expect the global decline in cases to continue to the end of September and for deaths until mid-October. At that point, some increases in transmission in the Northern Hemisphere due to seasonality should be enough to reverse the decline and lead to a slow increase, with daily deaths reaching 10,000 by the end of the year. Daily cases may see a much larger increase, reaching near 1 million a day by the end of the year, because increases in transmission are expected in places with higher infection-detection rates and also higher rates of vaccination, which will lower the average infection-fatality rate. In the Northern Hemisphere, trajectories across countries vary from steady increases through to the end of the year to declines followed by a prolonged period of moderate transmission. The different trajectories are a function of previous infection rates, vaccination rates, and demonstrated transmission potential in the winter based on the last 18 months of data. Larger recent or current Delta surges tend to reduce the height of the expected winter surge because more individuals are immune through natural infection along with vaccination. In Southeast Asian countries such as Indonesia, the Delta surges have been followed by extremely rapid declines, implying that effective R is well below 1. In these locations, we do not expect further increases in 2021 in the reference scenario, although our worse scenario suggests a later surge with increases in mobility and declines in mask use is still possible.

These reference forecasts may be optimistic for two critical reasons. First, we do not take into account waning immunity. More and more evidence is emerging from post-vaccination studies in England, the US, and Israel and from the long-term follow up of the Pfizer and Moderna trials that vaccine-derived immunity wanes for preventing infection. This week, some evidence (studies from Israel in the *New England Journal of Medicine* and a Public Health England report) is also emerging that vaccine-derived immunity for hospitalization and death may also wane, albeit at a slower rate.

We plan to revise our model to incorporate this evidence on waning immunity over the next weeks. Countries should seek to report data on cases, hospitalizations, and deaths by vaccination status so that more evidence can emerge on waning immunity. Second, we do not take into account the potential emergence of a new variant with increased transmissibility or immune escape. Some analysts have raised concern about the Mu variant, but there is not yet any population-level data to suggest this will lead to new surges. Strategies to manage the pandemic include 1) expanding vaccination coverage where supply is available by addressing vaccine hesitancy, including employer mandates and requiring vaccination for use of some businesses such as bars, restaurants, and gyms; 2) promoting seasonal mask use in the at-risk populations to reduce the burden in late fall and in winter; 3) where supply is available, consideration of boosters given the growing evidence on waning immunity, particularly in the at-risk populations; 4) use of mitigation measures to avoid school-based increases in transmission, including mask use, distancing, and where supplies are available vaccination requirements in ages over 12; and 5) hospital resource planning for potential high demand for hospitalization when both COVID-19 and influenza coincide in the winter.

Current situation

- Estimated daily infections in the last week decreased to 3.9 million on average compared to 4.2 million the week before (Figure 1).
- Daily hospital census in the last week (through September 13) decreased to 845,000 per day on average compared to 913,000 the week before.
- Daily reported cases in the last week decreased to 564,600 per day on average compared to 602,900 the week before (Figure 2).
- Reported deaths due to COVID-19 in the last week decreased to 8,800 per day on average compared to 9,300 the week before (Figure 3).
- Excess deaths due to COVID-19 in the last week decreased to 23,800 per day on average compared to 25,200 the week before (Figure 3). This makes COVID-19 the number 2 cause of death globally this week (Table 1). Estimated excess daily deaths due to COVID-19 in the past week were 2.7 times larger than the reported number of deaths.
- The daily reported COVID-19 death rate is greater than 4 per million in 31 countries, multiple US states, and some states in Mexico (Figure 4).
- The daily rate of excess deaths due to COVID-19 is greater than 4 per million in 62 countries (Figure 4).
- We estimate that 35% of people globally have been infected as of September 13 (Figure 6).
- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in three major zones: the more northern parts of North America, Central and Eastern Europe, and a band of countries in sub-Saharan Africa from Burkina Faso in the west to Somalia in the east. In addition, transmission continues to rapidly increase in Australia and Mongolia (Figure 7).

- The infection-detection rate globally was close to 13% on September 13 (Figure 8).
- Based on the GISAID and various national databases, combined with our variant spread model, we estimate the current prevalence of variants of concern (Figure 9). The Delta variant is dominant in most regions. The Mu variant (not shown) is an important variant in Colombia and is increasing in Chile.

Trends in drivers of transmission

- Mobility last week was 3% lower than the pre-COVID-19 baseline (Figure 11). Mobility was near baseline (within 10%) in 134 countries. Mobility was lower than 30% of baseline in Cambodia, Lao People's Democratic Republic, Malaysia, Maldives, Myanmar, New Zealand, Philippines, Sri Lanka, Timor-Leste, and Viet Nam.
- As of September 13, in the COVID-19 Trends and Impact Survey, 59% of people self-report that they always wore a mask when leaving their home, the same as last week (Figure 13).
- There were 155 diagnostic tests per 100,000 people on September 13 (Figure 15).
- As of September 13, 25 countries have reached 70% or more of the population who have received at least one vaccine dose, and 15 countries have reached 70% or more of the population who are fully vaccinated (Figure 17). Countries with less than 10% of the population with one dose of vaccine are concentrated in sub-Saharan Africa and North Africa and the Middle East.
- For the world overall, 73.5% of adults say they would accept or would probably accept a vaccine for COVID-19. The proportion of the adult population who are open to receiving a COVID-19 vaccine ranges from 30% in Botswana to 98% in the United Arab Emirates (Figure 19).
- In our current reference scenario, we expect that 3.5 billion people will be vaccinated with at least one dose by January 1 (Figure 20). We estimate that 37% of the global population will be fully vaccinated by January 1.
- Based on the estimate of the population who have been infected with COVID-19 and vaccinated to date, combined with assumptions on protection against infection with the Delta variant provided by either natural infection, vaccination, or both, we estimate that 40% of the world is immune to the Delta variant. In our current reference scenario, we expect that by January 1, 50% of people in the world will be immune to the Delta variant (Figure 21). These two calculations do not take into account waning of natural or vaccine-derived immunity.

Projections

- In our **reference scenario**, which represents what we think is most likely to happen, our model projects 5,573,000 cumulative reported deaths due to COVID-19 on January 1. This represents 908,000 additional deaths from September 13 to January 1. Daily reported deaths will rise drop to a low of near 7,500 by mid-October and then increase to 9,750 by the end of December (Figure 22).
- Under our **reference scenario**, our model projects 12,545,000 cumulative excess deaths due to COVID-19 on January 1. This represents 2,240,000 additional deaths from September 13 to January 1 (Figure 22).
- If **universal mask coverage (95%)** were attained in the next week, our model projects 349,000 fewer cumulative reported deaths compared to the reference scenario on January 1.
- Under our **worse scenario**, our model projects 6,537,000 cumulative reported deaths on January 1, an additional 964,000 deaths compared to our reference scenario. Daily reported deaths in the **worse scenario** will rise to over 28,000 by the end of November and then decline (Figure 22).
- Daily infections in the **reference scenario** decline to a low of near 3.5 million in late September and then increase to 5.6 million by the second week of December (Figure 23). Daily infections in the **worse scenario** will rise to 12.6 million by mid-November (Figure 23).
- Daily cases in the **reference scenario** will rise to nearly 1.0 million by the end of December (Figure 24). Daily cases in the **worse scenario** will rise to 2.9 million by late November (Figure 24).
- Daily hospital census in the **reference scenario** will decline to 664,980 by October 17, 2021 (Figure 25). Daily hospital census in the **worse scenario** will rise to 2,534,100 by November 29, 2021 (Figure 25).

Model updates

No model updates

Projections

Figure 1. Daily COVID-19 hospital census and infections

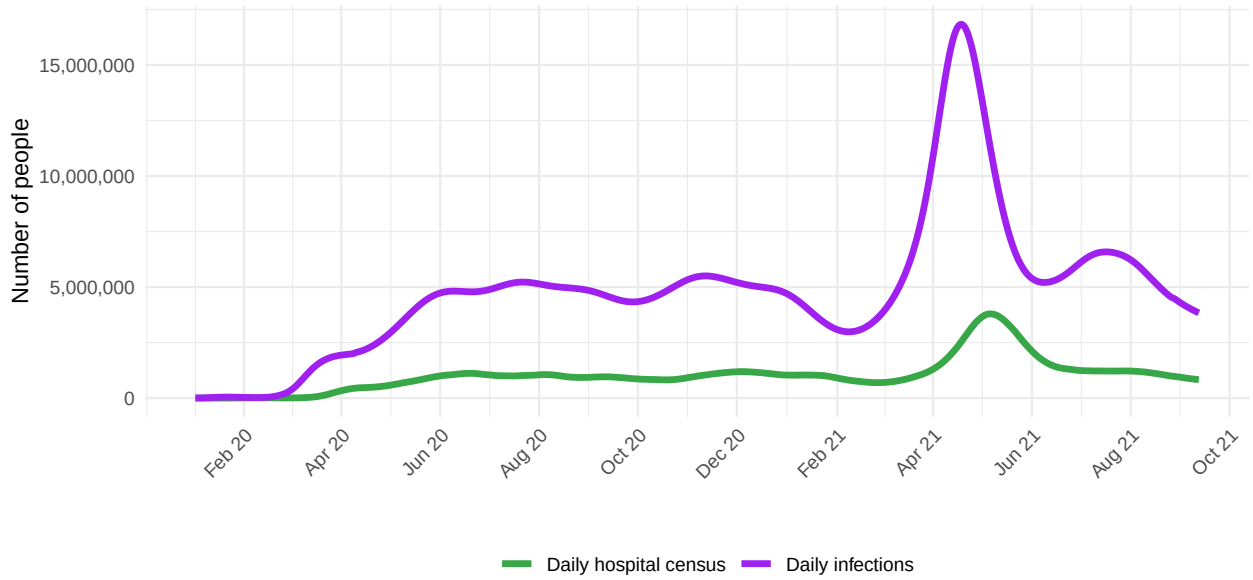


Figure 2. Reported daily COVID-19 cases, moving average

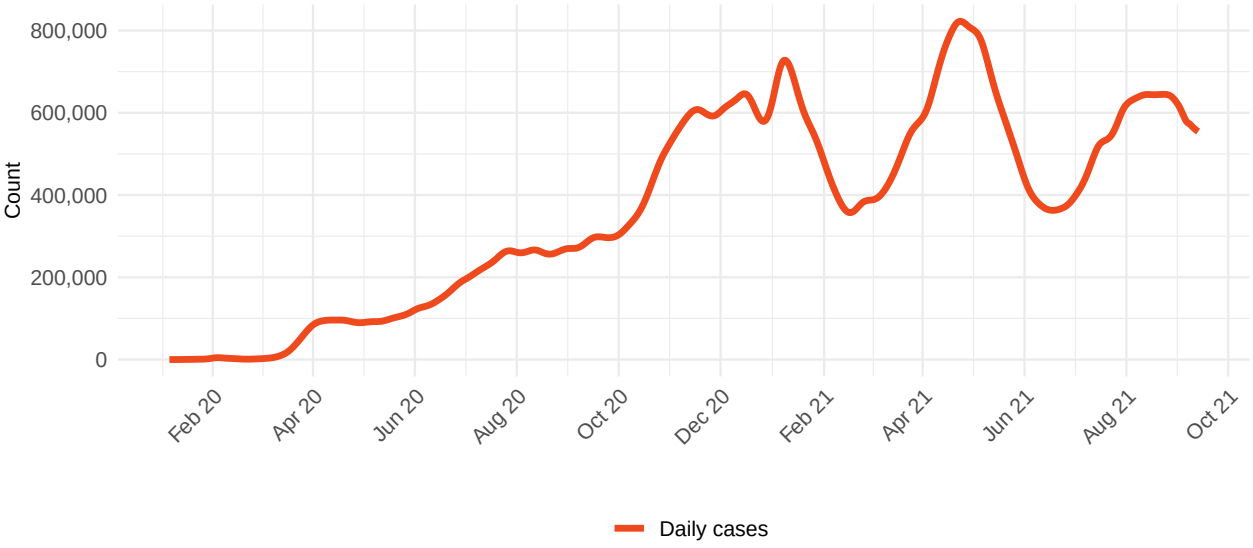


Table 1. Ranking of excess deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	175,727	1
COVID-19	166,868	2
Stroke	126,014	3
Chronic obstructive pulmonary disease	63,089	4
Lower respiratory infections	47,946	5
Tracheal, bronchus, and lung cancer	39,282	6
Neonatal disorders	36,201	7
Alzheimer's disease and other dementias	31,217	8
Diabetes mellitus	29,830	9
Diarrheal diseases	29,509	10

Figure 3. Smoothed trend estimate of reported daily COVID-19 deaths (blue) and excess daily deaths due to COVID-19 (orange)

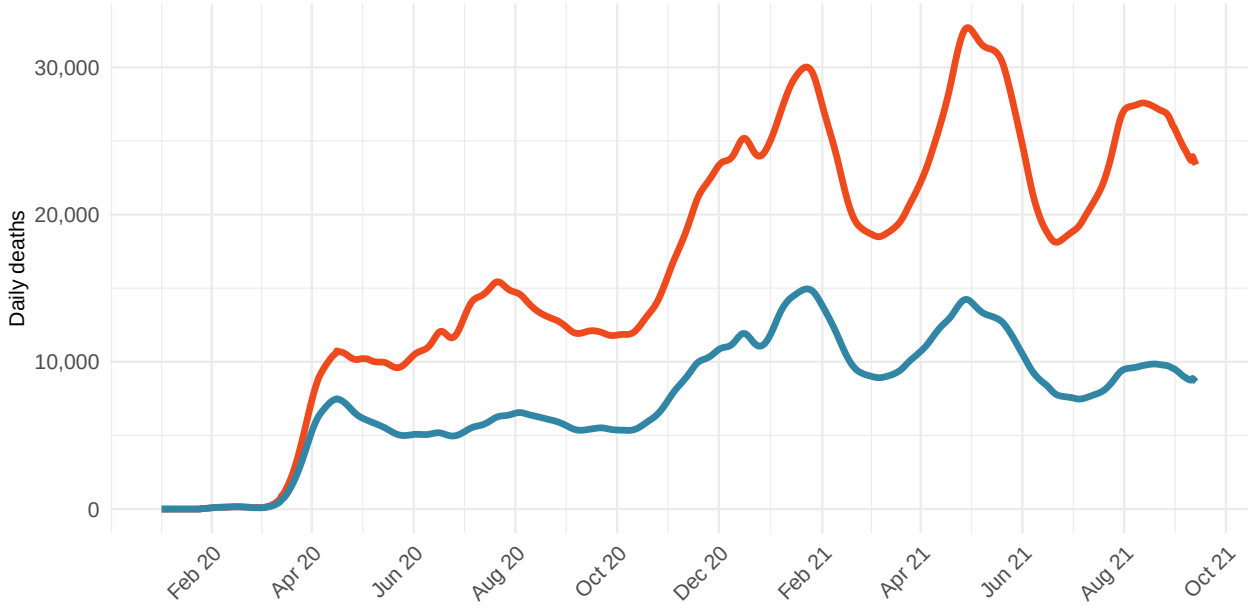
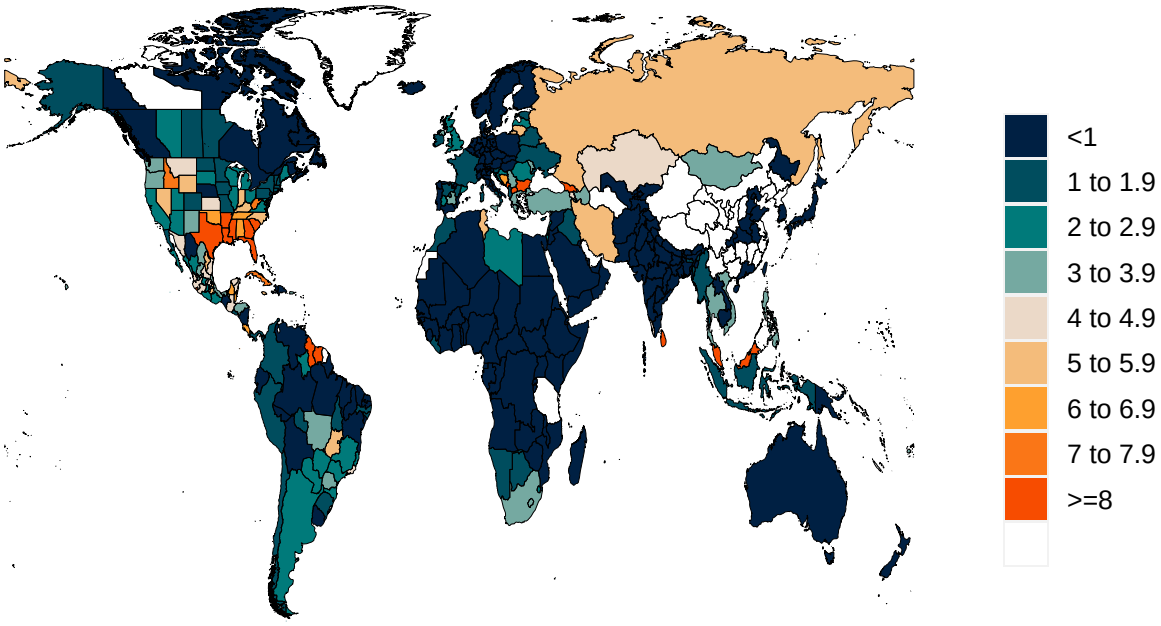


Figure 4. Daily COVID-19 death rate per 1 million on September 13, 2021

A. Daily reported COVID-19 death rate per 1 million



B. Daily excess COVID-19 death rate per 1 million

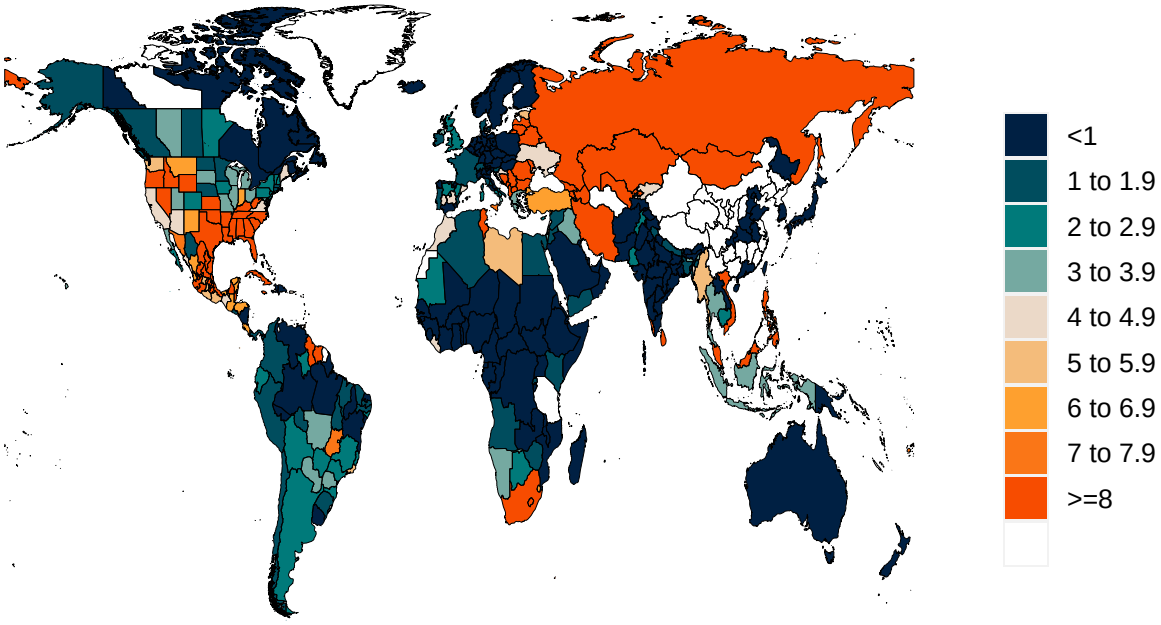
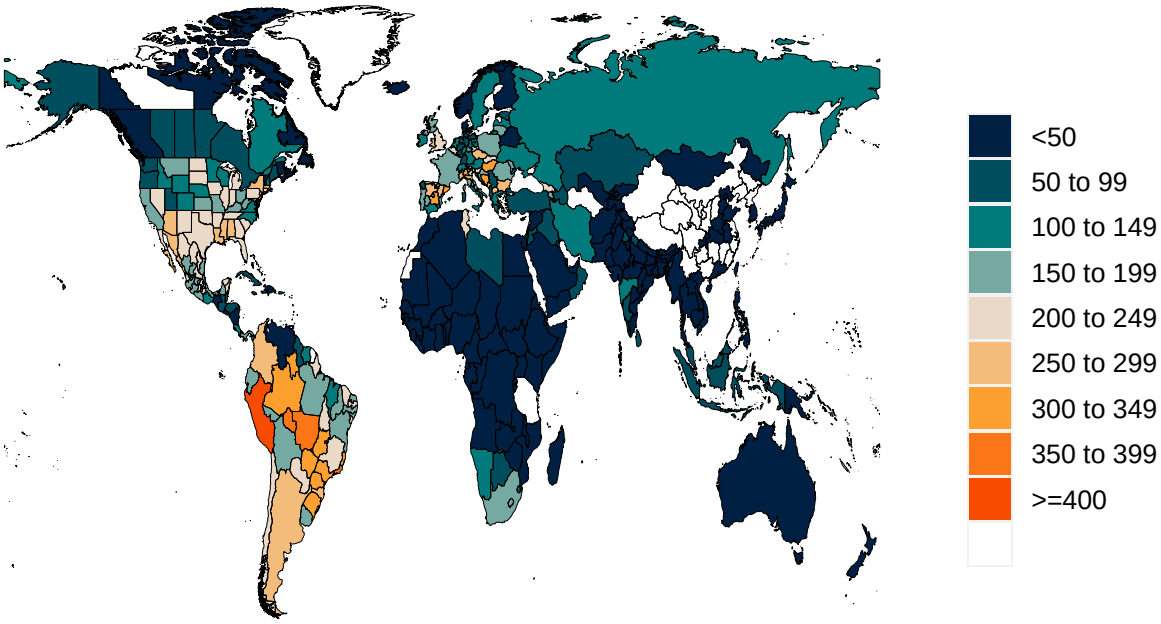


Figure 5. Cumulative COVID-19 deaths per 100,000 on September 13, 2021

A. Reported cumulative COVID-19 deaths per 100,000



B. Excess cumulative COVID-19 deaths per 100,000

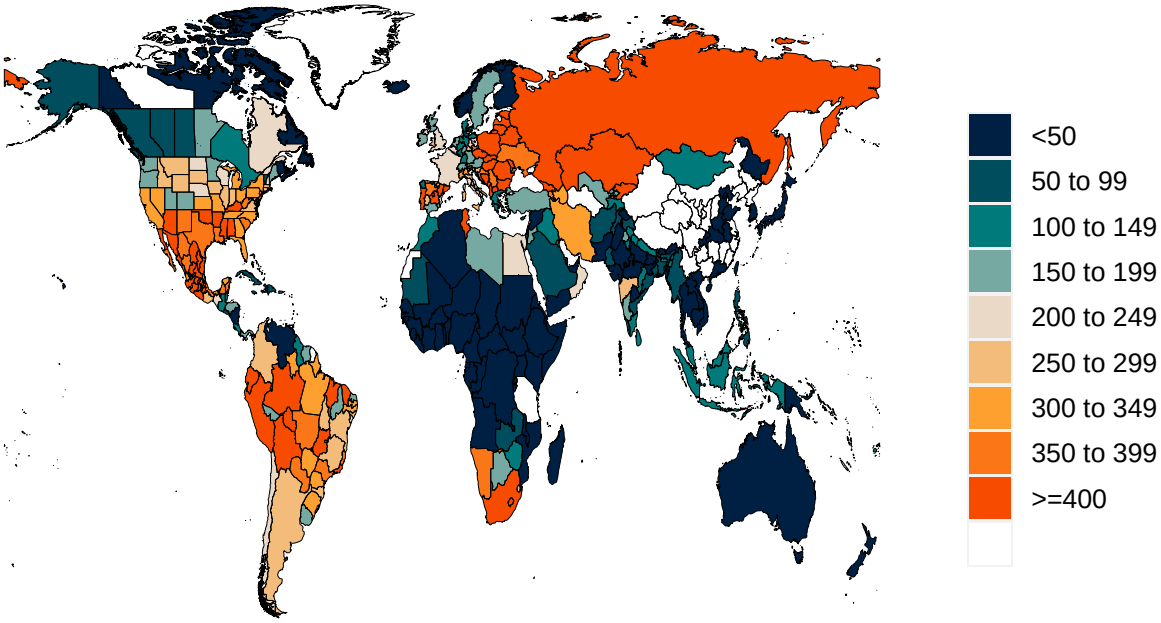


Figure 6. Estimated percent of the population infected with COVID-19 on September 13, 2021

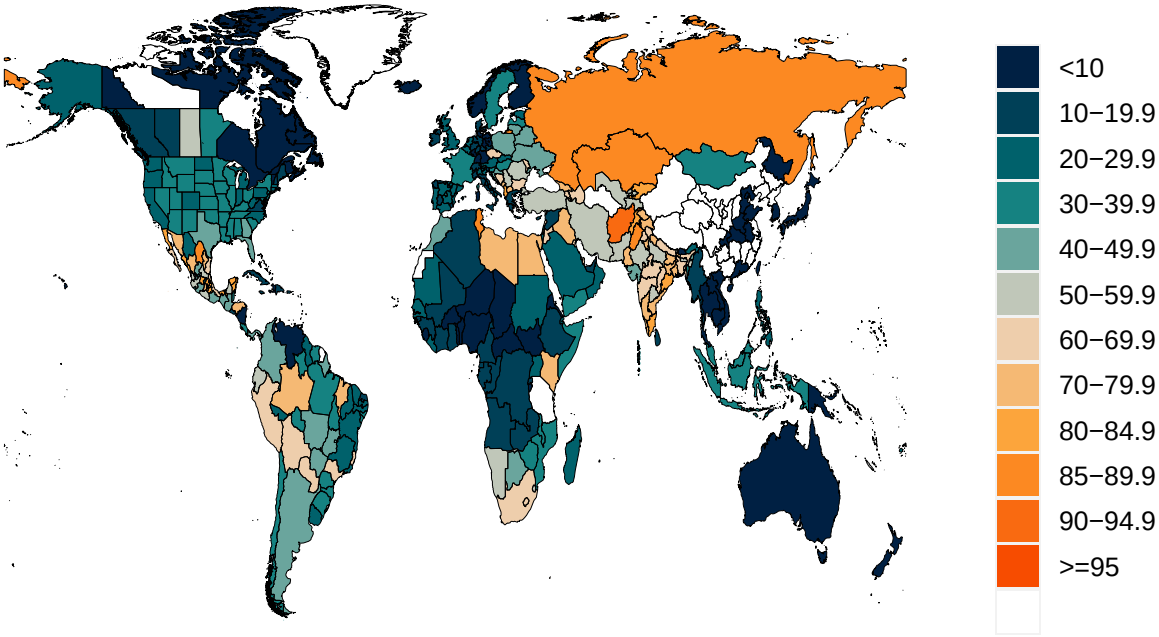


Figure 7. Mean effective R on September 2, 2021. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.

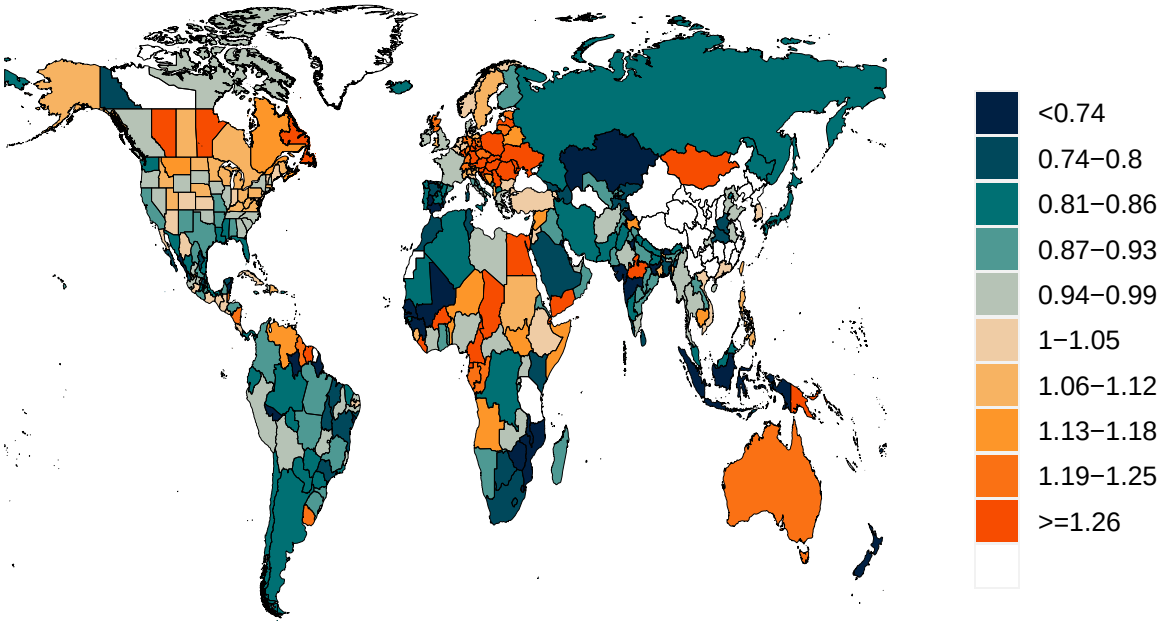


Figure 8. Percent of COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100% at particular points in time.

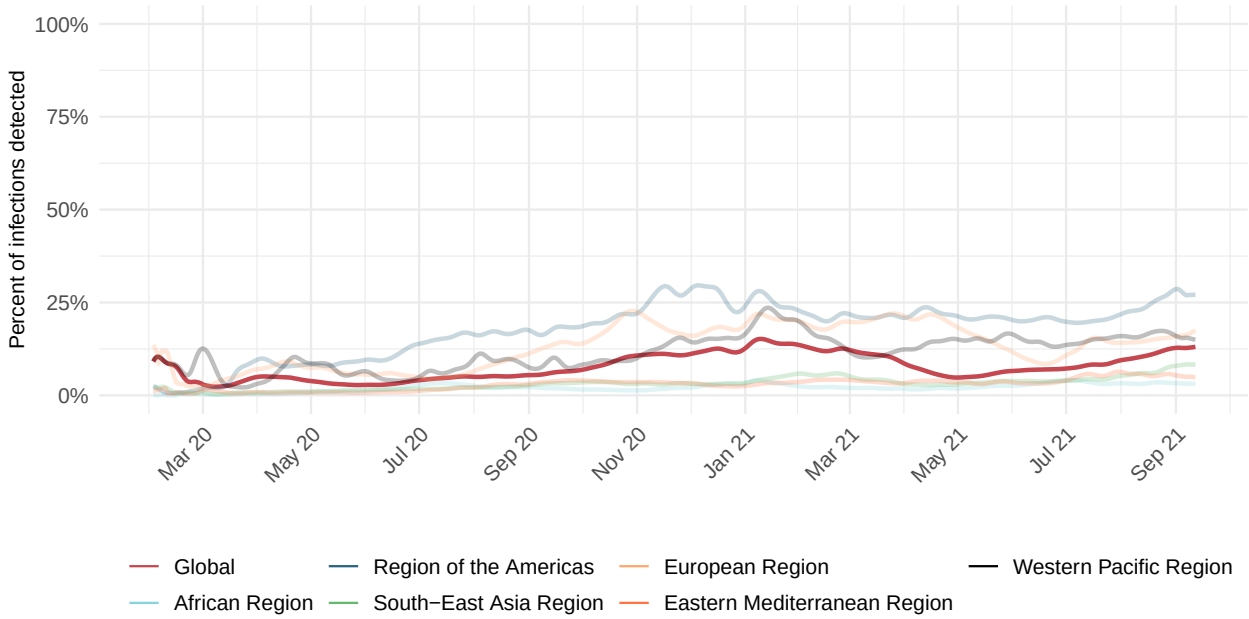
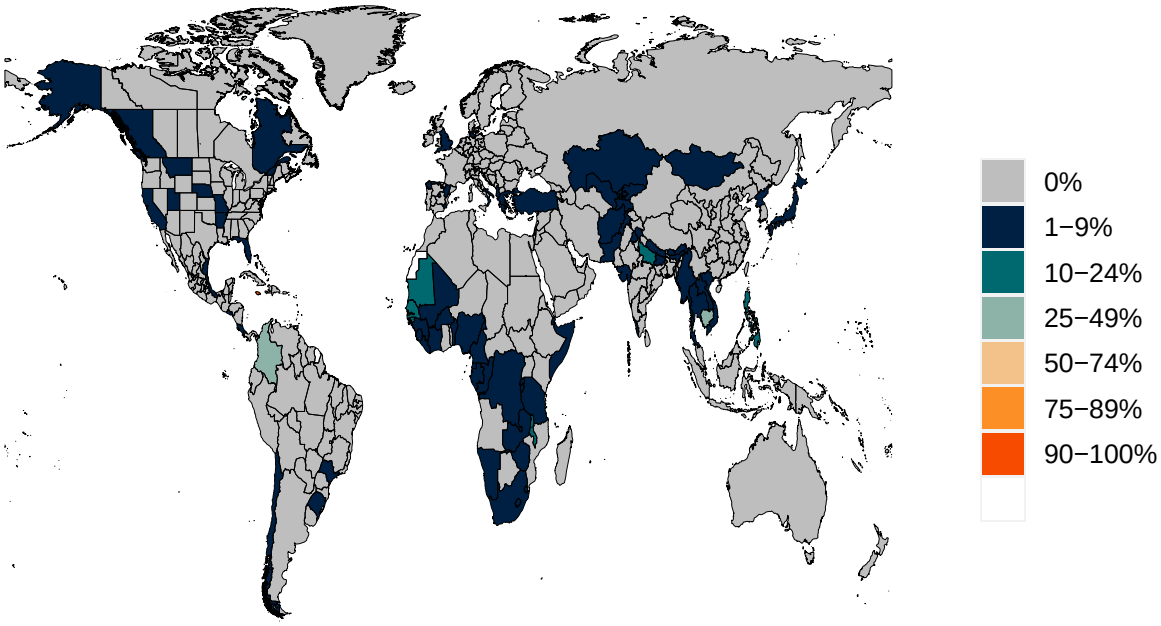
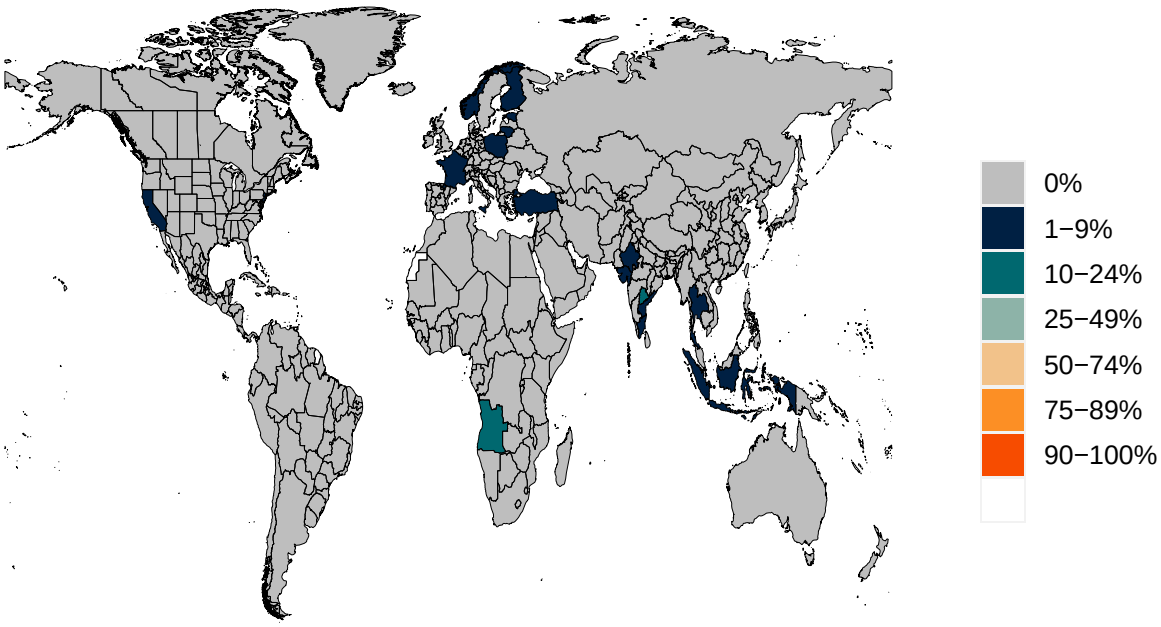


Figure 9. Estimated percent of circulating SARS-CoV-2 for primary variant families on September 13, 2021

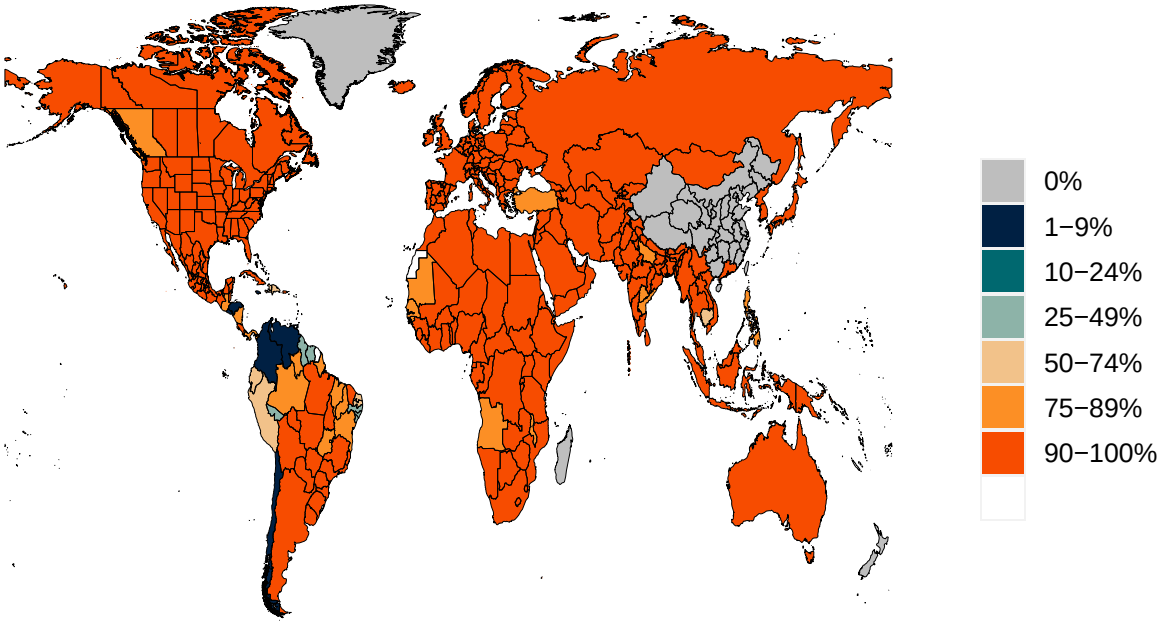
A. Estimated percent Alpha variant



B. Estimated percent Beta variant



C. Estimated percent Delta variant



D. Estimated percent Gamma variant

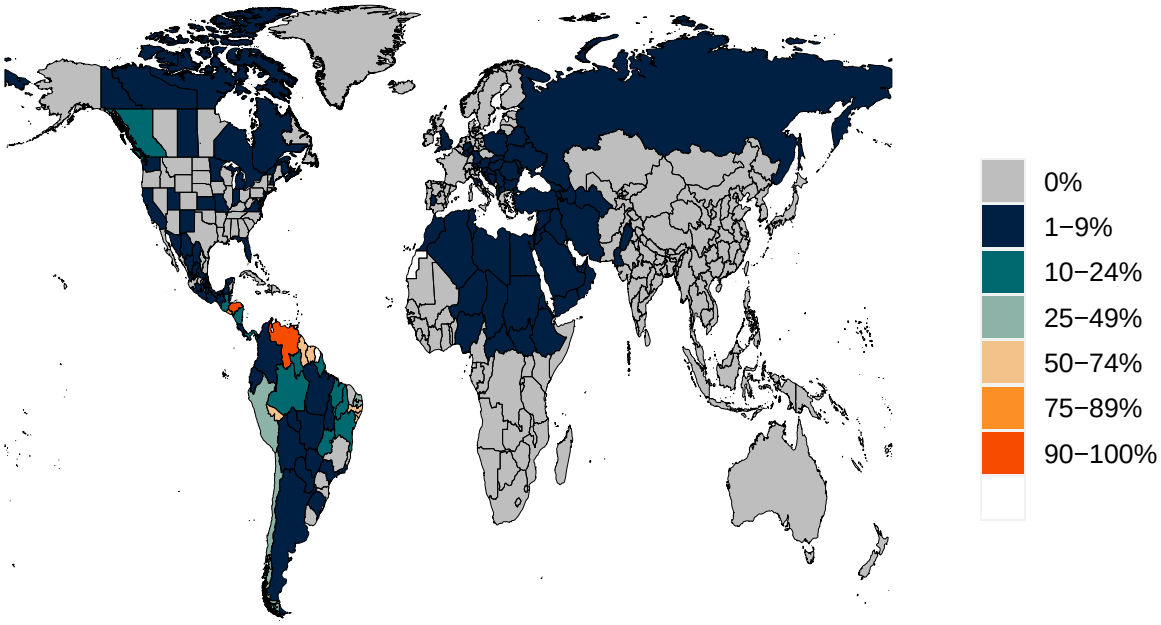
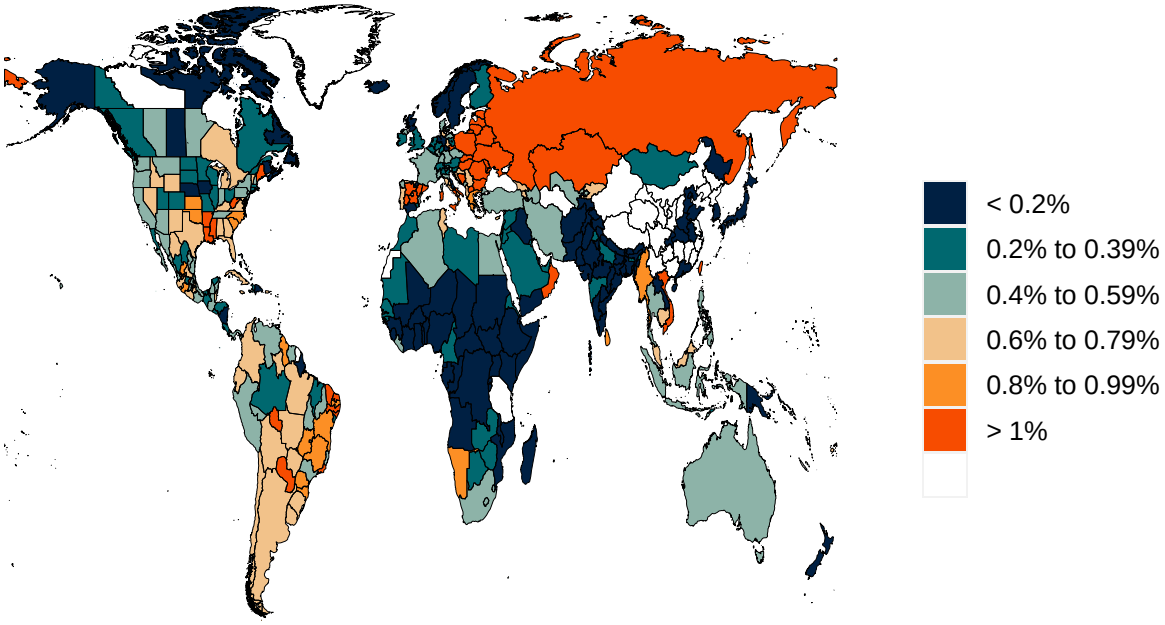


Figure 10. Infection-fatality rate on September 13, 2021. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.



Critical drivers

Figure 11. Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

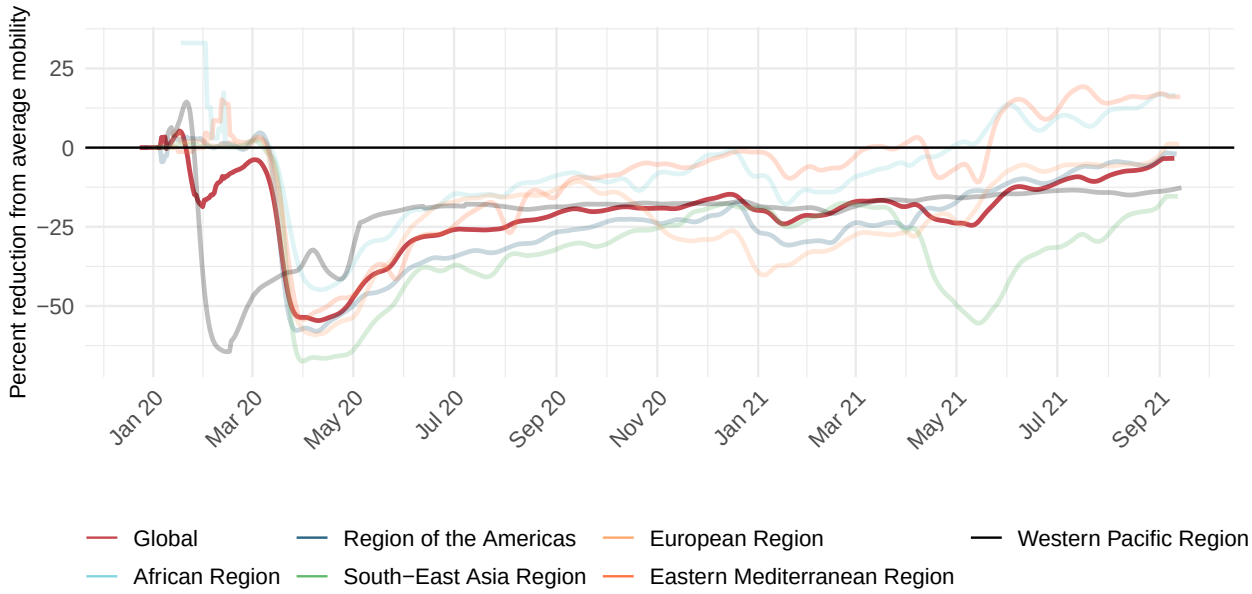


Figure 12. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on September 13, 2021

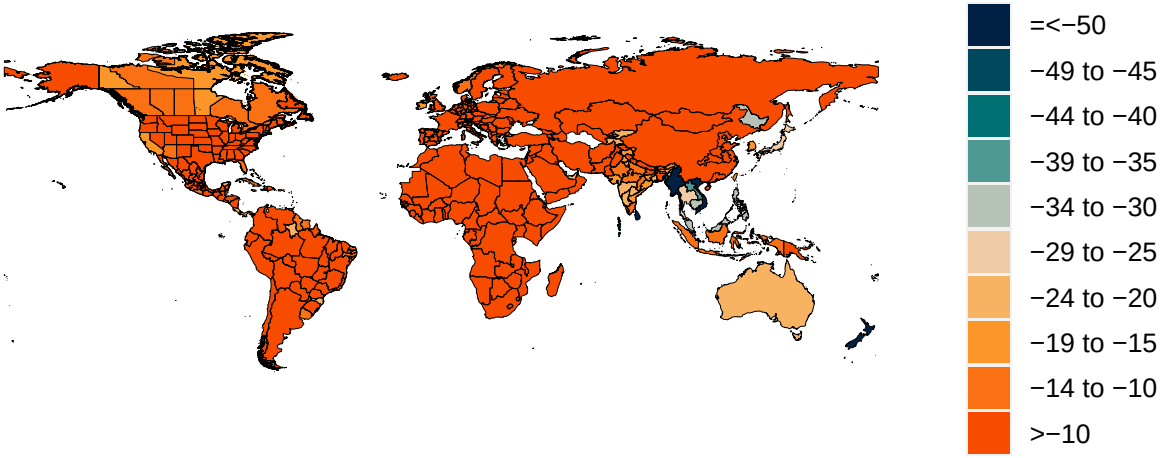


Figure 13. Trend in the proportion of the population reporting always wearing a mask when leaving home

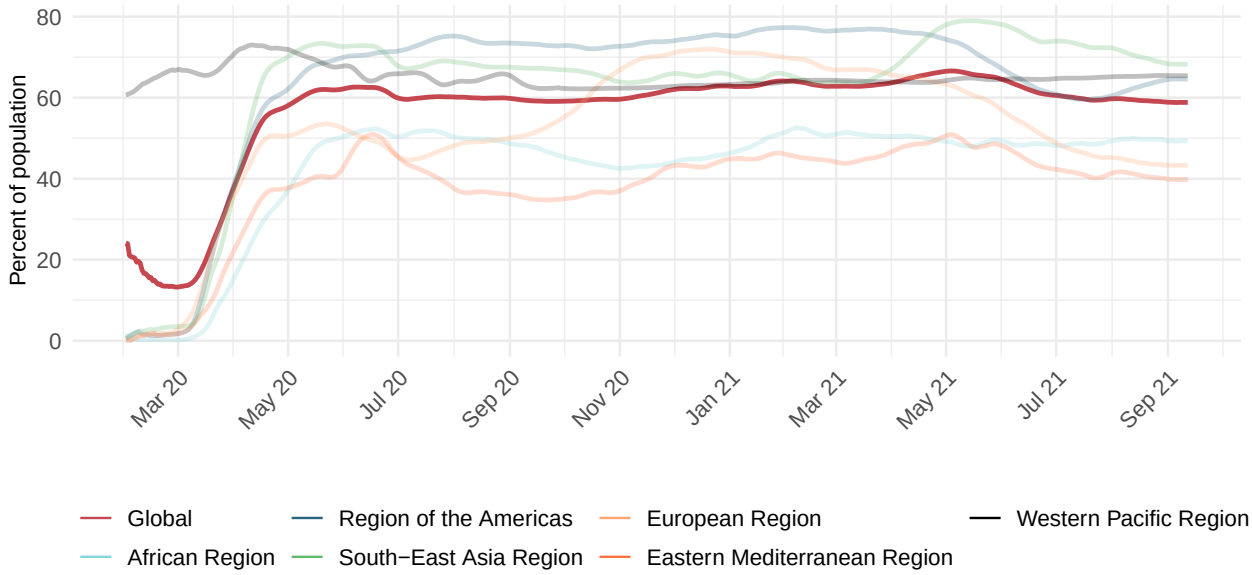


Figure 14. Proportion of the population reporting always wearing a mask when leaving home on September 13, 2021

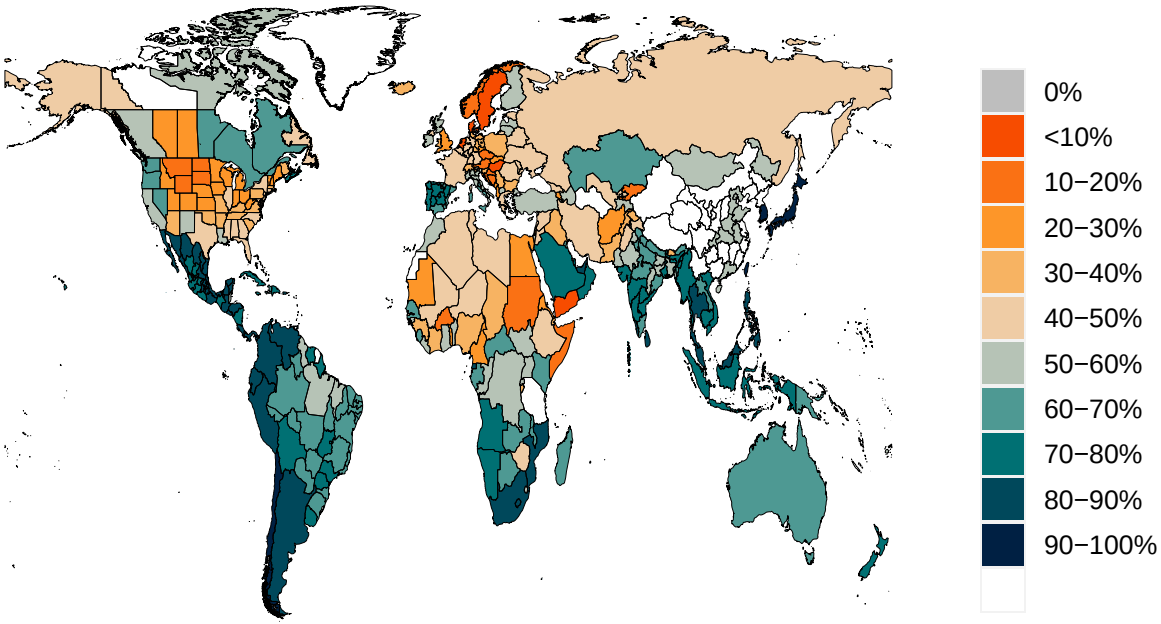


Figure 15. Trend in COVID-19 diagnostic tests per 100,000 people

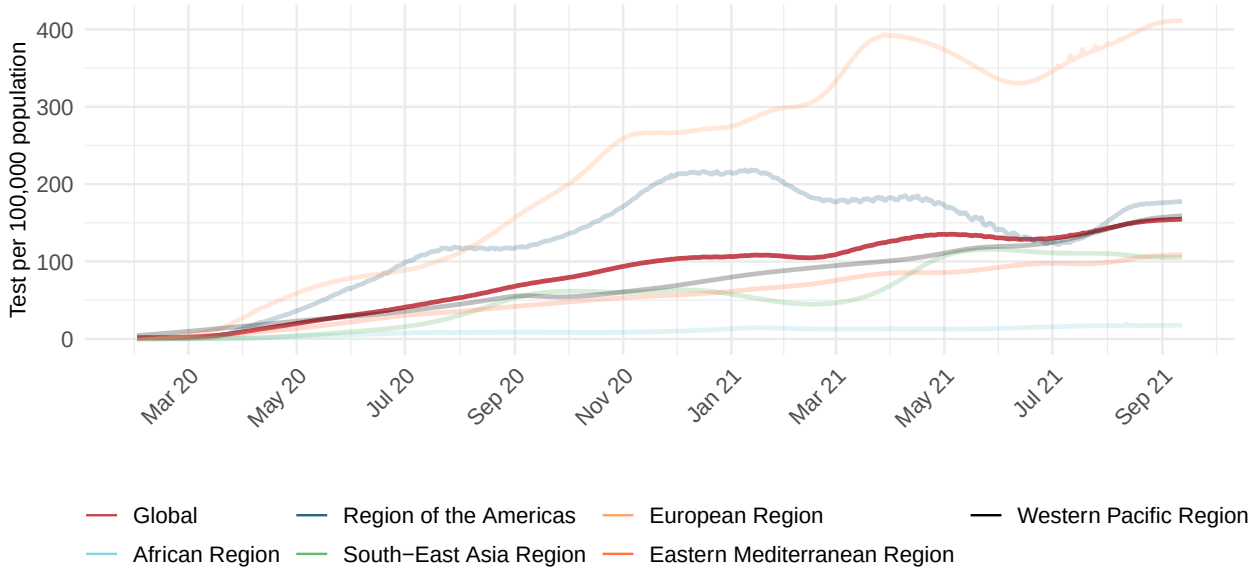


Figure 16. COVID-19 diagnostic tests per 100,000 people on September 13, 2021

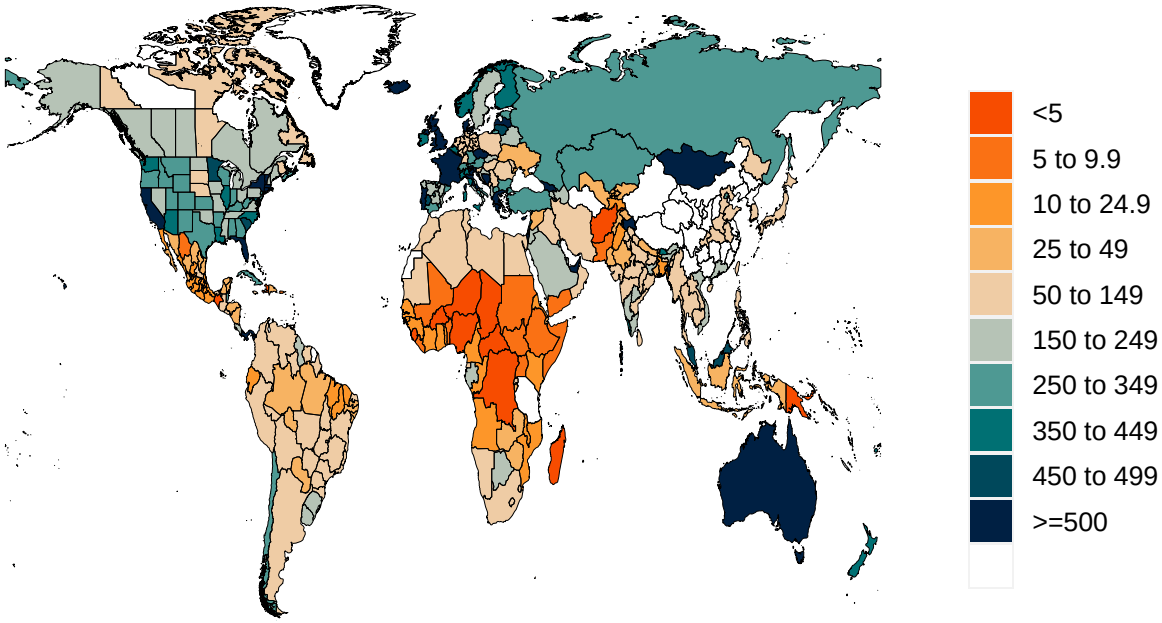
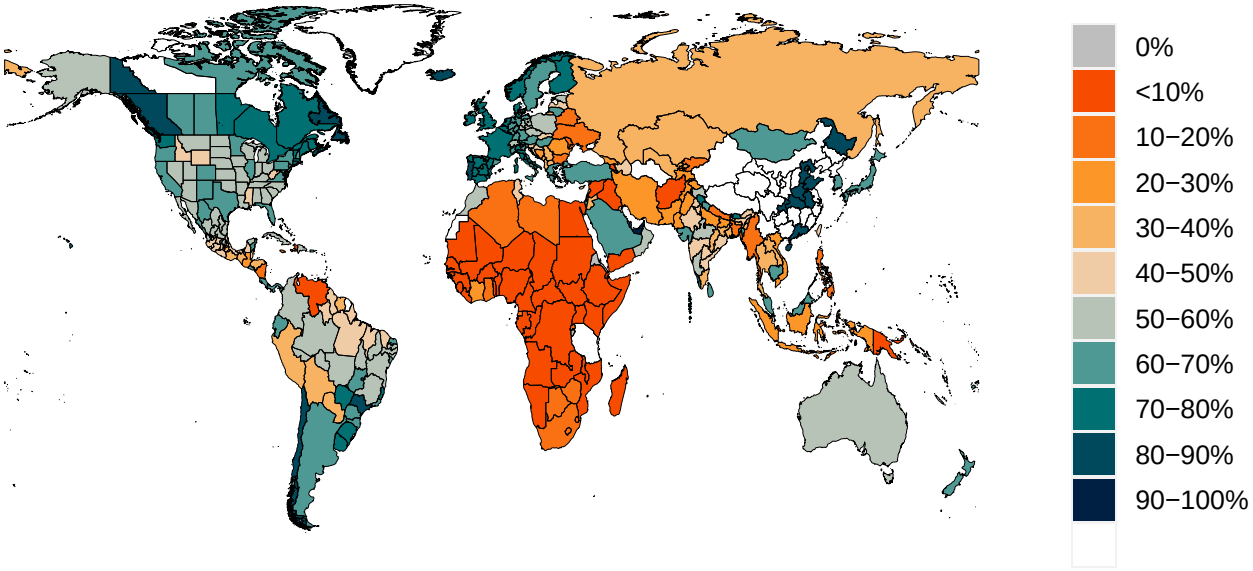


Table 3. Estimates of vaccine efficacy for specific vaccines used in the model at preventing disease and infection. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our website.

Vaccine	Efficacy at preventing disease: ancestral and Alpha	Efficacy at preventing infection: ancestral and Alpha	Efficacy at preventing disease: Beta, Delta, & Gamma	Efficacy at preventing infection: Beta, Delta, & Gamma
AstraZeneca	90%	52%	85%	49%
CoronaVac	50%	44%	43%	38%
Covaxin	78%	69%	68%	60%
Johnson & Johnson	86%	72%	60%	56%
Moderna	94%	89%	94%	80%
Novavax	89%	79%	79%	69%
Pfizer/BioNTech	94%	86%	85%	78%
Sinopharm	73%	65%	63%	56%
Sputnik-V	92%	81%	80%	70%
Tianjin CanSino	66%	58%	57%	50%
Other vaccines	75%	66%	65%	57%
Other vaccines (mRNA)	91%	86%	85%	78%

Figure 17. Percent of the population (A) having received at least one dose and (B) fully vaccinated against SARS-CoV-2 by September 13, 2021

A. Percent of the population having received one dose of a COVID-19 vaccine



B. Percent of the population fully vaccinated against SARS-CoV-2

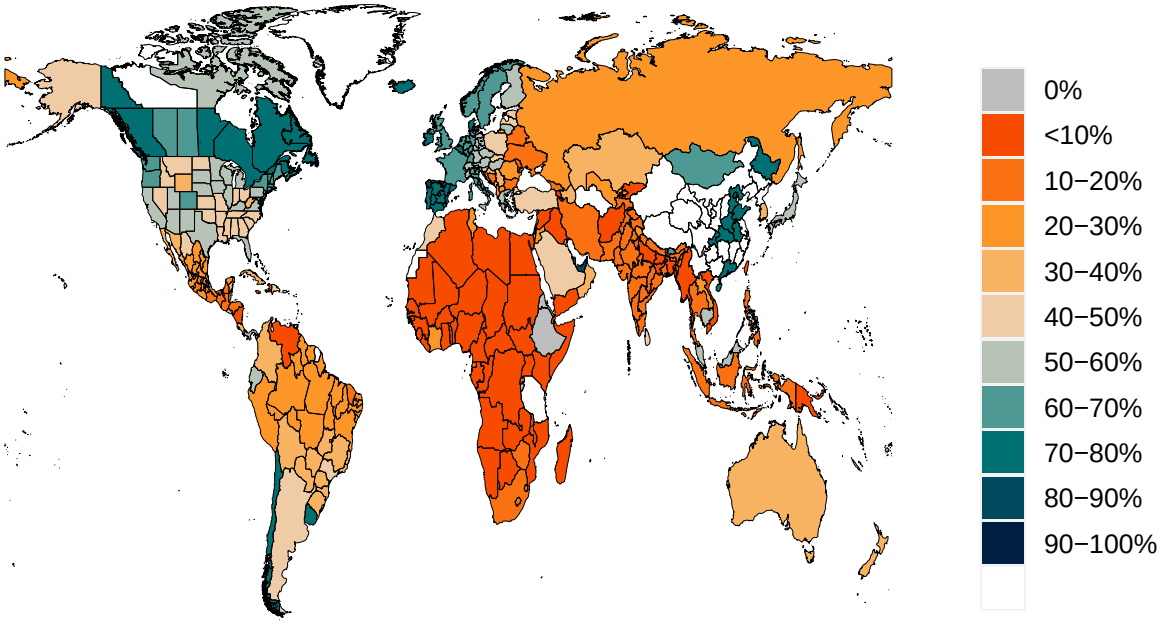


Figure 18. Trend in the estimated proportion of the adult (18+) population that have been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

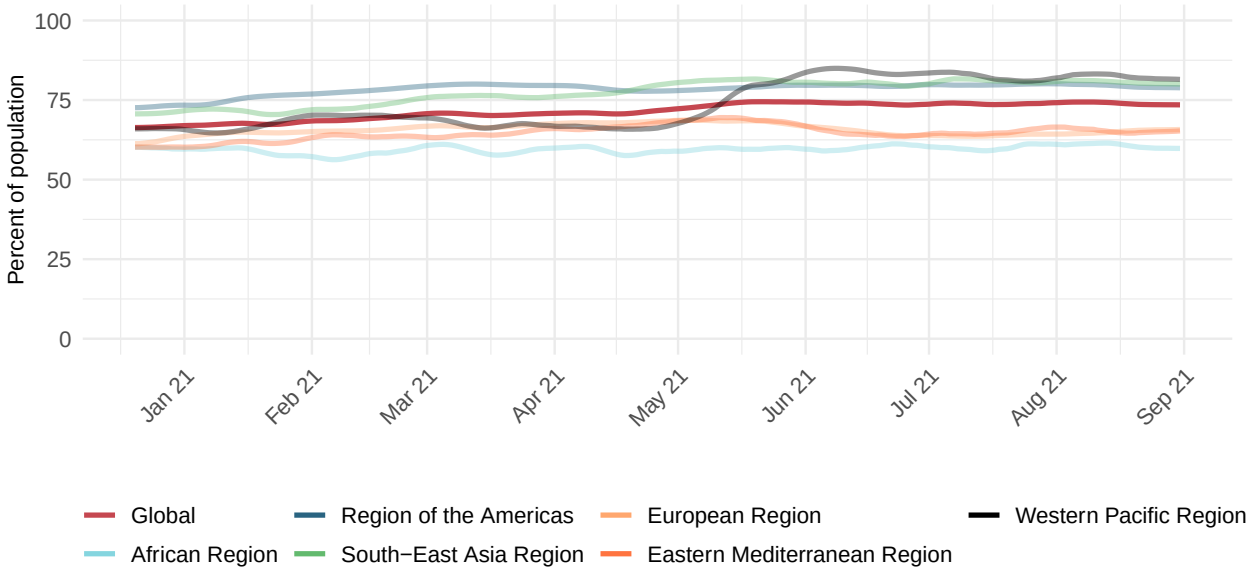


Figure 19. This figure shows the estimated proportion of the adult (18+) population that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

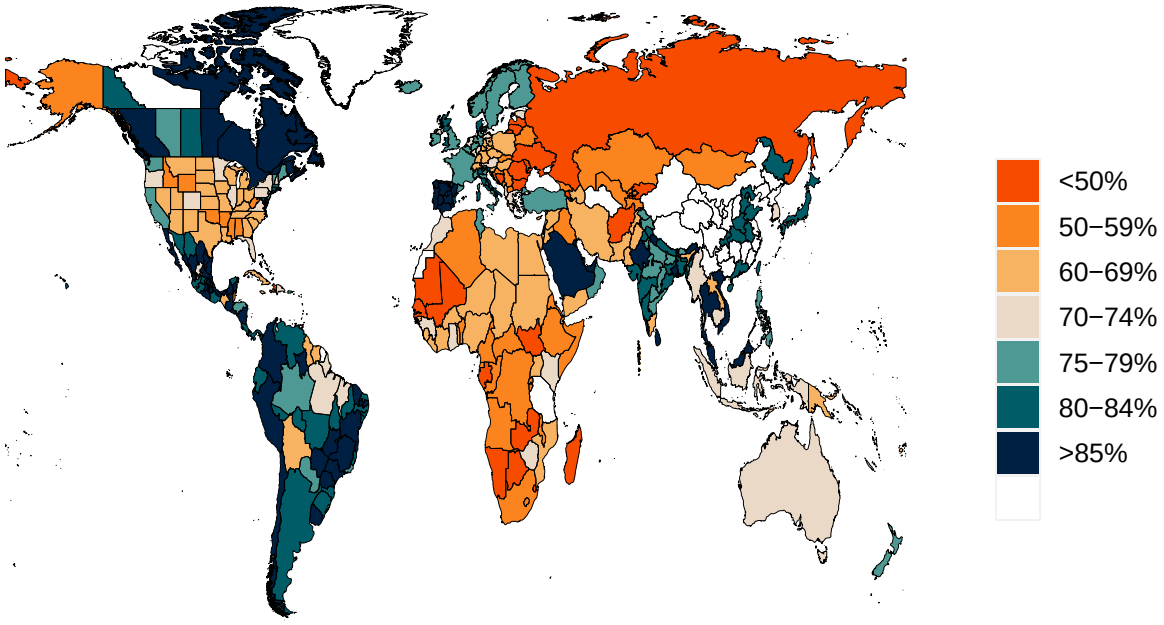


Figure 20. Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated

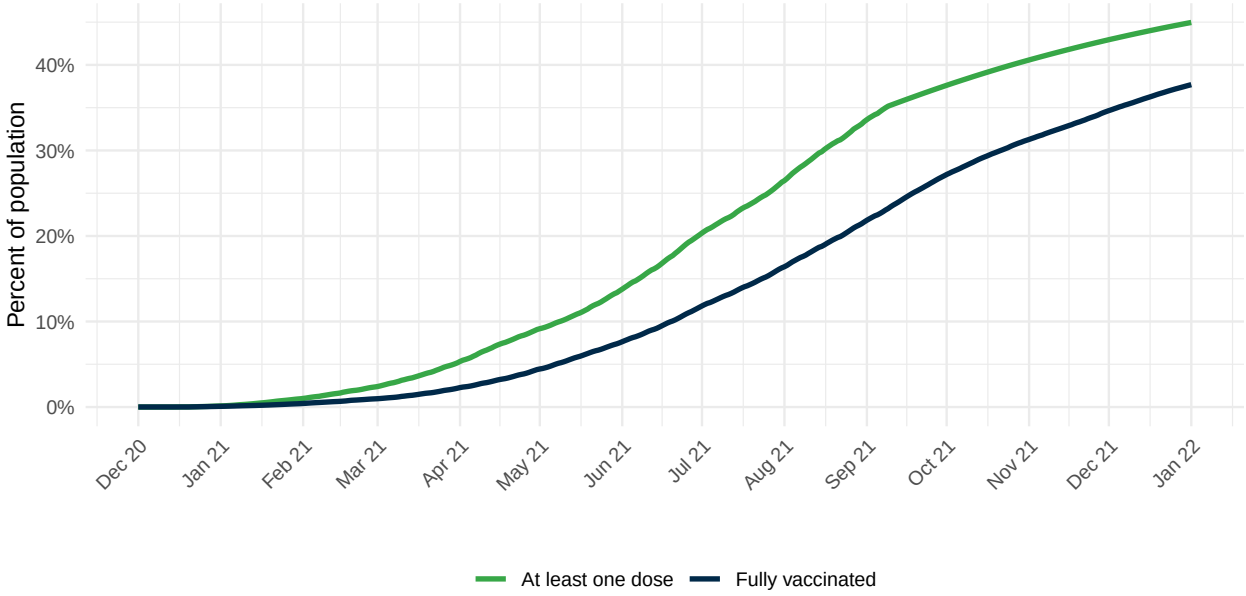
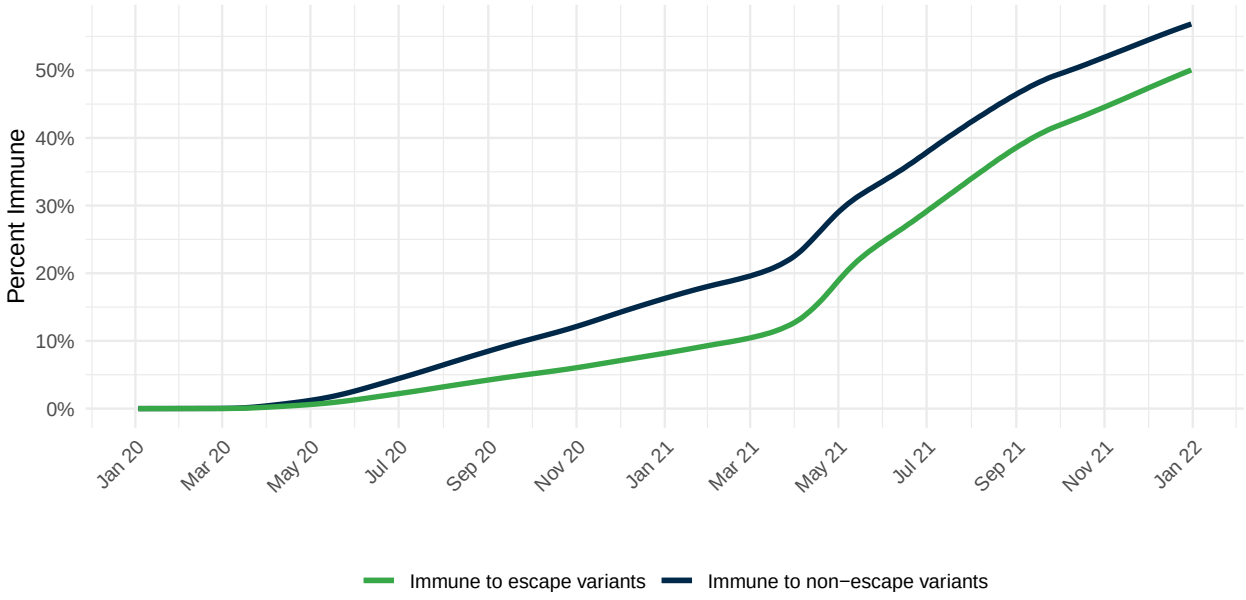


Figure 21. Percentage of people who are immune to non-escape variants and the percentage of people who are immune to escape variants



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. Brand- and variant-specific vaccine efficacy is updated using the latest available information from peer-reviewed publications and other reports.
- Future mask use is the mean of mask use over the last 7 days.
- Mobility increases as vaccine coverage increases.
- 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 reference scenario assumes that mandates are re-imposed when daily deaths reach 15 per million.
- Variants Alpha, Beta, Gamma, and Delta continue to spread regionally and globally from locations with sufficient transmission.

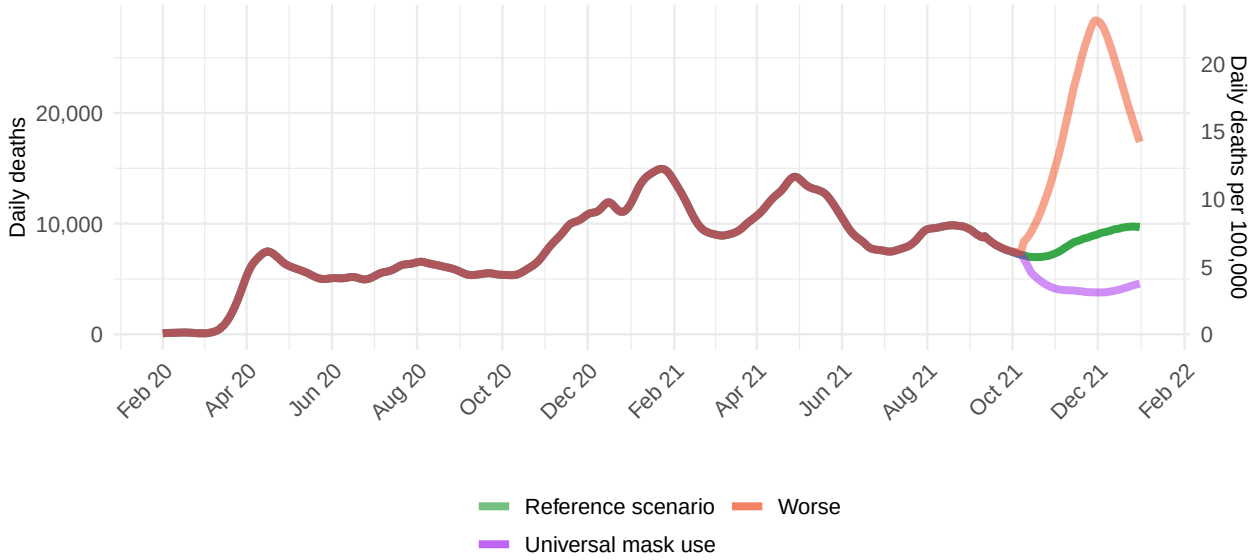
The **worse scenario** modifies the reference scenario assumption in four ways:

- 100% of vaccinated individuals stop using masks.
- Mobility increases in all locations to 25% above the pre-pandemic winter baseline, irrespective of vaccine coverage.
- Governments are more reluctant to re-impose social distancing mandates, waiting until the daily death rate reaches 15 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 reference scenario assumes that mandates are re-imposed when daily deaths reach 38 per million. In either case, we assume social distancing mandates remain in effect for 6 weeks.
- Variants Alpha, Beta, Gamma, and Delta spread between locations twice as fast when compared with our reference scenario.

The **universal masks scenario** makes all the same assumptions as the reference scenario but assumes all locations reach 95% mask use within 7 days.

Figure 22. Daily COVID-19 deaths until January 01, 2022 for three scenarios

A. Reported daily COVID-19 deaths per 100,000



B. Excess daily COVID-19 deaths per 100,000

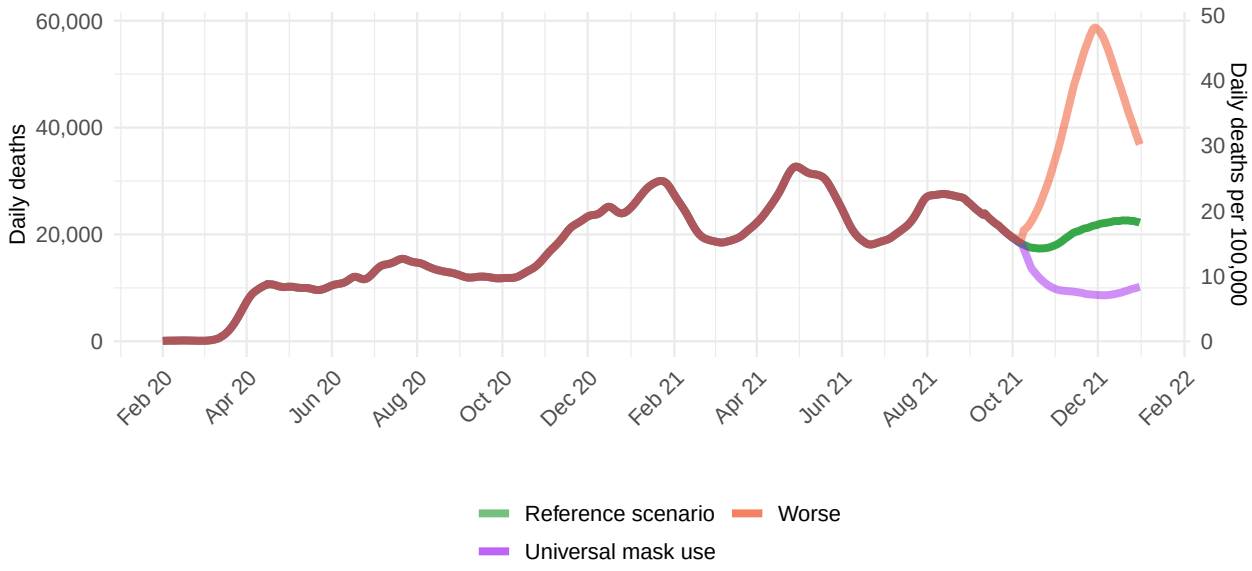


Figure 23. Daily COVID-19 infections until January 01, 2022 for three scenarios

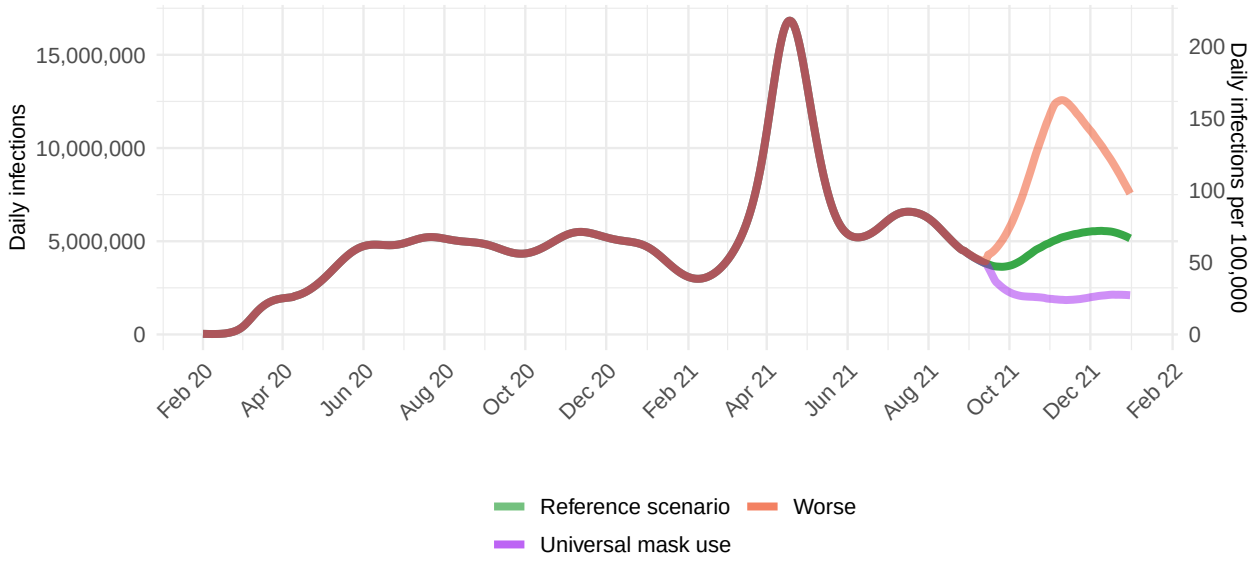


Figure 24. Daily COVID-19 reported cases until January 01, 2022 for three scenarios

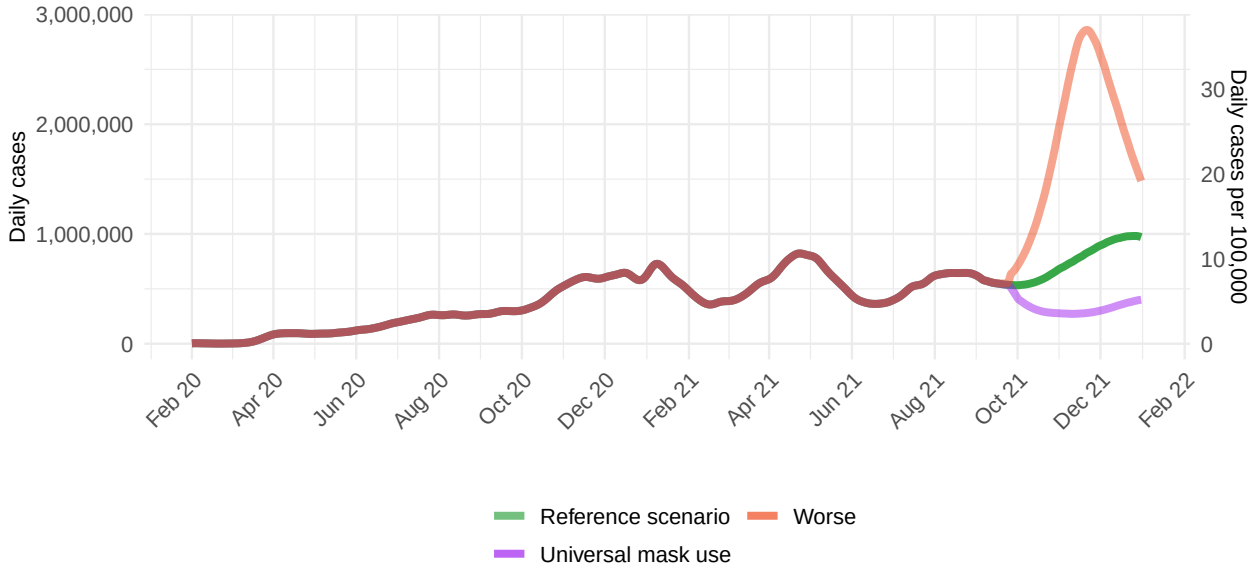
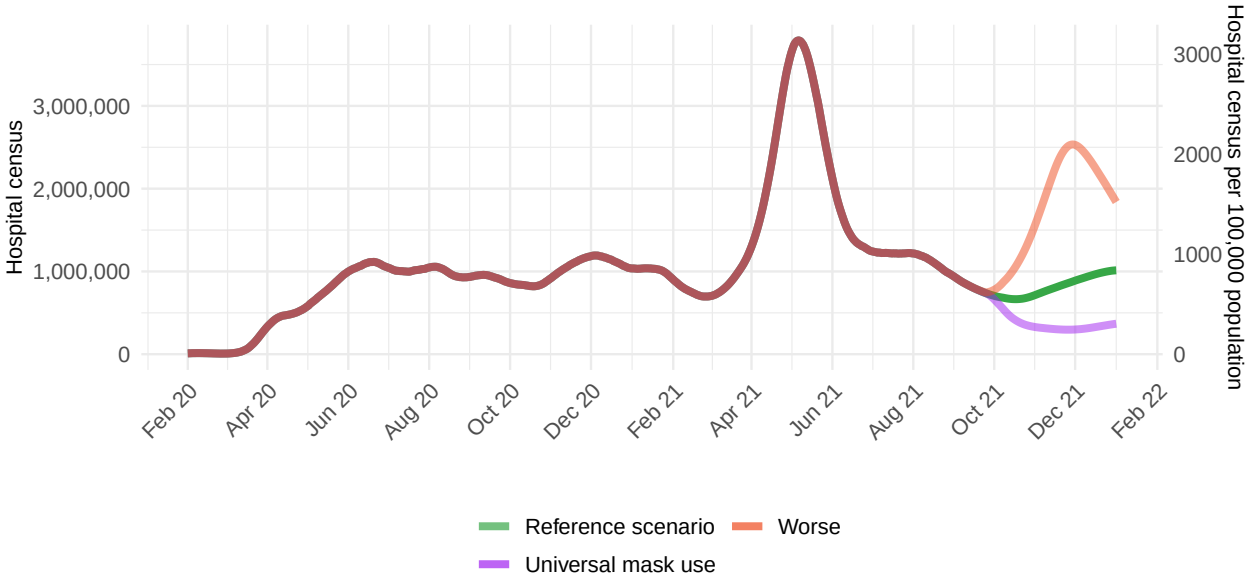


Figure 25. Daily COVID-19 hospital census until January 01, 2022 for three scenarios



More information

Data sources:

Mask use and vaccine confidence data are from the The Delphi Group at Carnegie Mellon University and University of Maryland COVID-19 Trends and Impact Surveys, in partnership with Facebook. Mask use data are also from Premise, the Kaiser Family Foundation, and the YouGov COVID-19 Behaviour Tracker survey.

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.

To download our most recent results, visit our Data downloads page.

Questions? Requests? Feedback? Please contact us at https://www.healthdata.org/covid/contact-us.