COVID-19 Results Briefing

Global

October 21, 2022

This document contains summary information on the latest projections from the IHME model on COVID-19 globally. The model was run on October 21, 2022, with data through October 18, 2022.

COVID-19 is increasing slowly in the Northern Hemisphere, likely due to seasonal changes in behavior. Three other factors warrant careful monitoring. First, most of the susceptible individuals in the world are in China. This is the main population of individuals who are uninfected and in some cases with limited protection from vaccination. There are mixed signals from China on whether the zero-COVID strategy will be aggressively pursued; changes in this policy would have a dramatic effect on COVID-19 infections, cases, and deaths. Second, the XBB subvariant has led to a surge in Singapore. Hospital admissions and cases have recently peaked but have not yet declined. Analyses by the ministry of health in Singapore show that there is no immune escape from BA.5 infection, which limits the global impact of this variant. Third, there has been in recent weeks a very rapid increase in hospital admissions with COVID-19 in Germany. This surge has not been uniquely associated with one subvariant as of yet. This surge also seems to have peaked.

In our reference scenario, COVID-19 infections will increase slowly in the Northern Hemisphere. Global transmission will lead to nearly a quarter of a million deaths with COVID-19 by February 1. However, these quarter million deaths include deaths where COVID-19 was present but not necessarily contributing to death. Our inability to distinguish effectively between hospital admissions and deaths *due to* COVID-19 as compared to *with* COVID-19 hampers our understanding of the true impact of COVID-19 now. Excess mortality estimation requires complete vital statistics reporting on weekly deaths, and these reports, even in countries with good data systems, are often incomplete up to 16 weeks, limiting our ability to discern the true impact in the Omicron era.

Transmission is most likely going to be dominated by the emergence of various Omicron lineage subvariants, seasonal behavioral change, and the policy stance in China. In these scenarios, the main strategies remain continued surveillance, promoting boosters for those at risk, and wider access to antivirals for those at risk. However, if a new variant emerges with immune escape that has a severity profile more like Delta, other strategies might be necessary, including the use of social distancing mandates. Learning more about which of these mandates worked and which ones had the least social, educational, and economic consequences is an urgent priority. In order to detect the emergence of a new more severe variant, strengthening the reporting of hospital admissions due to COVID-19 in addition to hospital admissions with COVID-19 is a high priority.

Current situation

- Estimated daily infections in the last week increased to 17.0 million per day on average compared to 16.8 million the week before (Figure 1.1).

- Daily reported cases in the last week increased to 474,000 per day on average compared to 445,000 the week before (Figure 2.1).
- Daily hospital census in the last week (through October 18) decreased to 247,000 per day on average compared to 248,000 the week before.
- Reported deaths due to COVID-19 in the last week remained the same at 1,500 per day on average compared to the week before (Figure 3.1).
- Total deaths due to COVID-19 in the last week remained the same at 2,500 per day on average compared to the week before (Figure 3.1). This makes COVID-19 the number 17 cause of death globally this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 1.7 times larger than the reported number of deaths.
- The daily rate of reported deaths due to COVID-19 is greater than 4 per million in one location and no subnational locations (Figure 4.1).
- The daily rate of total deaths due to COVID-19 is greater than 4 per million in eight locations and five subnational locations (Figure 4.2).
- We estimate that 75% of people globally have been infected at least once as of October 17 (Figure 6.1). Outside of China, the fraction infected is closer to 90% in nearly all jurisdictions. Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 90 locations and 134 subnational locations (Figure 7.1).
- The infection-detection rate globally was close to 3% on October 17 (Figure 8.1).
- Based on the GISAID and various national databases, combined with our variant spread model, we estimate the current prevalence of variants of concern (Figures 9.1-9.6). BA.5 remains the dominant variant in most jurisdictions.

Trends in drivers of transmission

- Based on self-reported mask use data collected in the COVID-19 Trends and Impact Survey, an estimated 24% of people are projected to always wear a mask when leaving their home. Mask use after June 24, 2022, is a statistical forecast.
- As of October 17, 89 locations and 188 subnational locations have reached 70% or more of the population who have received at least one vaccine dose, and 74 locations and 153 subnational locations have reached 70% or more of the population who are fully vaccinated (Figures 12.1 and 12.2). 68% of people globally have received at least one vaccine dose, and 63% are fully vaccinated.
- In our current reference scenario, we expect that 5.3 billion people will be vaccinated with at least one dose by February 1 (Figure 14.1). We expect that 64% of the population will be fully vaccinated by February 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:

- 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 will decline to 50% of the minimum level it reached between January 1, 2021, and May 1, 2022. This decline begins after the last observed data point in each location and transitions linearly to the minimum over a period of six weeks.
- Mobility increases as vaccine coverage increases.
- 80% of those who are fully vaccinated (two doses for most vaccines, or one dose for Johnson & Johnson) receive an additional dose six months after becoming fully vaccinated, and 80% of those who receive an additional dose receive a second additional dose six months later.
- Antiviral utilization for COVID-19 risk prevention has reached 80% in high-risk populations and 50% in low-risk populations between March 1, 2022, and June 1, 2022. This applies in high-income countries, but not low- and middle-income countries, and this rollout assumption follows a similar pattern to global vaccine rollouts.

The **80% mask use scenario** makes all the same assumptions as the reference scenario but assumes all locations reach 80% mask use within seven days. If a location currently has higher than 80% use, mask use remains at the current level.

The **antiviral access scenario** makes all the same assumptions as the reference scenario but assumes globally distributed antivirals and extends coverage to all low- and middle-income countries between August 15, 2022, and September 15, 2022.

Infections

- Daily estimated infections in the **reference scenario** will rise to 18.7 million by January 25, 2023 (Figure 16.1).
- Daily estimated infections in the **80% mask use scenario** will rise to 16.6 million by February 1, 2023 (Figure 16.1).
- Daily estimated infections in the **antiviral access scenario** will rise to 18.7 million by January 25, 2023 (Figure 16.1).

Cases

- Daily estimated cases in the **reference scenario** will rise to 730,000 by February 1, 2023 (Figure 16.2).
- Daily estimated cases in the **80% mask use scenario** will rise to 645,000 by February 1, 2023 (Figure 16.2).
- Daily estimated cases in the **antiviral access scenario** will rise to 730,000 by February 1, 2023 (Figure 16.2).

Hospitalizations

- Daily hospital census in the **reference scenario** will rise to 263,000 by November 30, 2022 (Figure 16.3).
- Daily hospital census in the **80% mask use scenario** will rise to 241,000 by October 26, 2022 (Figure 16.3).
- Daily hospital census in the **antiviral access scenario** will rise to 242,000 by November 30, 2022 (Figure 16.3).

Deaths

- In our **reference scenario**, our model projects 7,368,000 cumulative reported deaths due to COVID-19 on February 1. This represents 245,000 additional deaths from October 17 to February 1. Daily reported COVID-19 deaths in the **reference scenario** will rise to 2,750 by February 1, 2023 (Figure 16.4).
- Under our **reference scenario**, our model projects 18,031,000 cumulative total deaths due to COVID-19 on February 1. This represents 386,000 additional deaths from October 17 to February 1 (Figure 16.5).
- In our **80% mask use scenario**, our model projects 7,338,000 cumulative reported deaths due to COVID-19 on February 1. This represents 214,000 additional deaths from October 17 to February 1. Daily reported COVID-19 deaths in the **80% mask use scenario** will rise to 2,360 by February 1, 2023 (Figure 16.4).
- In our **antiviral access scenario**, our model projects 7,341,000 cumulative reported deaths due to COVID-19 on February 1. This represents 218,000 additional deaths from October 17 to February 1. Daily reported COVID-19 deaths in the **antiviral access scenario** will rise to 2,390 by February 1, 2023 (Figure 16.4).

Model updates

Revisions to transmission covariates

The covariates for transmission intensity have been revised to replace our mobility index with an index that more directly measures policy mandates in individual locations and to remove the level of testing entirely as a model covariate. The decision to replace mobility with a mandate index is driven both by the sunsetting of the data products we use to derive mobility as well as by a desire to more directly relate policy measures to changes in transmission. The new mandate index is described below. Testing was removed because it has not been a predictive covariate since the beginning of the pandemic. The early hypothesis was that testing and contact tracing would be policy mechanisms for pandemic control. Instead, we found that during much of the pandemic, testing levels were mostly uncorrelated with transmission. In the post-Omicron era, much of the testing is done with at-home kits and is not registered with any reporting agency, so it has become a generally unreliable measure.

Mandate variable

To model the overall intensity of non-pharmaceutical interventions (NPIs) implemented over time, we developed a database of 17 NPI variables. Each binary NPI variable represents instances of when a government mandated an intervention aimed at altering population behavior to reduce transmission of SARS-CoV-2 (e.g., closure of primary schools or a mandate that gatherings of large numbers of people are restricted; see table). These data were collated for 220 countries and 206 subnational units from November 2019 to present using news reports, press releases, and local collaborators and ministries of public health as sources. To summarize overall mandate intensity, we created an NPI index in a two-step process. We first created sub-indices for primary and secondary education, gatherings, and stay-at-home orders by averaging the statuses of the individual mandates in those groups. We then averaged the sub-indices with the remaining individual mandates to produce a measure of overall mandate intensity over time across our 17 NPI variables on a scale of 0 to 1.

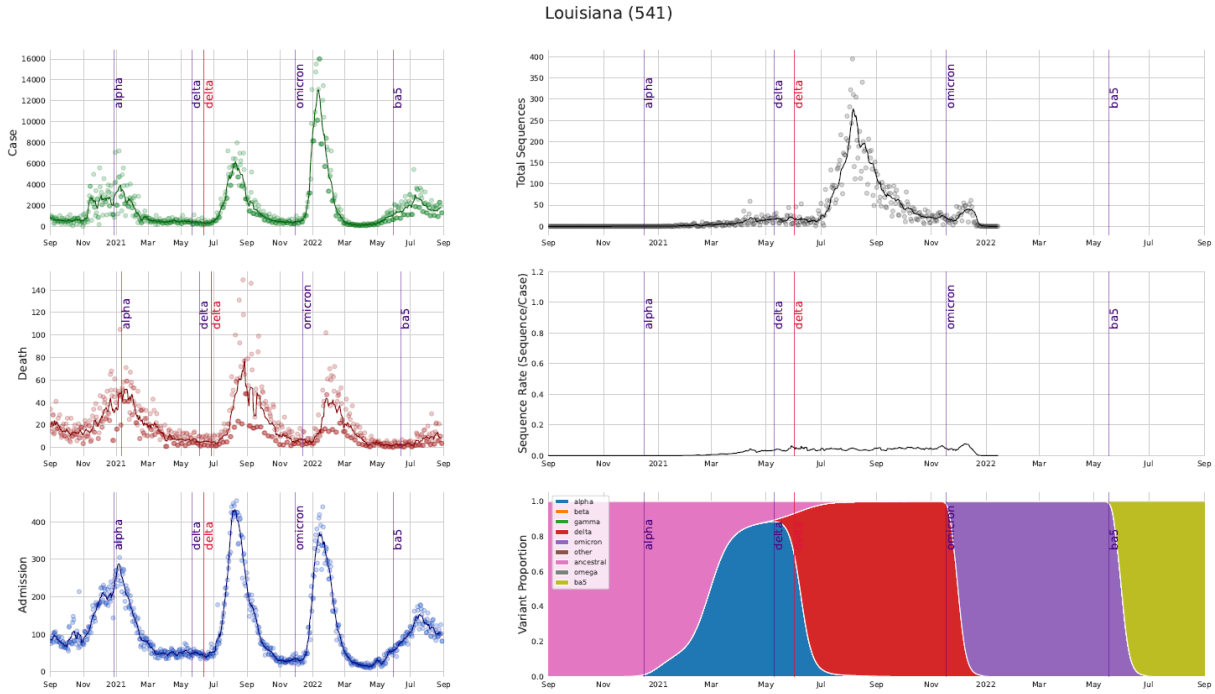
Group		Description of individual NPI
Educational	1	Primary schools are closed.
	2	Secondary and middle schools are closed.
	3	Higher educational institutions (e.g., universities) are closed.
Travel	4	A country has closed all of its borders.
Gathering	5	Gatherings of 100 to 250 people are prohibited.
	6	Gatherings of 50 to 100 people are prohibited.
	7	Gatherings of 25 to 50 people are prohibited.
	8	Gatherings of 10 to 25 people are prohibited.
	9	Gatherings of 6 to 10 people are prohibited.
	10	Citizens are instructed to remain in their homes. Only essential travel is permitted.
Business	11	Dining establishments are closed for dining in, but delivery admissible.
	12	Businesses selling alcoholic beverages in social setting, such as bars and nightclubs, are closed.
	13	Retail establishments which are deemed non-essential are closed. Grocery and gas stations remain open.
	14	Workplaces where it is not essential for workers to be physically present are closed.
	15	Establishments for leisure activities, such as gyms and pools, are closed.
Curfew	16	Non-essential businesses are required to close before a specified time each day.
	17	Residents are required to remain in their homes after a specified time each day.

Revised invasion dates

Invasion dates for all variants in all locations have been revised to better reflect the actual waves of transmission indicated by spikes in cases, deaths, and admissions. Previously, we used sequencing data from the GISAID database to decide when a new variant of SARS-CoV-2 began local transmission in a location (the "invasion

date" for the variant). Unfortunately, the results suggested by the sequencing data often led to invasion timings that did not make sense when compared with reported cases, deaths, and hospital admissions in a location. Both the capture and reporting of sequencing data are subject to several kinds of bias. Because we have no mechanism to review the underlying data sources collated by GISAID and ensure those biases are properly accounted for, we have decided to use it as a confirmatory source instead of the primary arbiter of when a variant enters a location. New invasion dates were selected to match peak timings in reported cases, deaths, and hospital admissions and to reflect the invasion speeds reported in other literature and confirmed in our own analyses in earlier model development.

Below is an example diagnostic used in this analysis. On the right are plots of the total number of GISAID sequences in Louisiana and the proportion of those sequences of each variant (with a smoothing model applied). The purple vertical lines on the plots indicate the invasion dates suggested by our GISAID-driven model. In this example, we see the Alpha variant invade just prior to a decline in reported cases, deaths, and admissions, which is implausible, and we also see the Delta variant arriving too far ahead of the surge in cases, deaths, and admissions. This location was revised to remove the Alpha variant entirely and to shift the invasion of the Delta variant forward by about a month.



The effects of these shifts were examined after the model was run to confirm that surges in the reported measures accurately reflect the variants we believe to be responsible using diagnostics like those below that attribute infections and the reported cases, deaths, and hospital admissions to particular variants.

Louisiana (541)

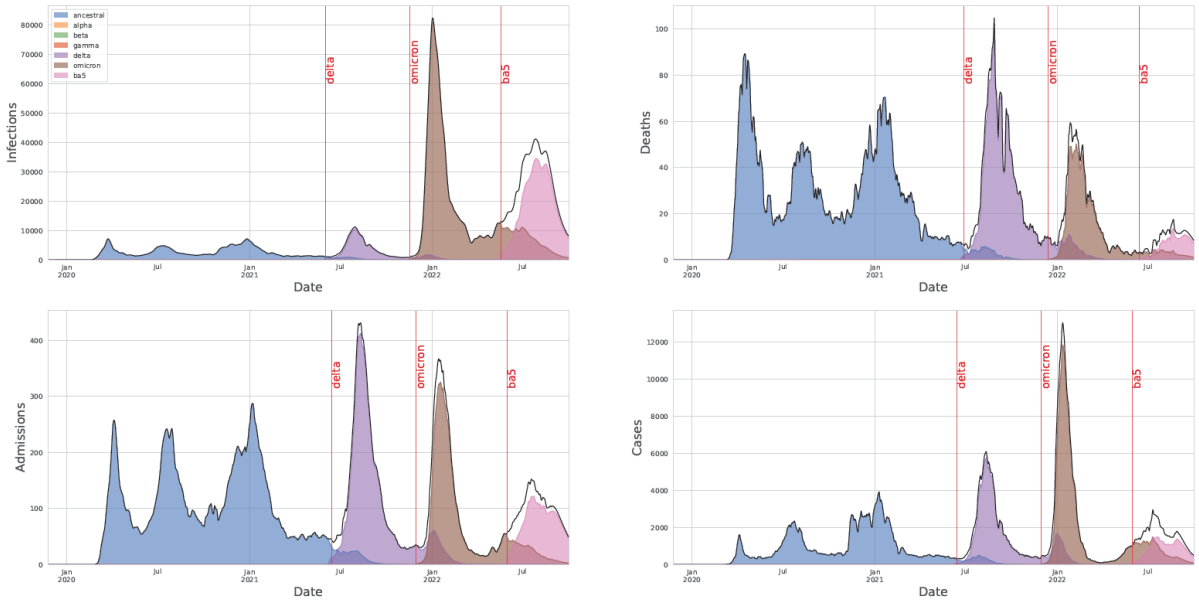


Figure 1.1: Daily COVID-19 hospital census and estimated infections

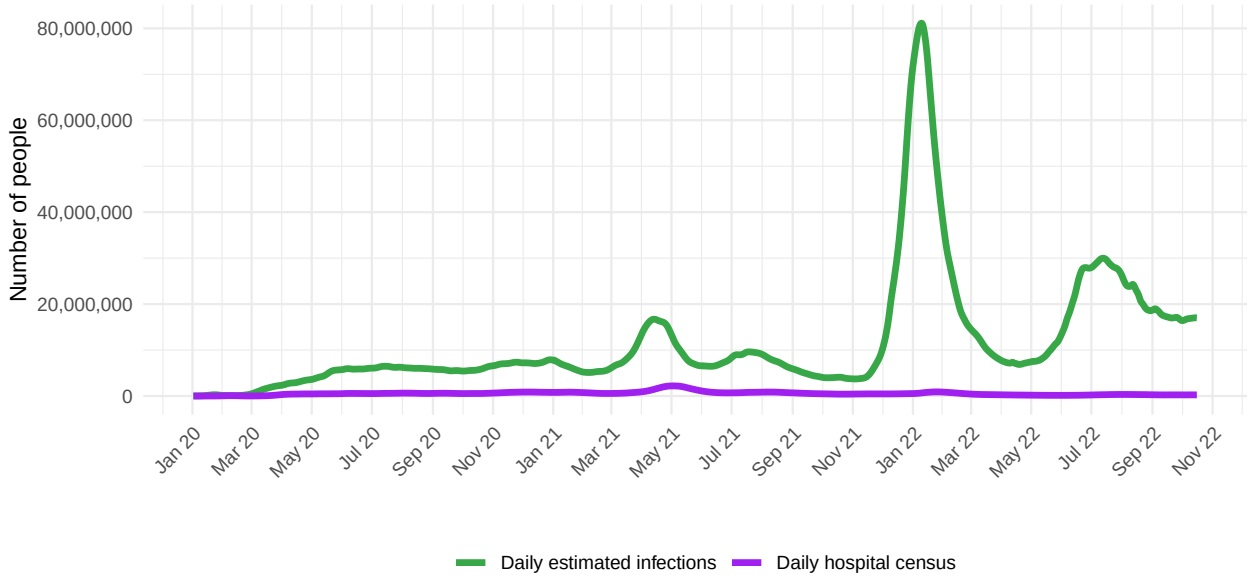


Figure 2.1: Reported daily COVID-19 cases, moving average

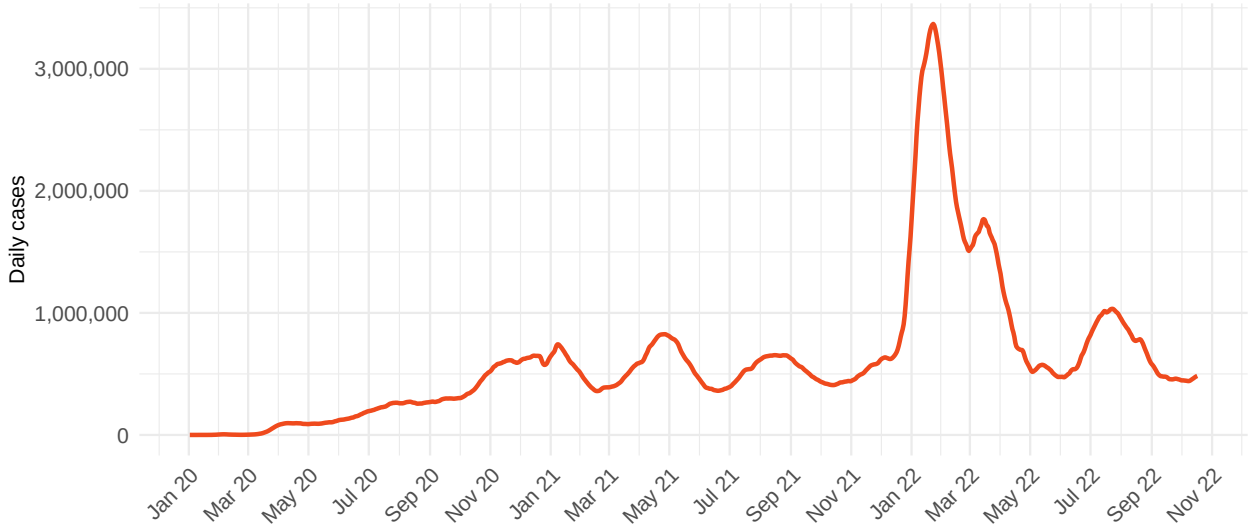
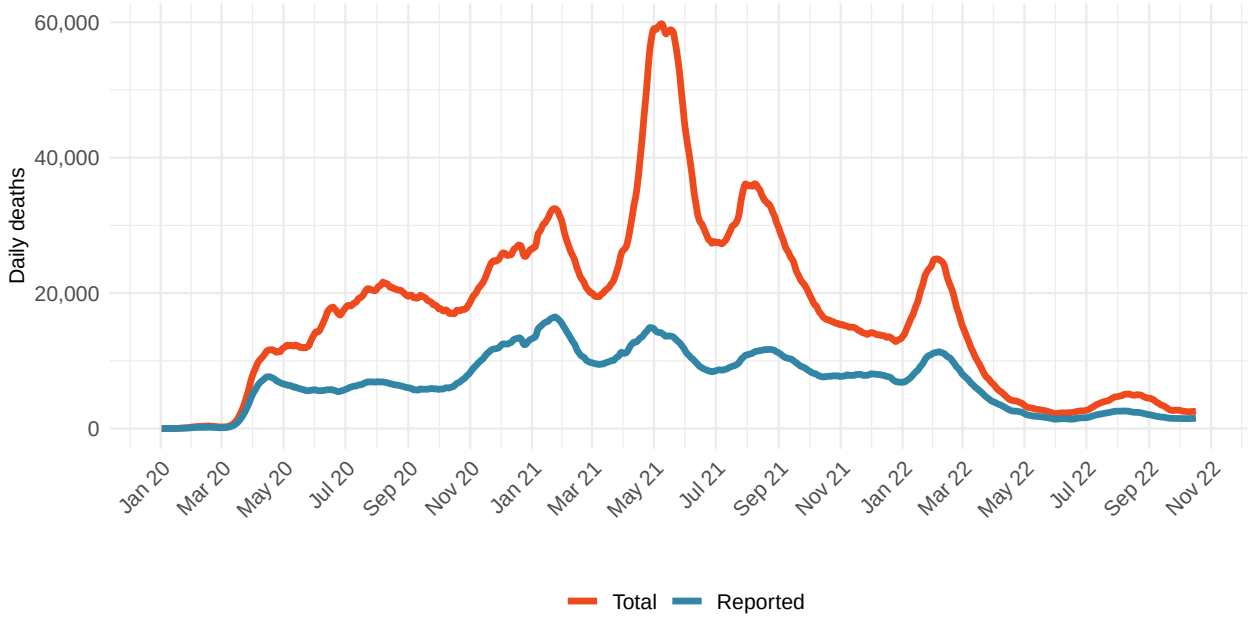


Table 1: Ranking of total deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	175,727	1
Stroke	126,014	2
Chronic obstructive pulmonary disease	63,089	3
Lower respiratory infections	47,946	4
Tracheal, bronchus, and lung cancer	39,282	5
Neonatal disorders	36,201	6
Alzheimer's disease and other dementias	31,217	7
Diabetes mellitus	29,830	8
Diarrheal diseases	29,509	9
Cirrhosis and other chronic liver diseases	28,308	10
COVID-19	17,631	17

Figure 3.1: Smoothed trend estimate of daily COVID-19 deaths



Daily COVID-19 death rate per 1 million on October 17, 2022

Figure 4.1: Daily reported COVID-19 death rate per 1 million

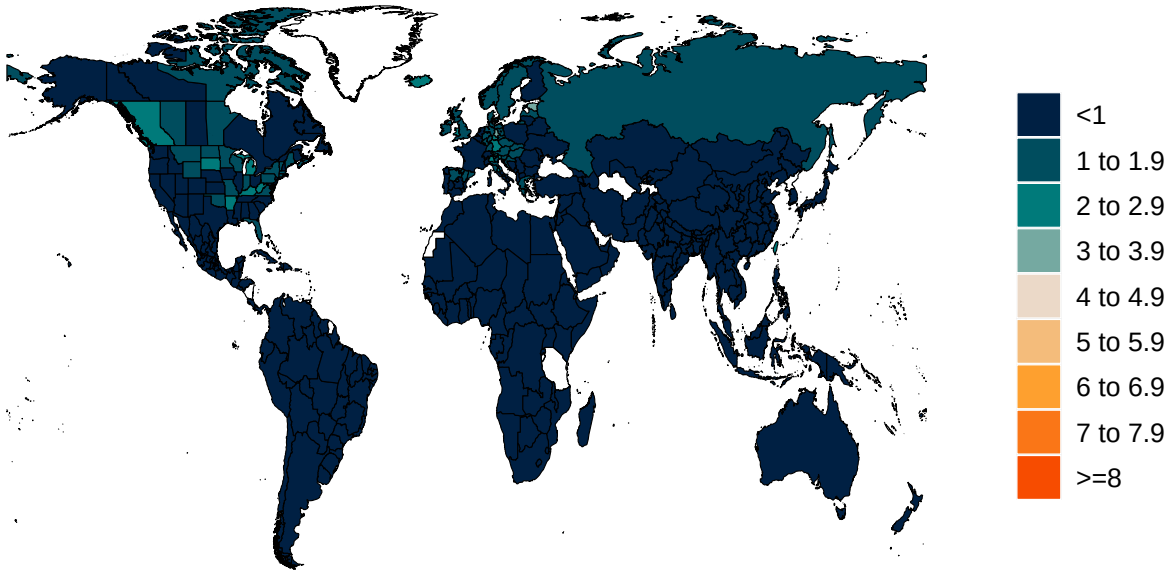
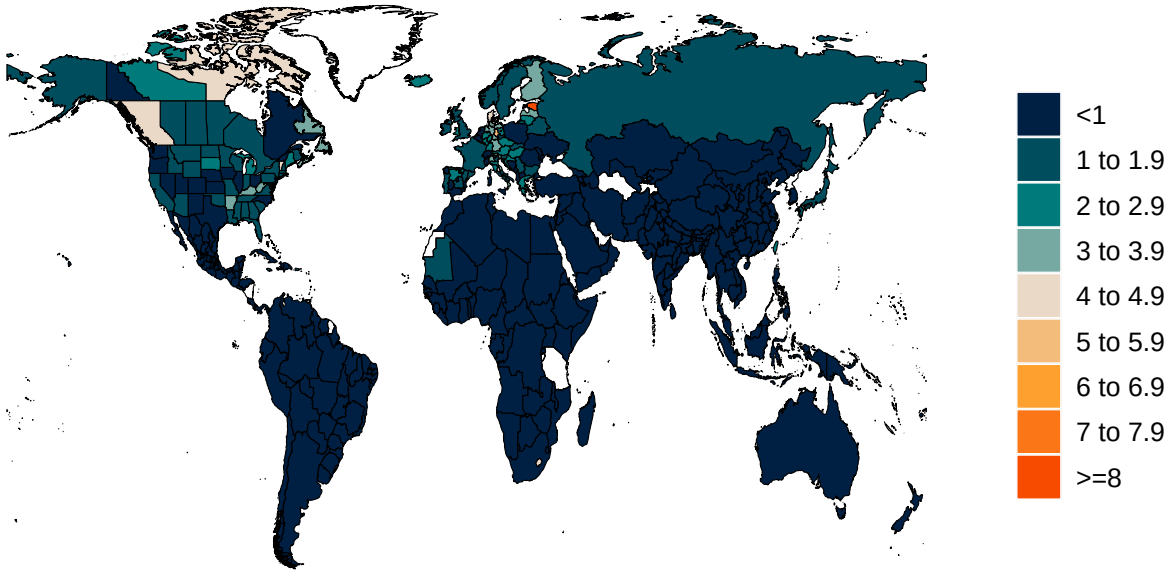


Figure 4.2: Daily total COVID-19 death rate per 1 million



Cumulative COVID-19 deaths per 100,000 on October 17, 2022

Figure 5.1: Reported cumulative COVID-19 deaths per 100,000

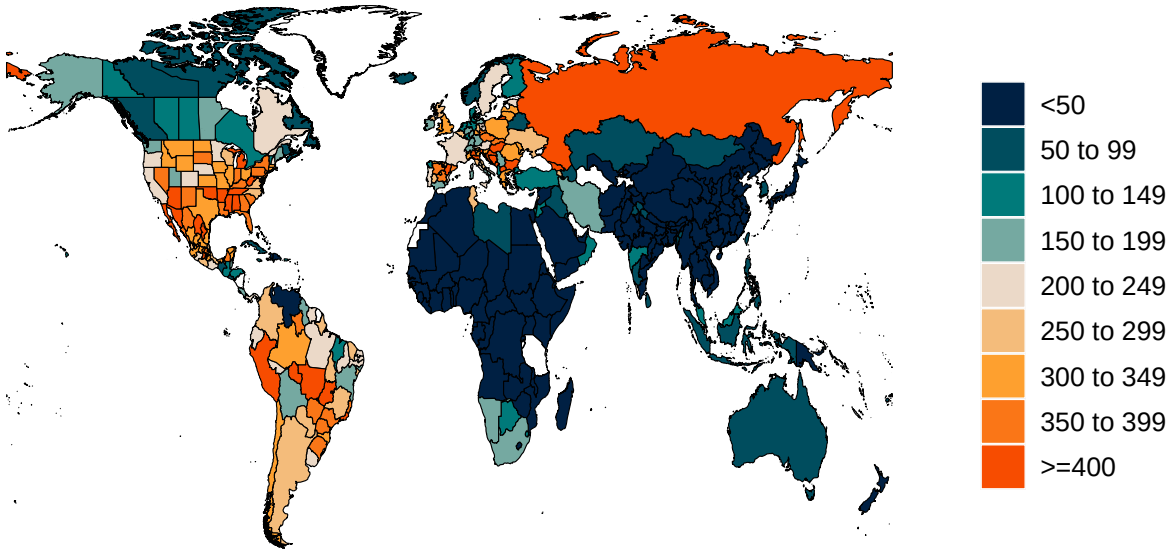


Figure 5.2: Total cumulative COVID-19 deaths per 100,000

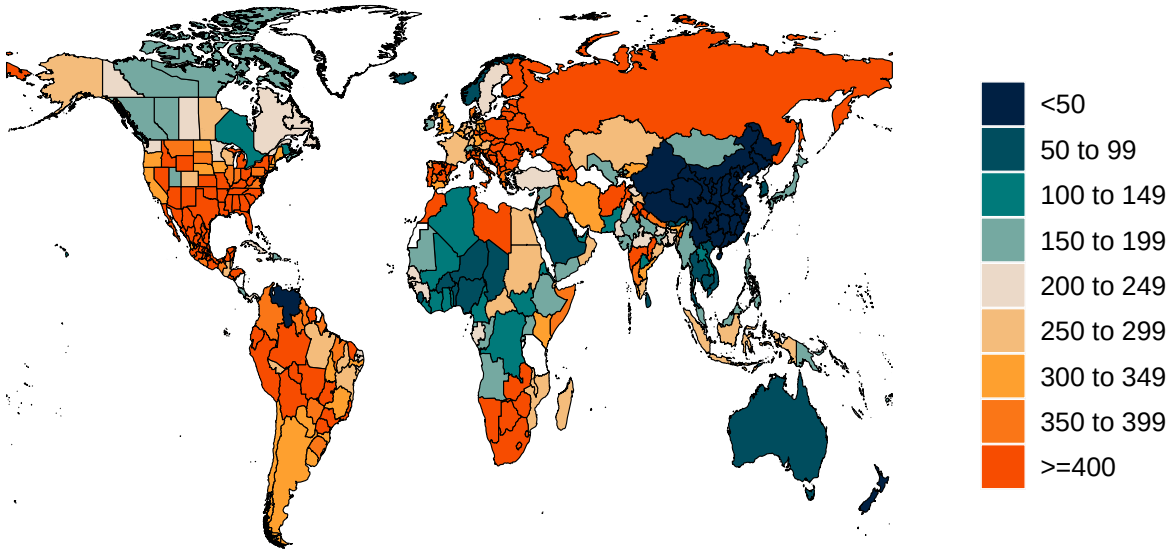


Figure 6.1: Estimated percent of the population infected with COVID-19 on October 17, 2022

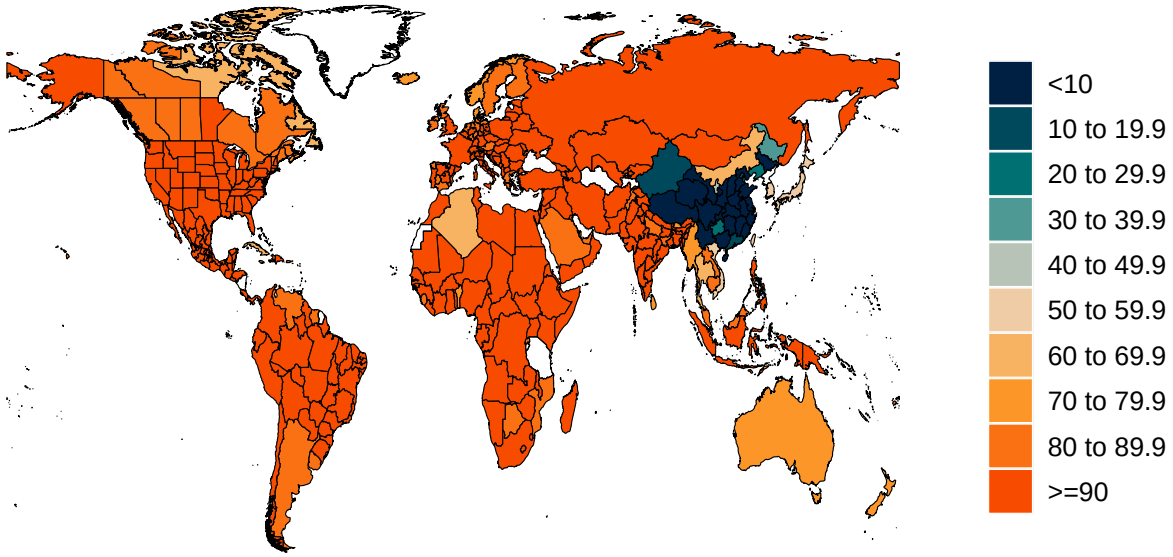


Figure 7.1: Mean effective R on October 6, 2022. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.

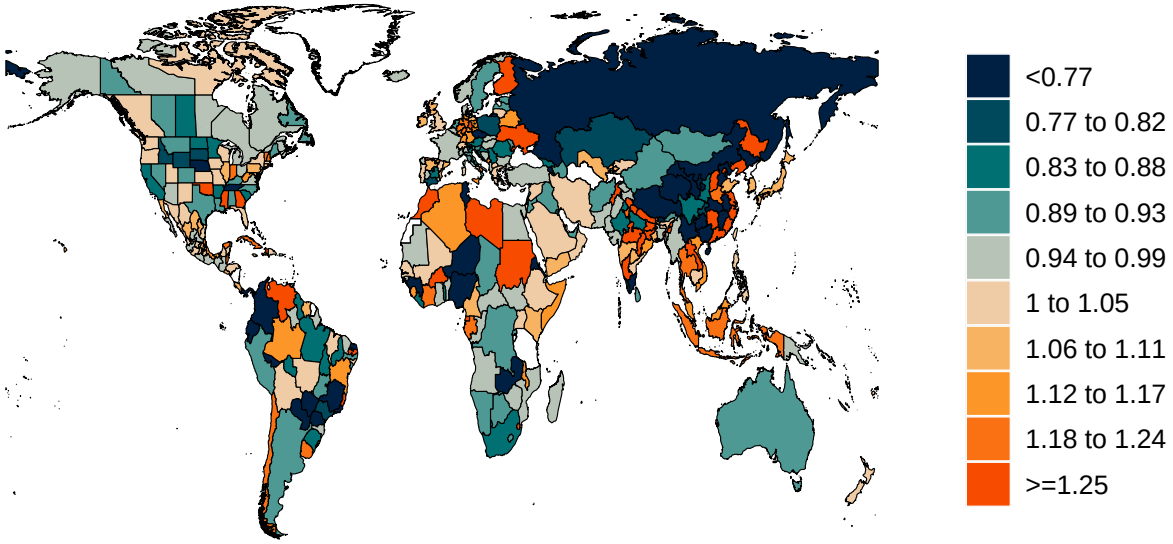
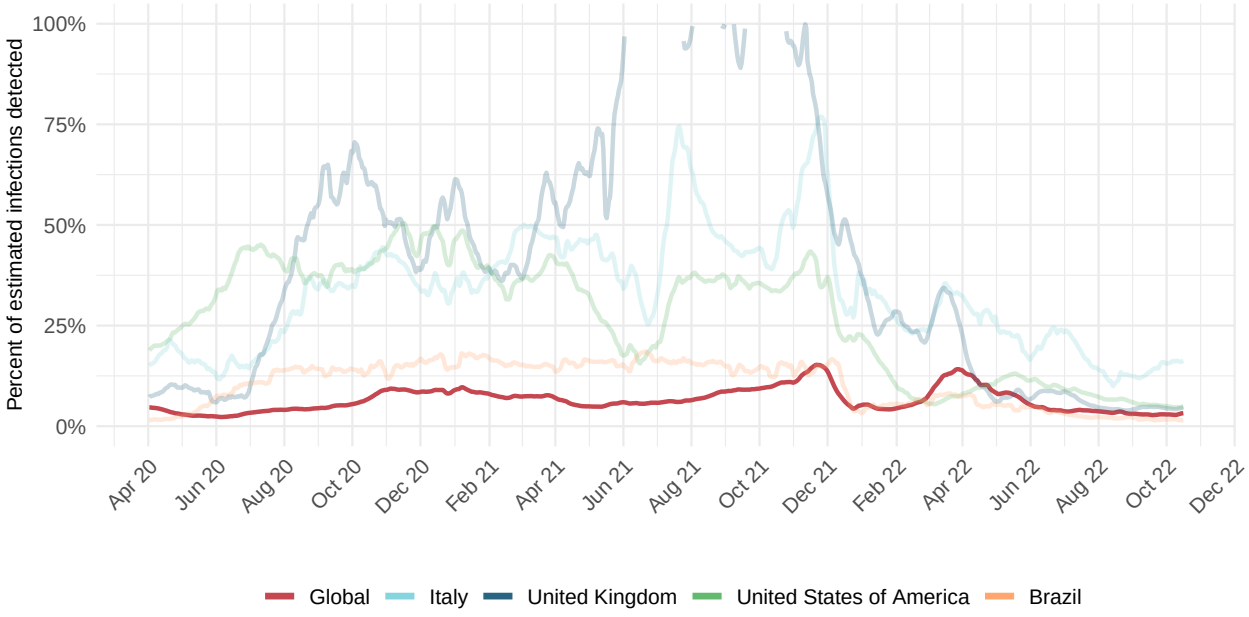


Figure 8.1: Percent of estimated COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed 100% at particular points in time.



Estimated percent of circulating SARS-CoV-2 for primary variant families on October 17, 2022

Figure 9.1: Estimated percent of new infections that are Alpha variant

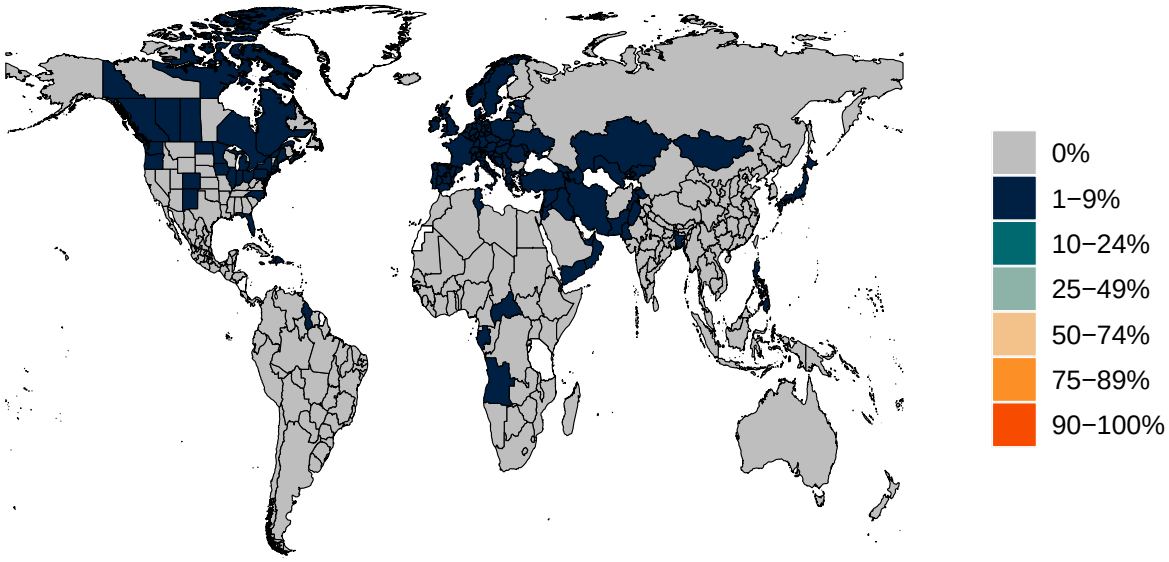


Figure 9.2: Estimated percent of new infections that are Beta variant

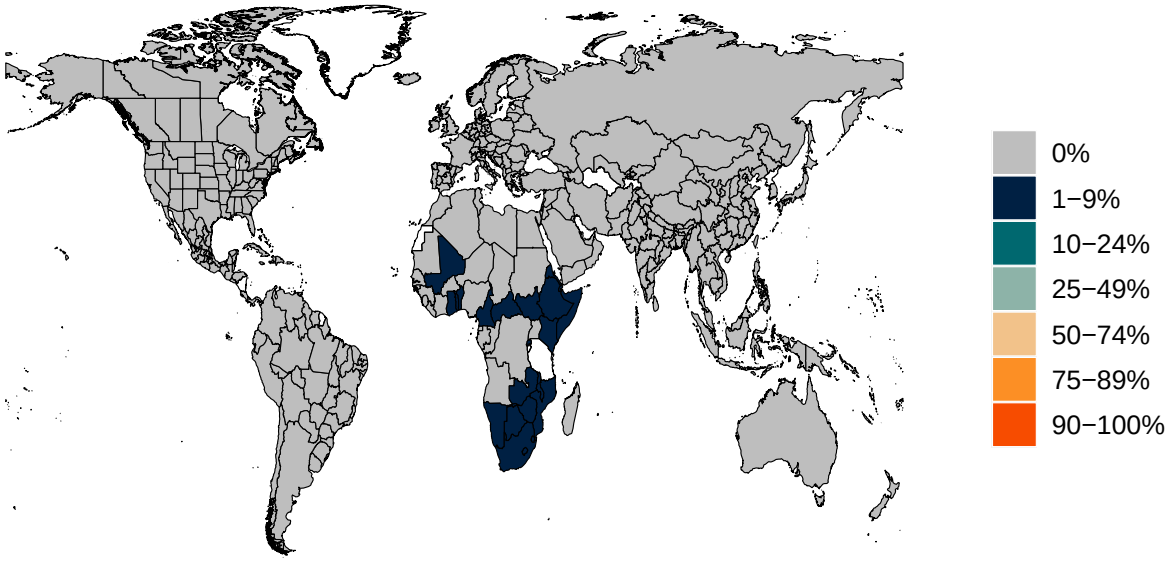


Figure 9.3: Estimated percent of new infections that are Delta variant

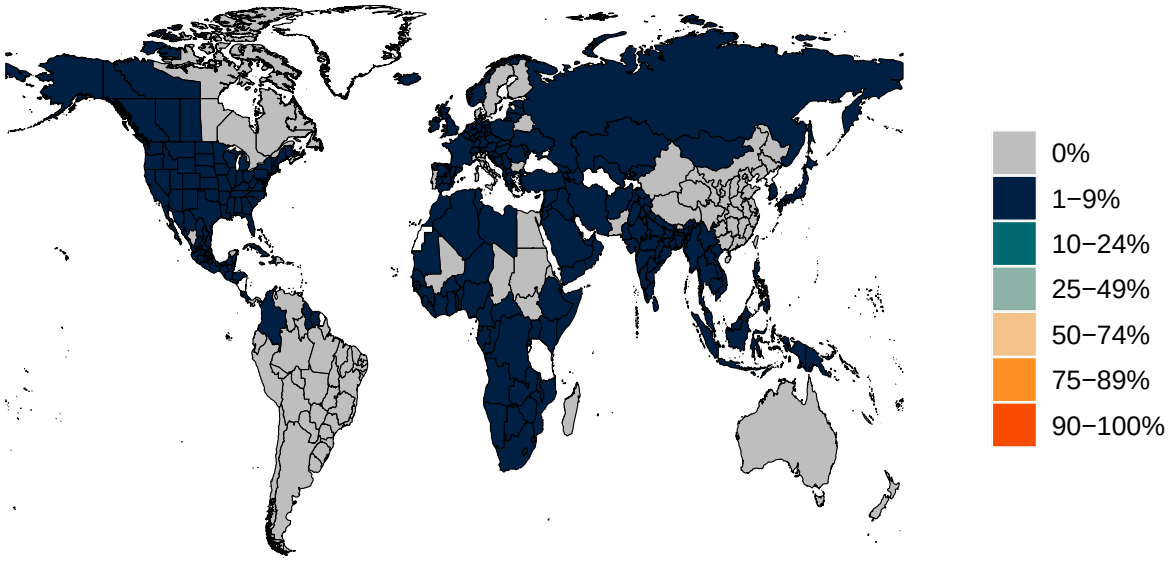


Figure 9.4: Estimated percent of new infections that are Gamma variant

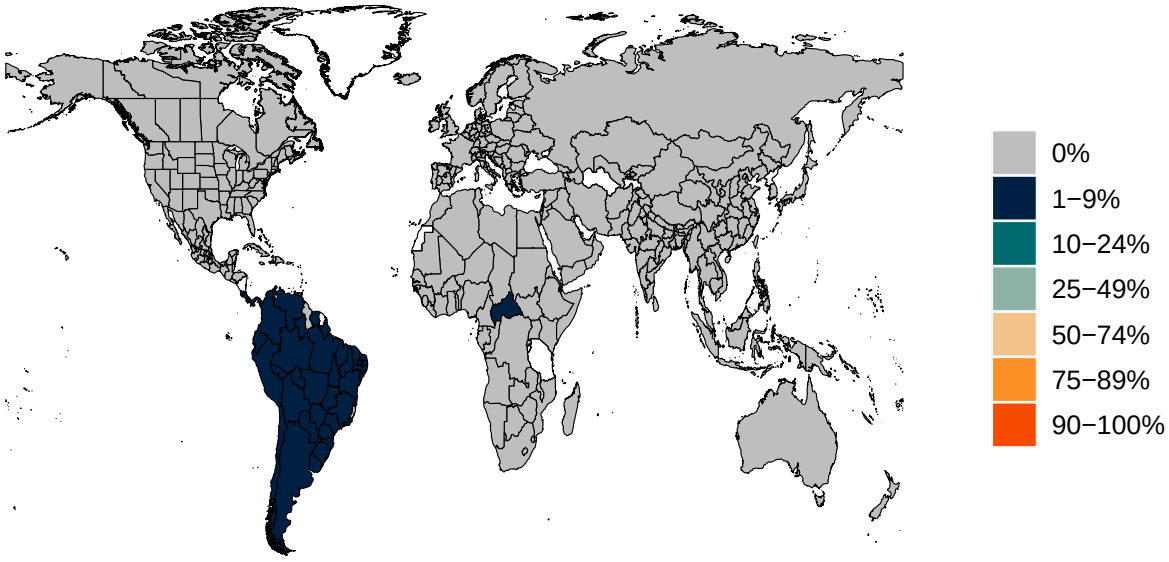


Figure 9.5: Estimated percent of new infections that are BA.1/BA.2 variant

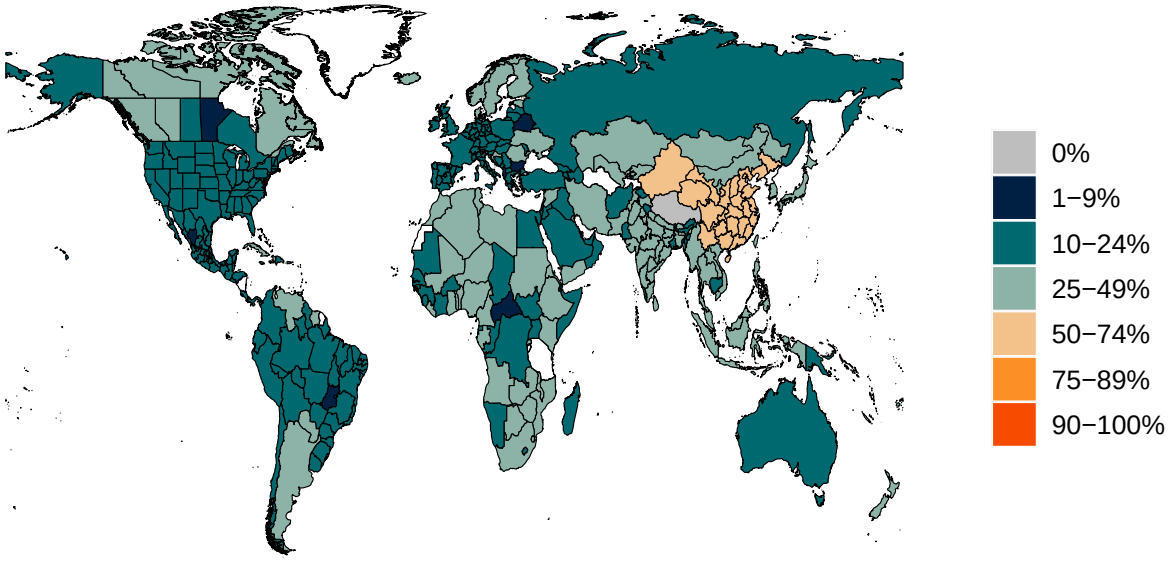


Figure 9.6: Estimated percent of new infections that are BA.5 variant

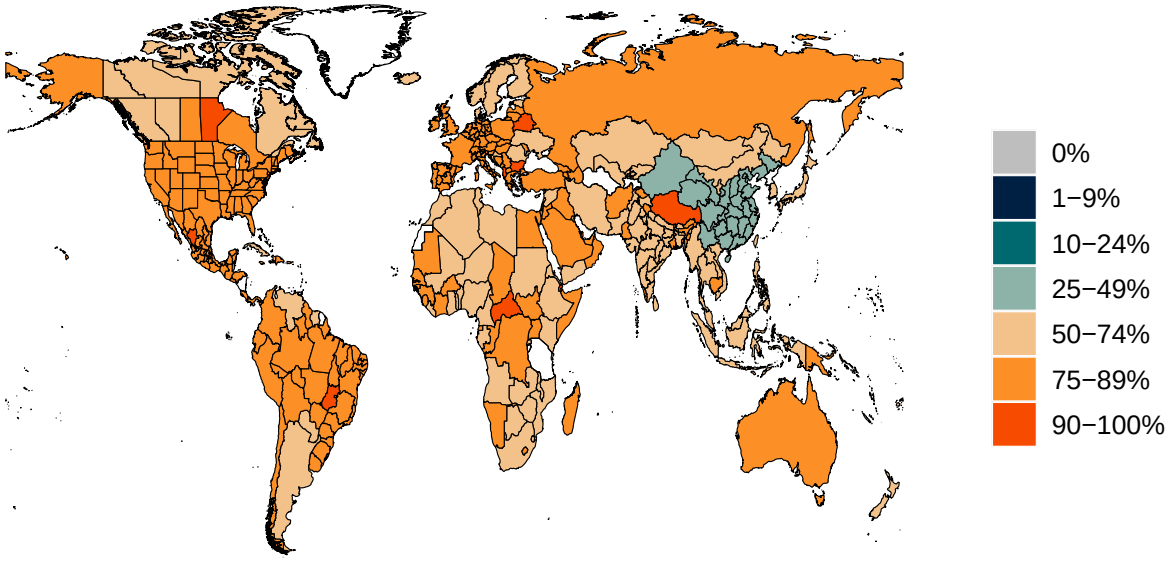


Figure 10.1: Infection-fatality rate on October 17, 2022. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.

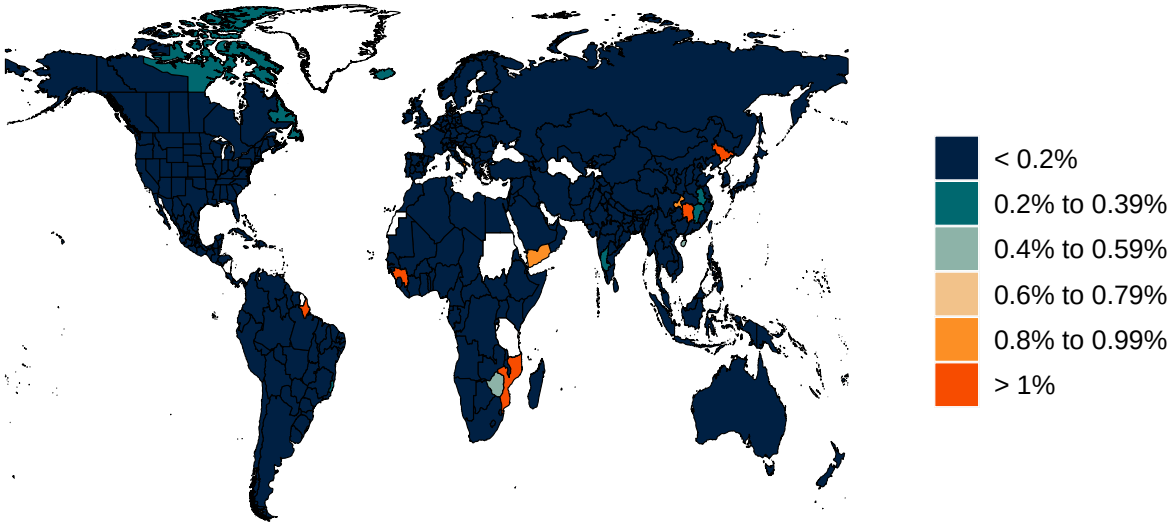


Figure 11.1: Trend in the proportion of the population reporting always wearing a mask when leaving home

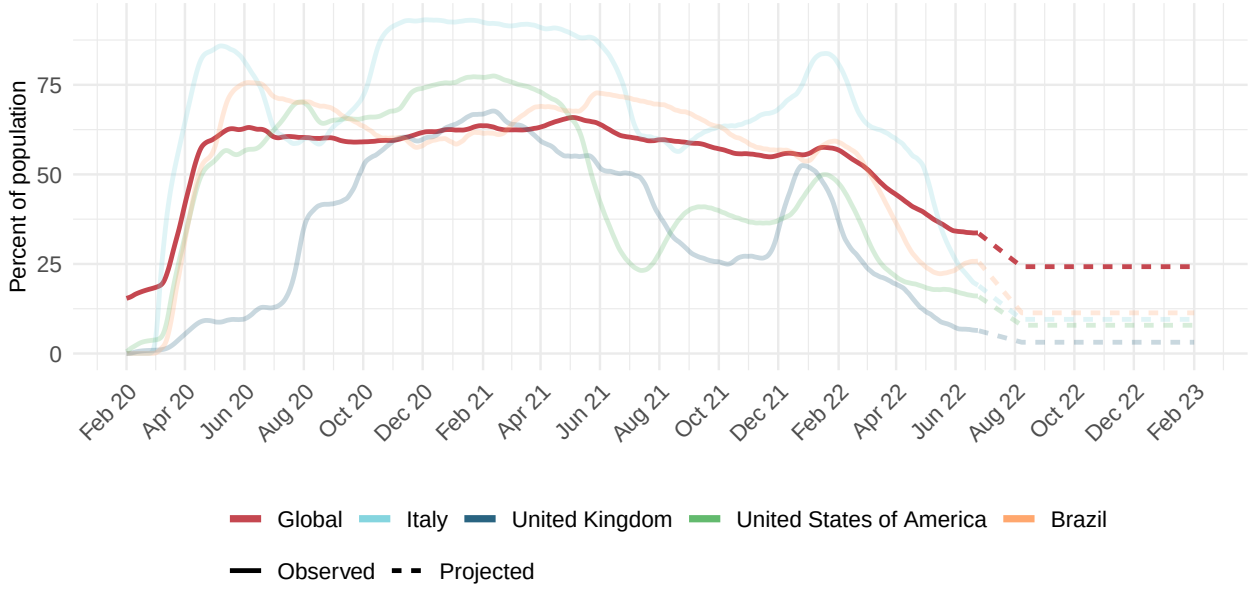


Table 3: Estimates of vaccine effectiveness for specific vaccines used in the model at preventing severe disease and infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our website.

	Effectiveness at preventing											
	Ancestral		Alpha		Beta		Gamma		Delta		Omicron	
Vaccine	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection
AstraZeneca	94%	63%	94%	63%	0.9400000	69%	0.9400000	69%	94%	69%	71%	36%
CanSino	66%	62%	66%	62%	0.6408140	61%	0.6408140	61%	64%	61%	48%	32%
CoronaVac	50%	47%	50%	47%	0.4854651	46%	0.4854651	46%	49%	46%	37%	24%
Covaxin	78%	73%	78%	73%	0.7573256	72%	0.7573256	72%	76%	72%	57%	38%
Johnson & Johnson	86%	72%	86%	72%	0.7600000	64%	0.7600000	64%	76%	64%	57%	33%
Moderna	97%	92%	97%	92%	0.9700000	91%	0.9700000	91%	97%	91%	73%	48%
Novavax	89%	83%	89%	83%	0.8641279	82%	0.8641279	82%	86%	82%	65%	43%
Pfizer/BioNTech	95%	86%	95%	86%	0.9500000	84%	0.9500000	84%	95%	84%	72%	44%
Sinopharm	73%	68%	73%	68%	0.7087791	67%	0.7087791	67%	71%	67%	53%	35%
Sputnik-V	92%	86%	92%	86%	0.8932558	85%	0.8932558	85%	89%	85%	67%	44%
Other vaccines	75%	70%	75%	70%	0.7281977	69%	0.7281977	69%	73%	69%	55%	36%
Other vaccines (mRNA)	91%	86%	91%	86%	0.8835465	85%	0.8835465	85%	88%	85%	67%	45%

Percent of the population having received at least one dose (12.1) and fully vaccinated against SARS-CoV-2 (12.2) by October 17, 2022

Figure 12.1: Percent of the population having received one dose of a COVID-19 vaccine

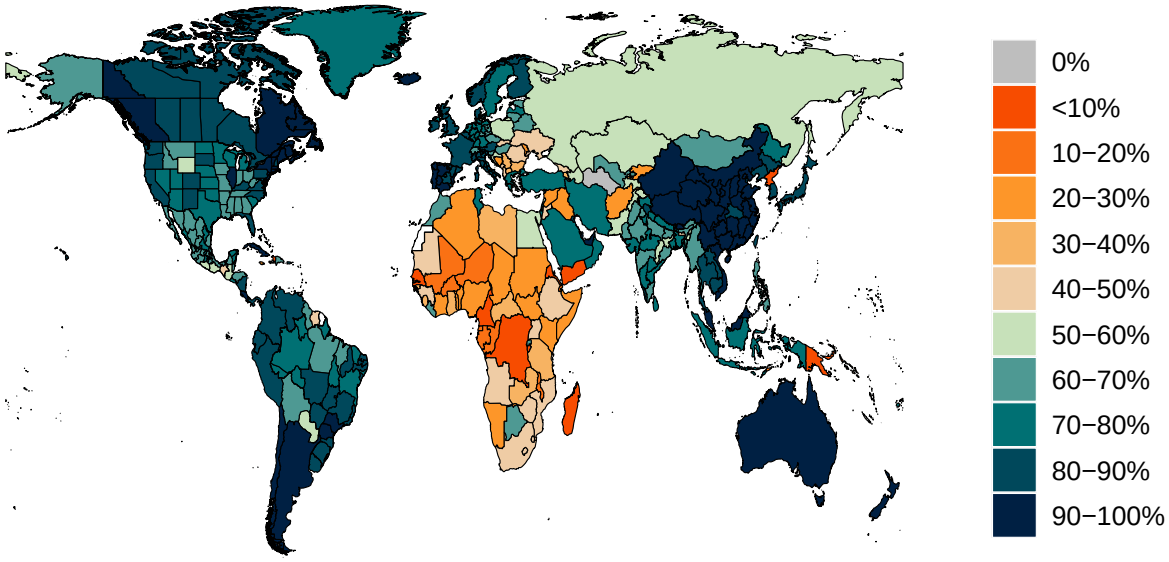


Figure 12.2: Percent of the population fully vaccinated against SARS-CoV-2

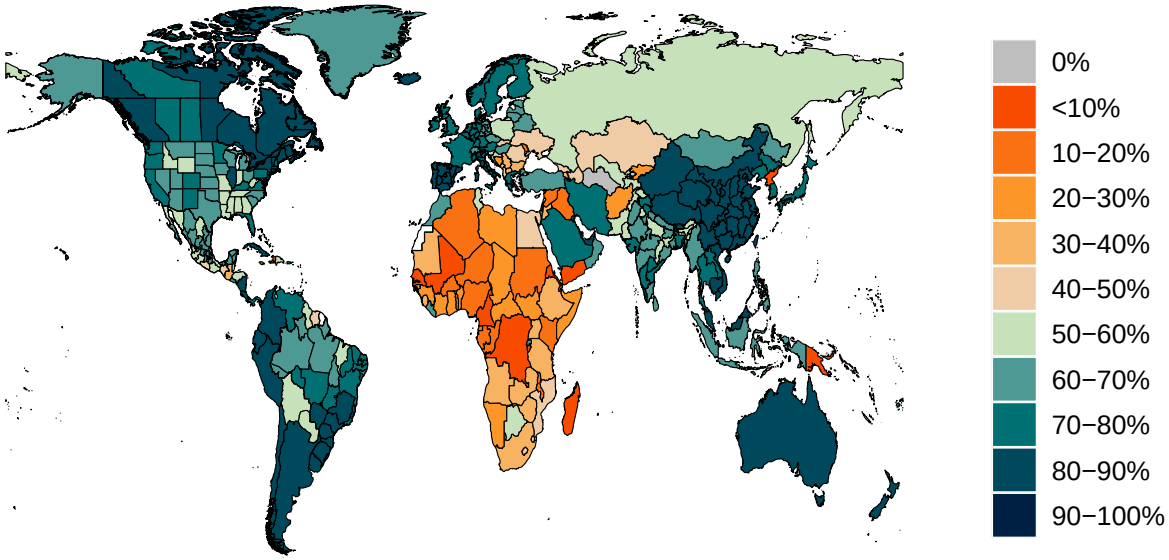


Figure 13.1: Estimated proportion of the total population that is not vaccinated but willing to be vaccinated as of June 24, 2022

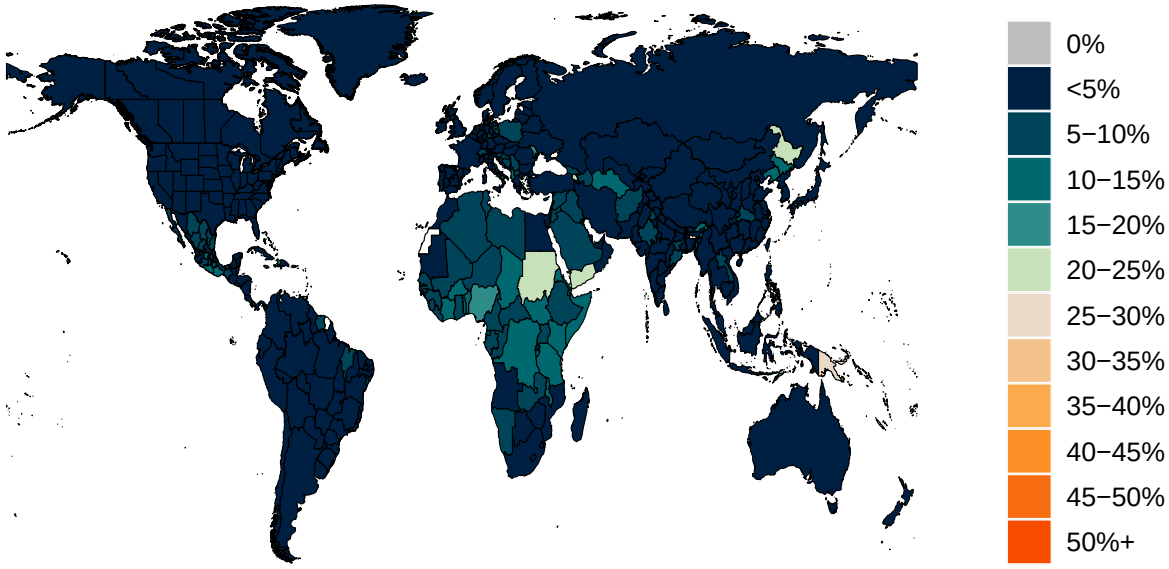


Figure 14.1: Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated

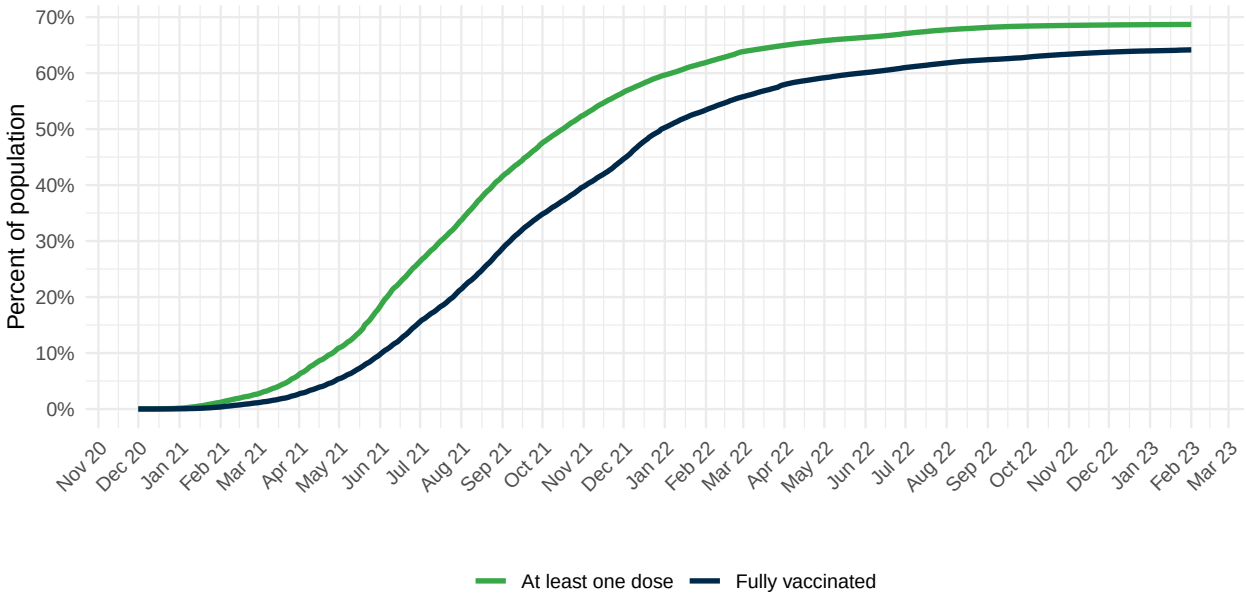
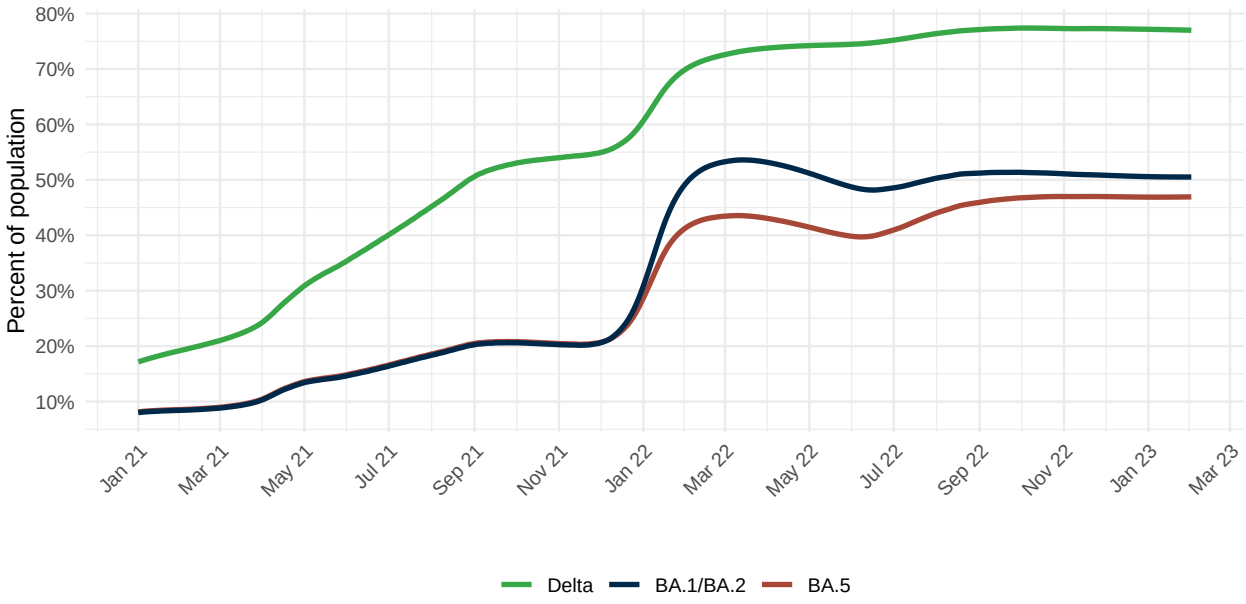


Figure 15.1: Percent of people who are immune to Delta, BA.1/BA.2 or BA.5. Immunity is based on protection due to prior vaccination and infection(s). Moreover, variant-specific immunity is also based on variant-variant specific protection.



Projections and scenarios

Figure 16.1: Daily COVID-19 infections until February 01, 2023 for three scenarios

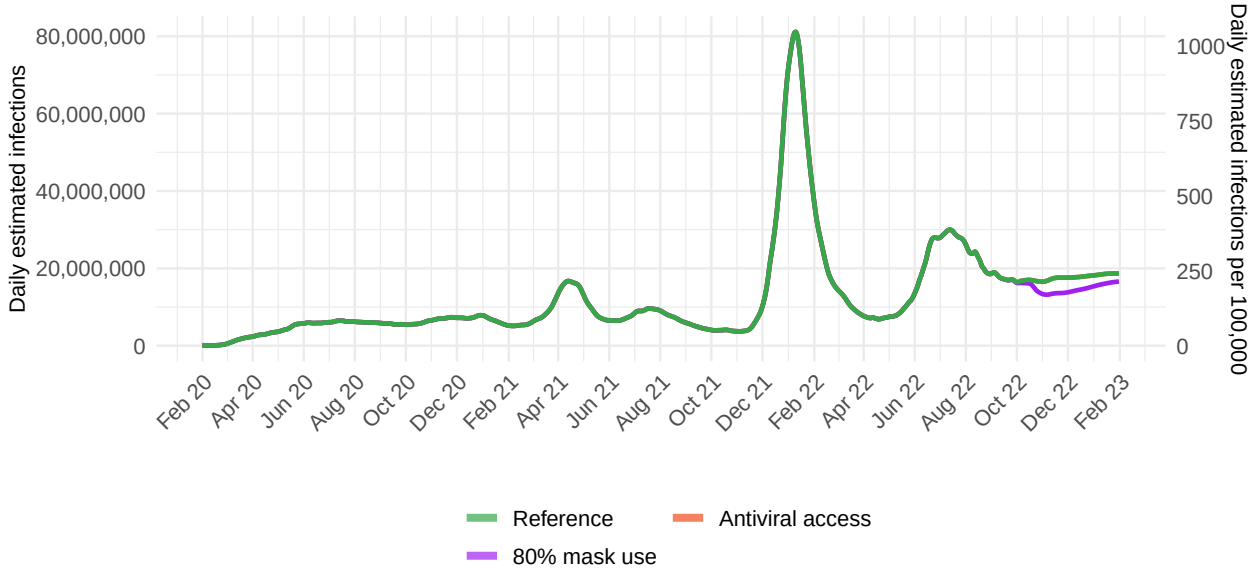


Figure 16.2: Daily COVID-19 reported cases until February 01, 2023 for three scenarios

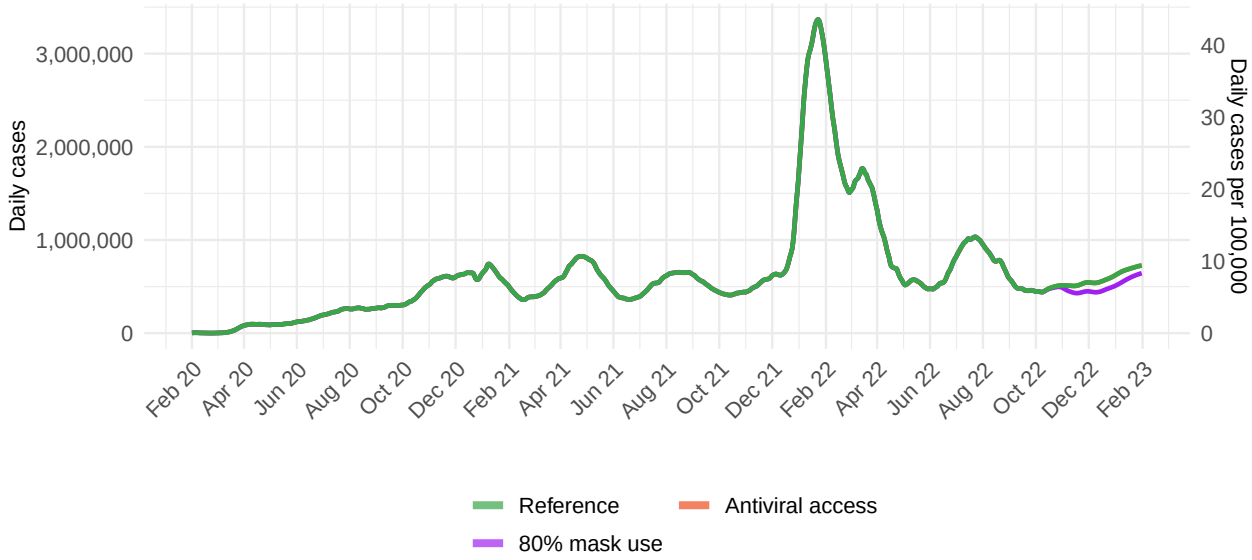


Figure 16.3: Daily COVID-19 hospital census until February 01, 2023 for three scenarios

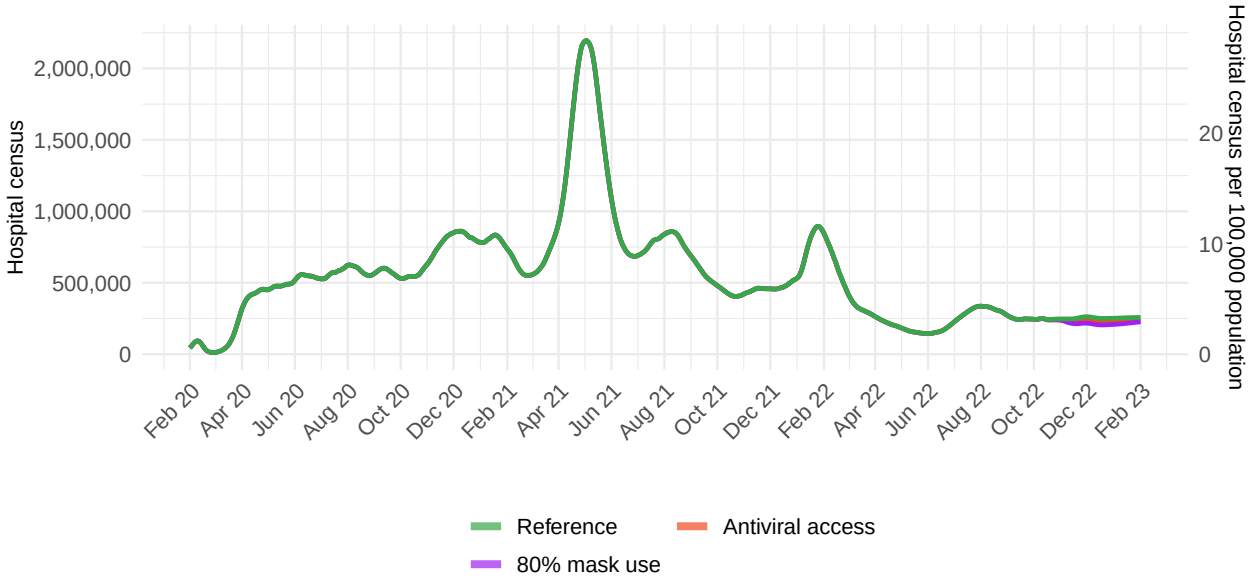


Figure 16.4: Reported daily COVID-19 deaths per 100,000

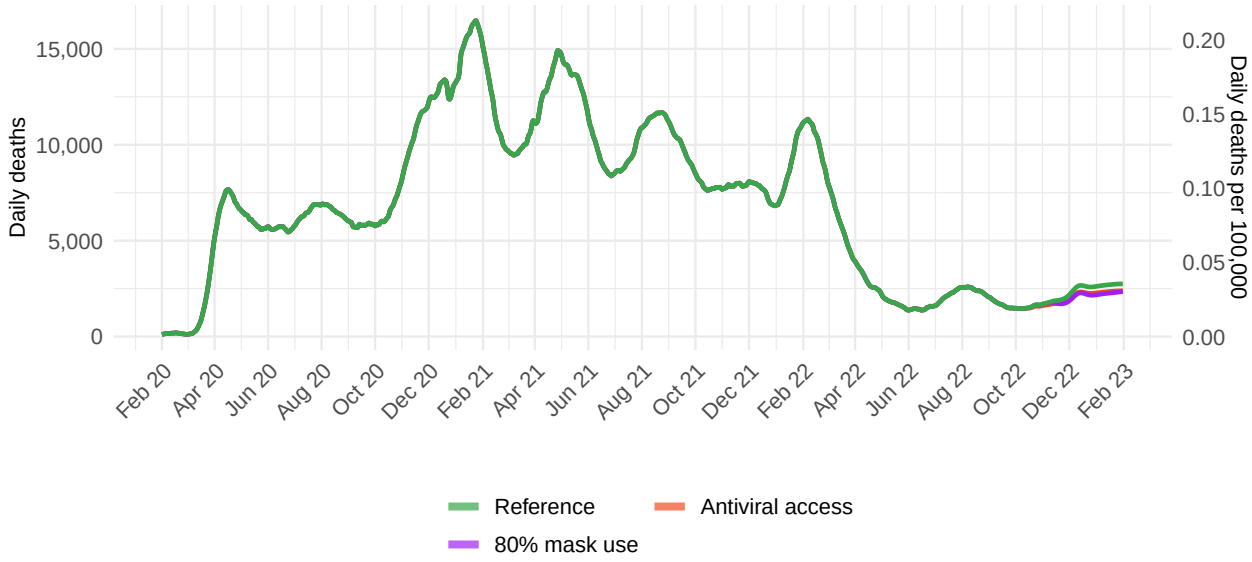
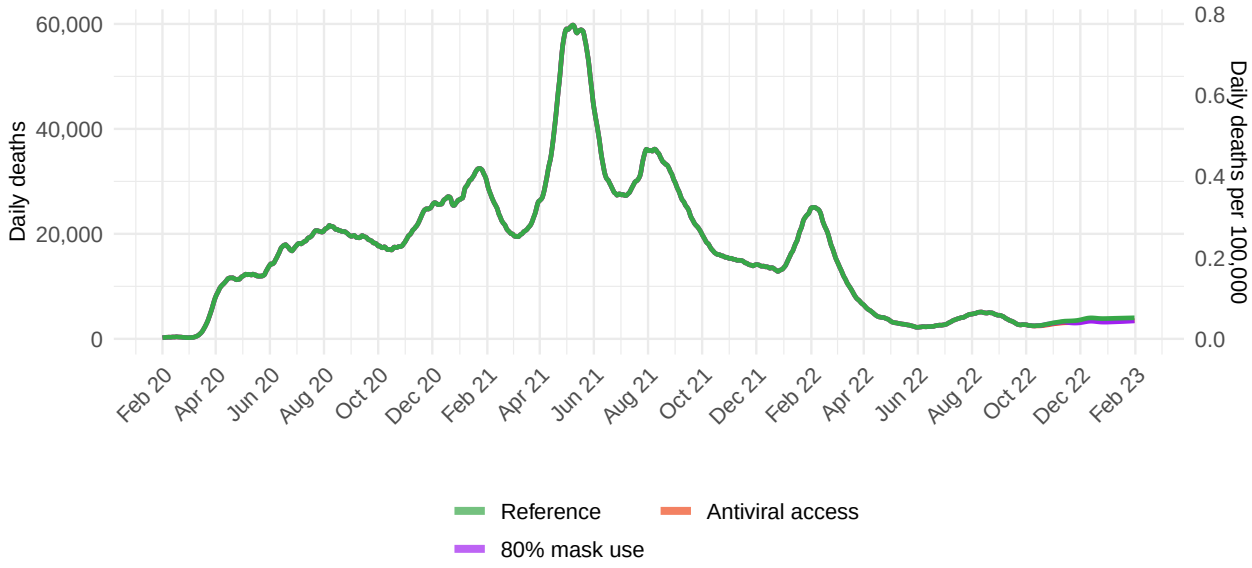


Figure 16.5: Total daily COVID-19 deaths per 100,000



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.