COVID-19 Results Briefing

Global

December 15, 2022

This document contains summary information on the latest projections from the IHME model on COVID-19 globally. The model was run on December 15, 2022, with data through December 12, 2022.

The current global COVID-19 situation falls into three distinct categories. In most of the Northern Hemisphere there is a modest increase in infections, cases, hospitalizations, and deaths due to winter seasonality. Omicron transmission is expected to continue for the foreseeable future as waning vaccine- and infection-acquired immunity continually provides susceptible individuals to sustain Omicron transmission. Second, in some parts of Central and South America, Omicron transmission is increasing as well.

The global trajectory for COVID-19 is fundamentally driven by events in China. While reported cases have declined in the last week, more than 80% of the population are susceptible to Omicron infection. Without the aggressive zero-COVID-19 policies in place, even with the imposition of some social distancing mandates we expect more than 300,000 deaths in China by April 1. Without mandates, this number could exceed 500,000. Considering the experience with Omicron in an epidemiologically naïve population in Hong Kong, over 2023 China could well experience over 1 million deaths from COVID-19. The Chinese government, however, could reinstate the zero-COVID-19 policies. Alternatively, the Chinese government could purchase and deliver the more effective mRNA vaccines, particularly those tuned to the more recent subvariants. In addition, they could try to deploy Paxlovid in the at-risk elderly population when they become sick. These latter policies could substantially mitigate the expected death toll.

The global COVID-19 situation is somewhat precarious. Most of the world has accepted to live with COVID-19 and will not re-impose social distancing mandates. However, booster vaccination rates are low in most countries. As time passes, vaccine-derived immunity will wane substantially, increasing the fraction susceptible to Omicron. Ongoing Omicron subvariant waves may act to maintain immunity in the large segments of the population who are not maintaining vaccine-derived immunity through vaccination. Outside of China, we do not expect continued Omicron subvariant waves to cause major mortality; however, a new, more severe variant with sufficient immune escape to replace Omicron could lead to very substantial death rates. In addition to the risks from waning immunity and a laissez-faire attitude toward maintaining vaccine-derived immunity, the coming massive epidemic in China could pose further threats. Global, regional, and national public health authorities need to monitor the COVID-19 situation closely in the coming months so that if a variant with immune escape and increased severity emerges, immediate actions can be taken to mitigate risk.

Current situation

- Estimated daily infections in the last week increased to 17.6 million per day on average compared to 16.5 million the week before (Figure 1.1).

- Daily reported cases in the last week increased to 574,000 per day on average compared to 532,000 the week before (Figure 2.1).

- Estimated daily hospital census in the last week (through December 12) increased to 289,000 per day on average compared to 278,000 the week before.

- Reported deaths due to COVID-19 in the last week increased to 1,800 per day on average compared to 1,600 the week before (Figure 3.1).

- Total deaths due to COVID-19 in the last week increased to 3,500 per day on average compared to 3,100 the week before (Figure 3.1). This makes COVID-19 the number 12 cause of death globally this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 2.0 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 five locations and two subnational locations (Figure 4.1).

- The daily rate of total deaths due to COVID-19 is greater than 4 per million in 12 locations and 11 subnational locations (Figure 4.2).

- We estimate that 77% of people globally have been infected at least once as of December 12 (Figure 6.1). Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in 132 locations and 171 subnational locations (Figure 7.1).

- The infection-detection rate globally was close to 4% on December 12 (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). Omicron subvariants are dominant throughout the world.

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 December 12, 92 locations and 210 subnational locations have reached 70% or more of the population who have received at least one vaccine dose, and 73 locations and 172 subnational locations have reached 70% or more of the population who are fully vaccinated (Figures 12.1 and 12.2). 69% of people globally have received at least one vaccine dose, and 64% are fully vaccinated.

- In our current reference scenario, we expect that 5.4 billion people will be vaccinated with at least one dose by April 1 (Figure 14.1). We expect that 65% of the population will be fully vaccinated by April 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.

- Mandates will be reimposed at the maximum level of mandates in the post-ancestral period once the death rate has reached an algorithmic minimum threshold of daily reported deaths for a given location.

- 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

- Estimated daily estimated infections in the **reference scenario** will rise to 21.0 million by late January 2023 (Figure 16.1).

- Daily estimated infections in the **80% mask use scenario** will decline to 10.3 million by mid-January 2023 (Figure 16.1).

- Daily estimated infections in the **antiviral access scenario** will follow the reference scenario trajectory (Figure 16.1).

Cases

- Daily estimated cases in the **reference scenario** will rise to 795,000 by April 1, 2023 (Figure 16.2).

- Daily estimated cases in the **80% mask use scenario** will rise to 609,000 by December 20, 2022 (Figure 16.2).

- Daily estimated cases in the **antiviral access scenario** will rise to 808,000 by April 1, 2023 (Figure 16.2).

Hospitalizations

- Daily hospital census in the **reference scenario** will rise to 318,830 by February 11, 2023 (Figure 16.3).

- Daily hospital census in the **80% mask use scenario** will rise to 289,700 by December 21, 2022 (Figure 16.3).

- Daily hospital census in the **antiviral access scenario** will rise to 314,420 by December 30, 2022 (Figure 16.3).
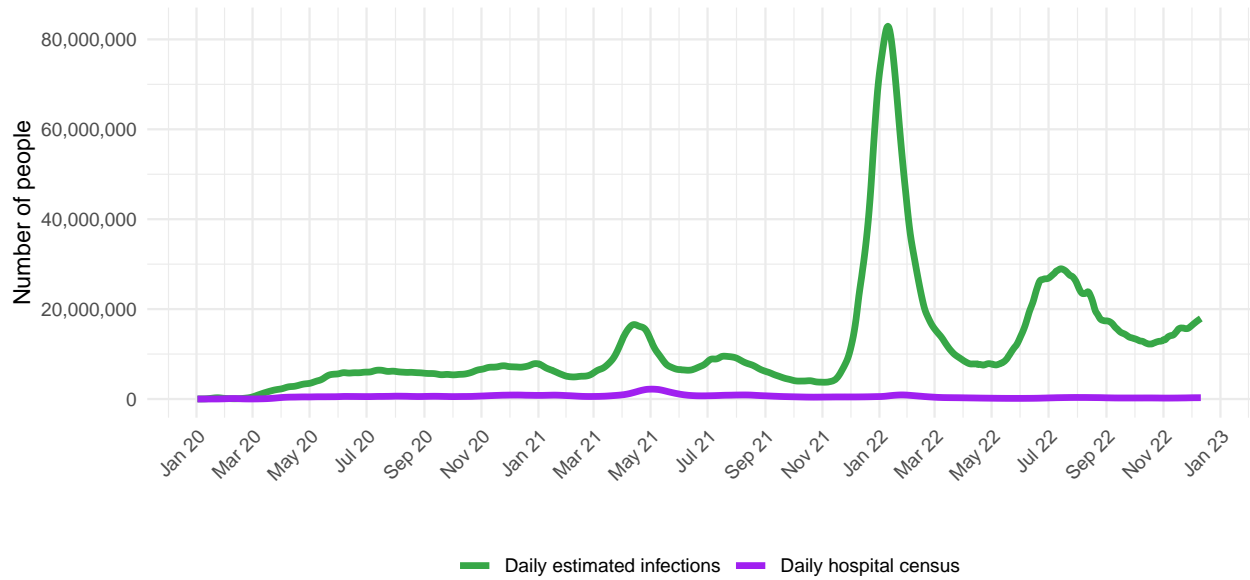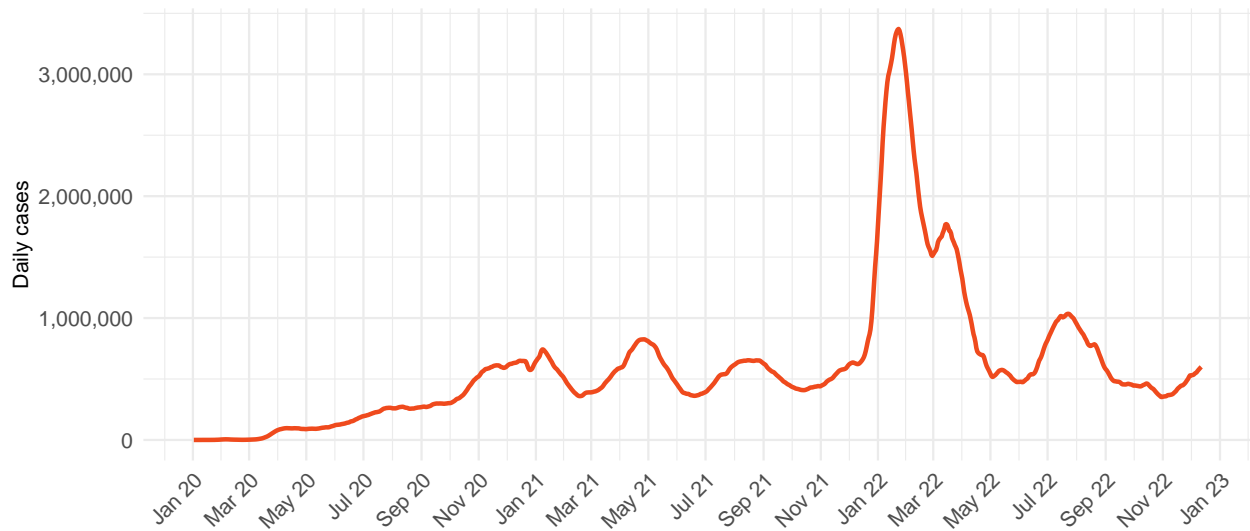
Deaths

- In our **reference scenario**, our model projects 7,728,000 cumulative reported deaths due to COVID-19 on April 1. This represents 515,000 additional deaths from December 12 to April 1. Daily reported COVID-19 deaths in the **reference scenario** will rise to 6,810 by April 1, 2023 (Figure 16.4).

- Under our **reference scenario**, our model projects 18,572,000 cumulative total deaths due to COVID-19 on April 1. This represents 764,000 additional deaths from December 12 to April 1 (Figure 16.5).

- In our **80% mask use scenario**, our model projects 7,574,000 cumulative reported deaths due to COVID-19 on April 1. This represents 361,000 additional deaths from December 12 to April 1. Daily reported COVID-19 deaths in the **80% mask use scenario** will rise to 4,700 by April 1, 2023 (Figure 16.4).

- In our **antiviral access scenario**, our model projects 7,674,000 cumulative reported deaths due to COVID-19 on April 1. This represents 461,000 additional deaths from December 12 to April 1. Daily reported COVID-19 deaths in the **antiviral access scenario** will rise to 5,730 by April 1, 2023 (Figure 16.4).

Model updates

We have updated our reference scenario to assume that mandates will be re-imposed at the maximum level of mandates in the post-ancestral period once the death rate has reached an algorithmic minimum threshold of daily reported deaths for a given location.

For the foreseeable future, we will not be updating our model or producing COVID-19 estimates. These will be the final briefing documents we produce until further notice.

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	24,302	12

Figure 3.1: Smoothed trend estimate of daily COVID-19 deaths
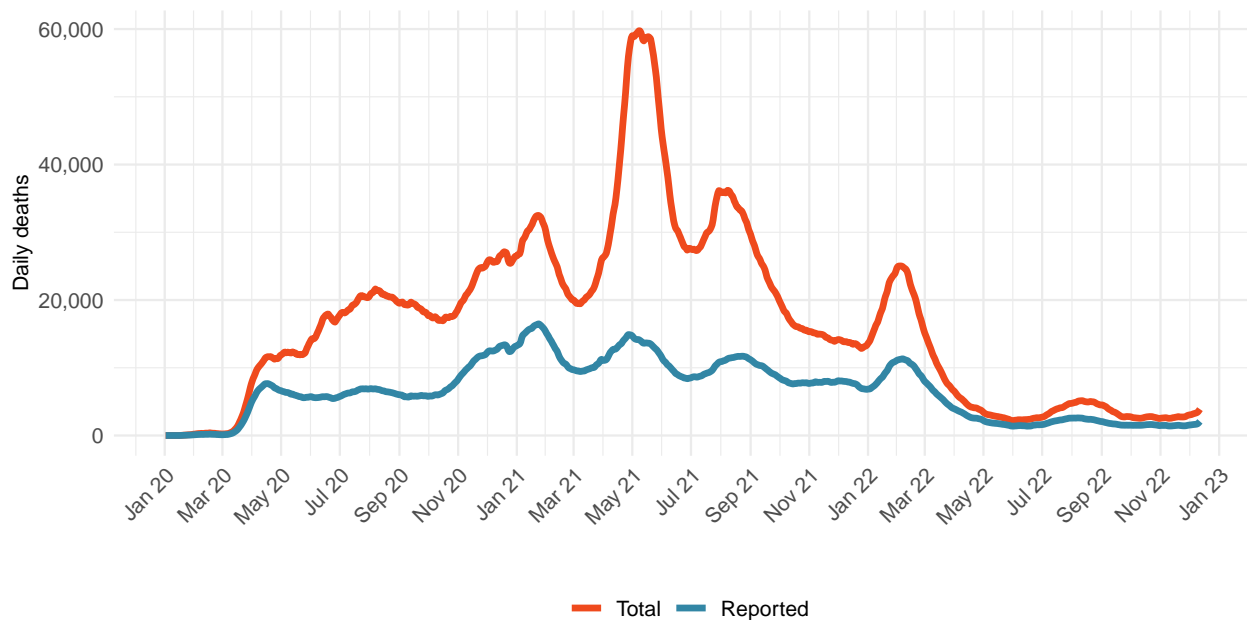
Daily COVID-19 death rate per 1 million on December 12, 2022

Figure 4.1: Daily reported COVID-19 death rate per 1 million
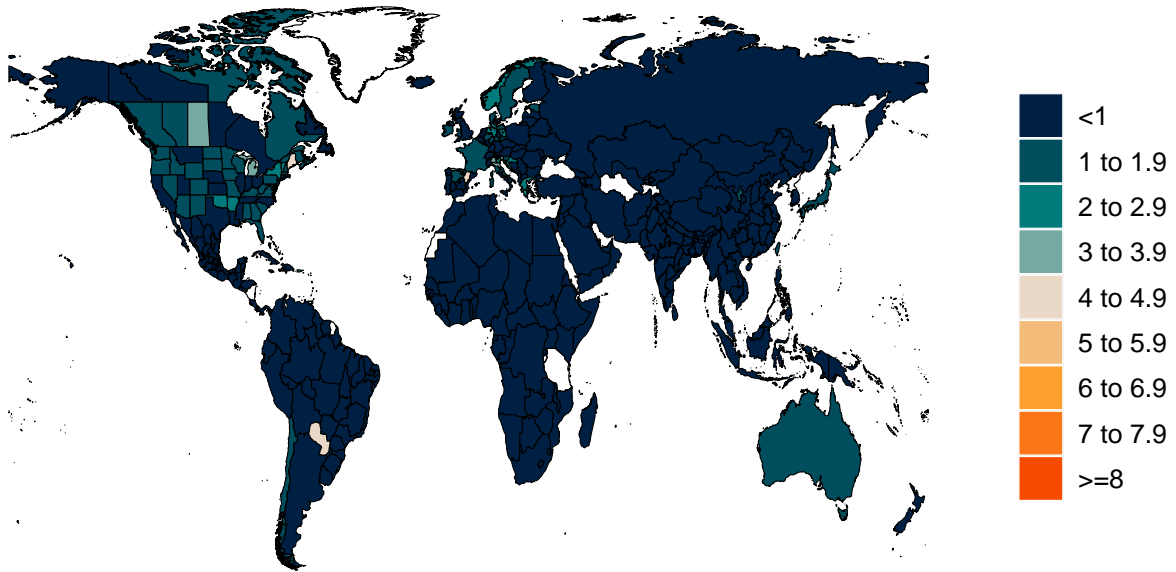
Figure 4.2: Daily total COVID-19 death rate per 1 million

Institute for Health Metrics and Evaluation
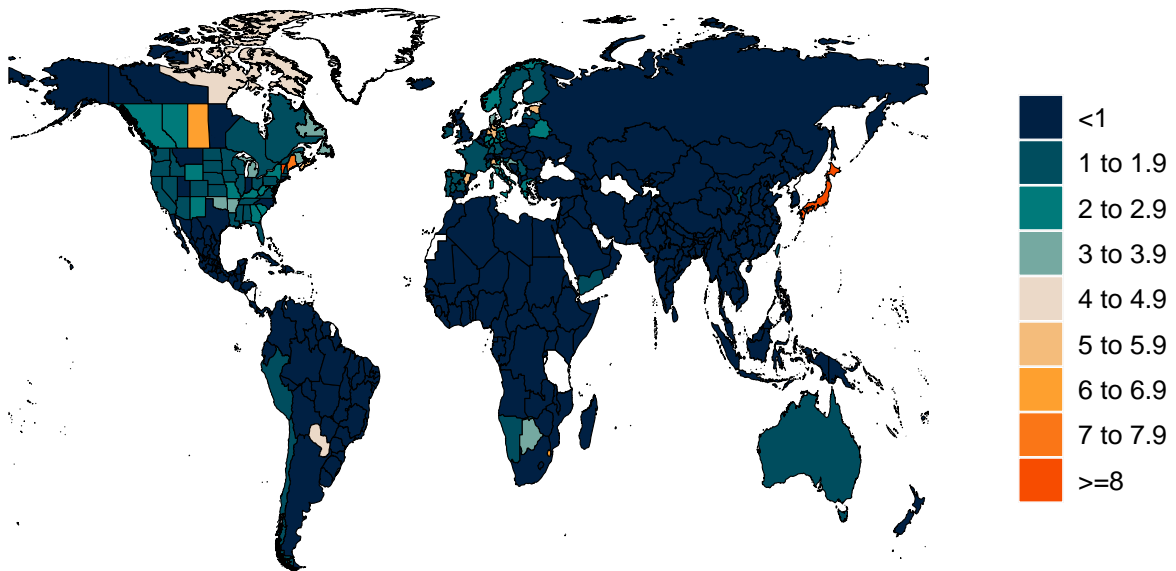
Cumulative COVID-19 deaths per 100,000 on December 12, 2022
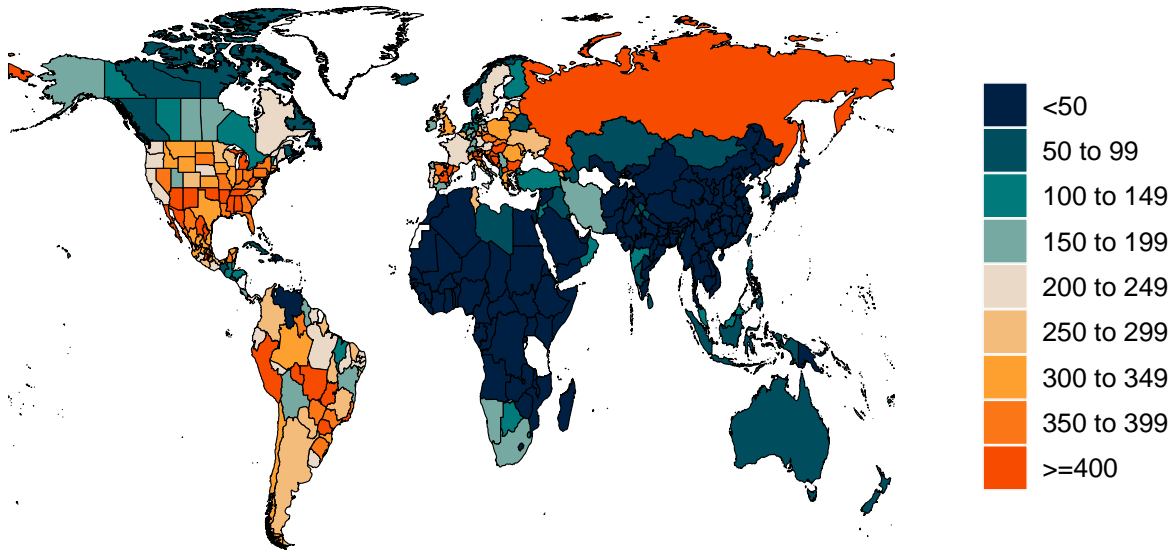
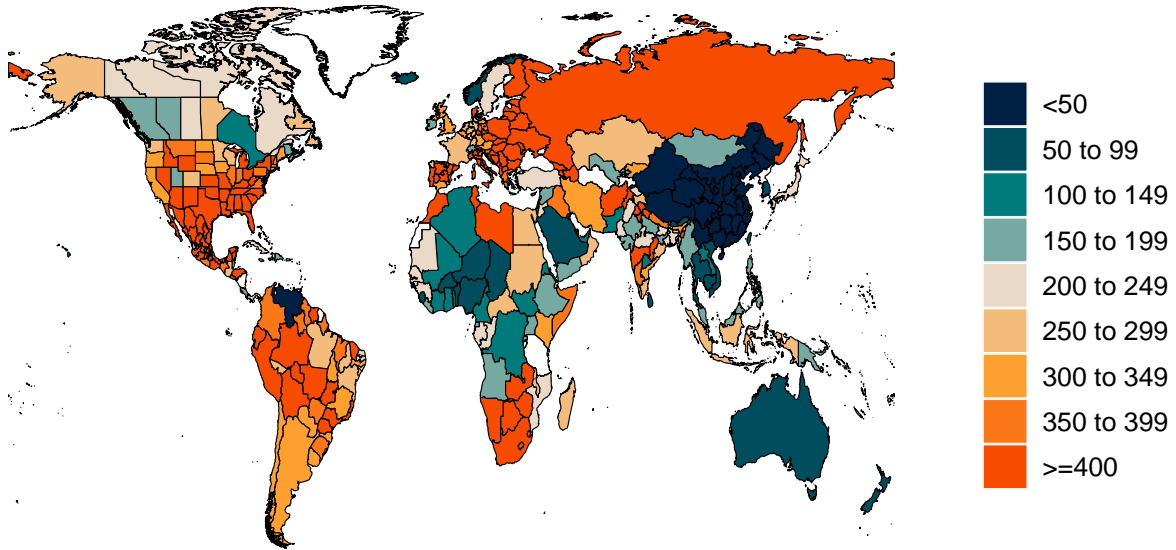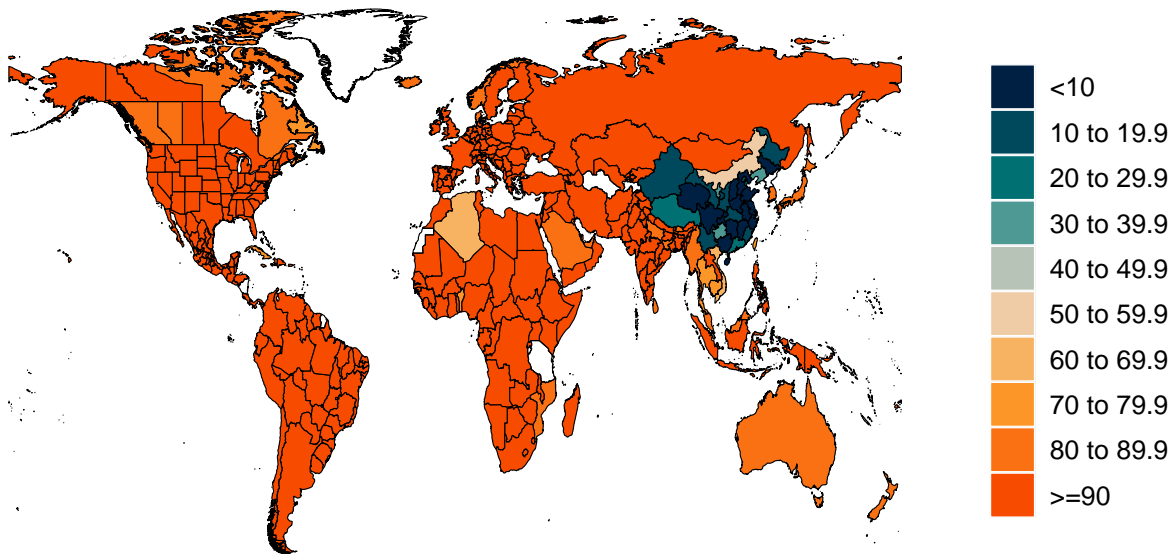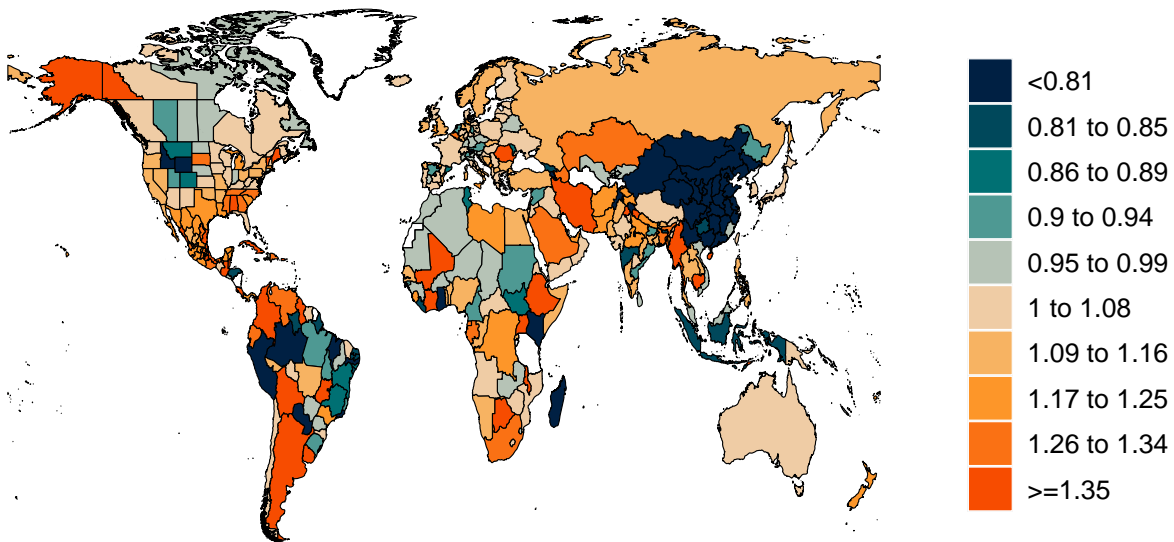**Figure 5.1: Reported cumulative COVID-19 deaths per 100,000**


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

Figure 6.1: Estimated percent of the population infected with COVID-19 on December 12, 2022

■	<10
■	10 to 19.9
■	20 to 29.9
■	30 to 39.9
■	40 to 49.9
■	50 to 59.9
■	60 to 69.9
■	70 to 79.9
■	80 to 89.9
■	>=90

Figure 7.1: Mean effective R on December 1, 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.

■	<0.81
■	0.81 to 0.85
■	0.86 to 0.89
■	0.9 to 0.94
■	0.95 to 0.99
■	1 to 1.08
■	1.09 to 1.16
■	1.17 to 1.25
■	1.26 to 1.34
■	>=1.35

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.
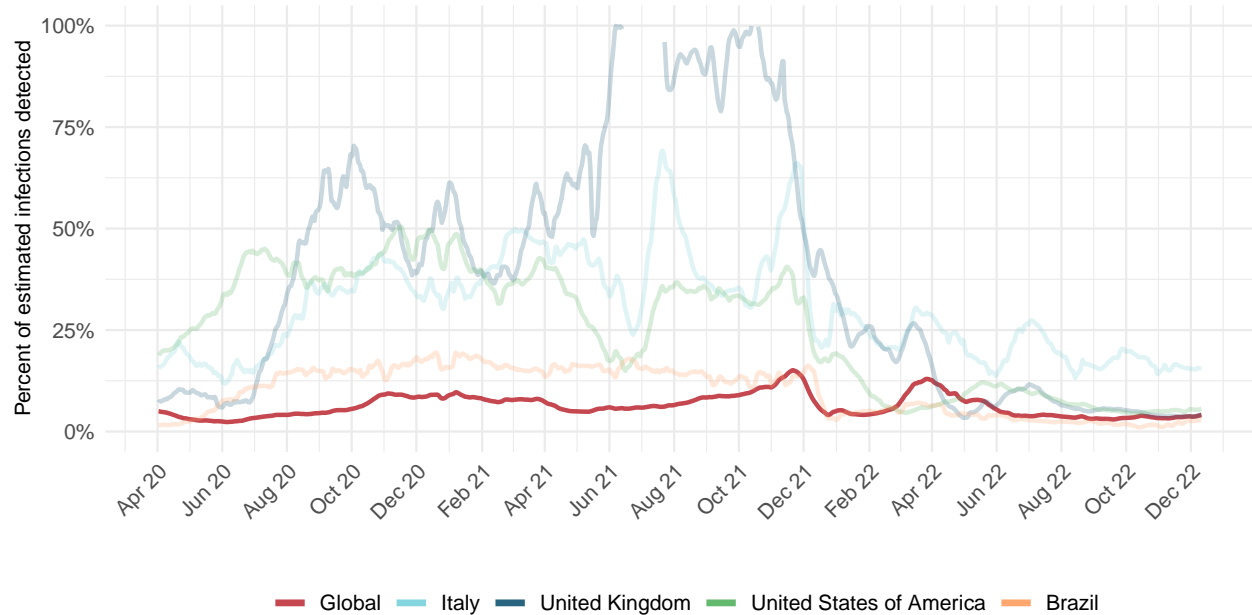
Estimated percent of circulating SARS-CoV-2 for primary variant families on December 12, 2022
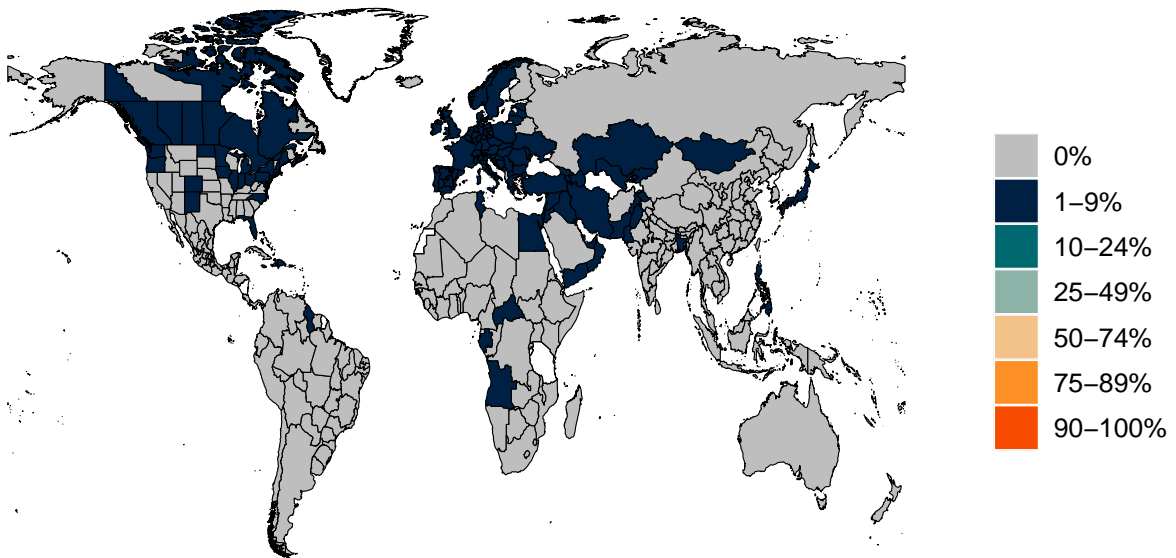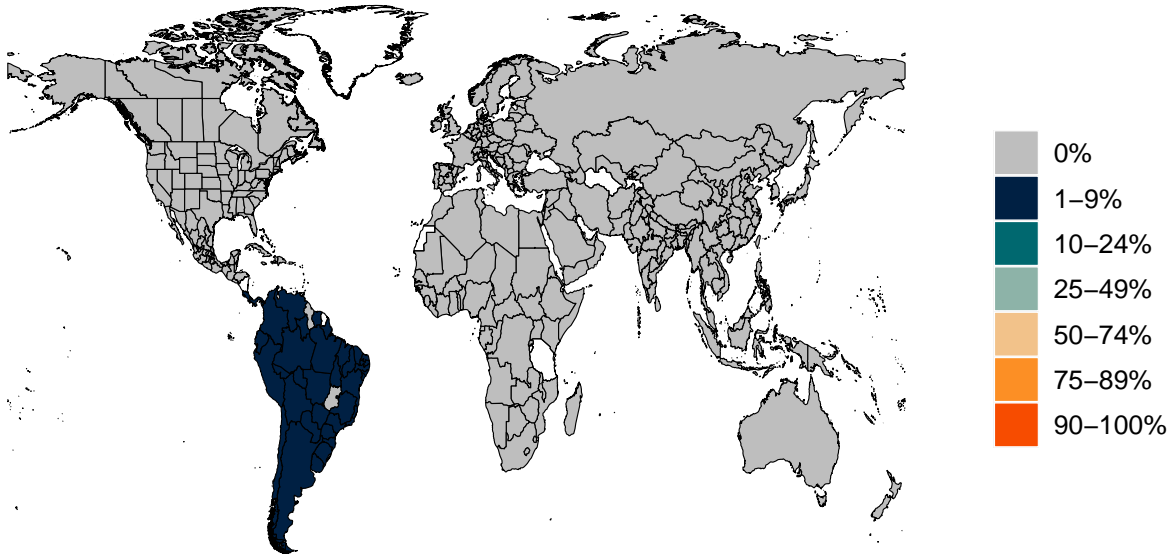
Figure 9.1: Estimated percent of new infections that are Alpha variant

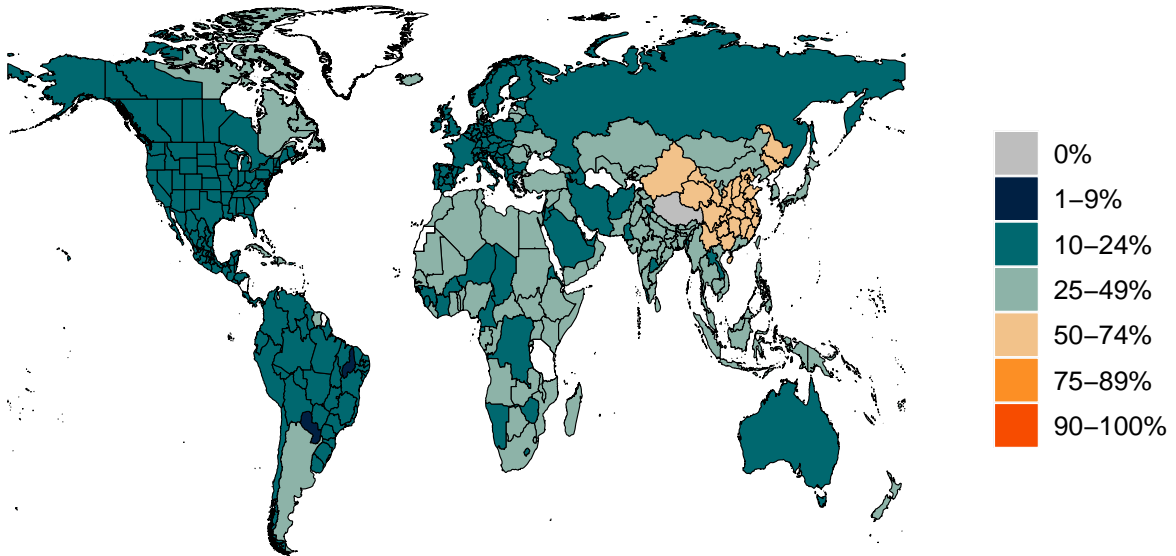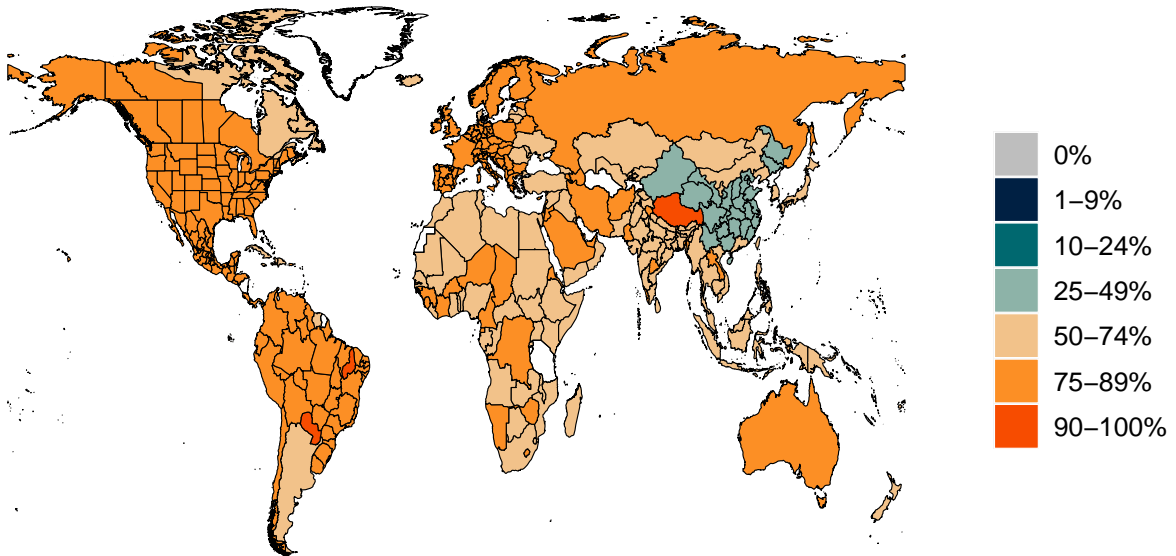**Figure 9.2: Estimated percent of new infections that are Beta variant**
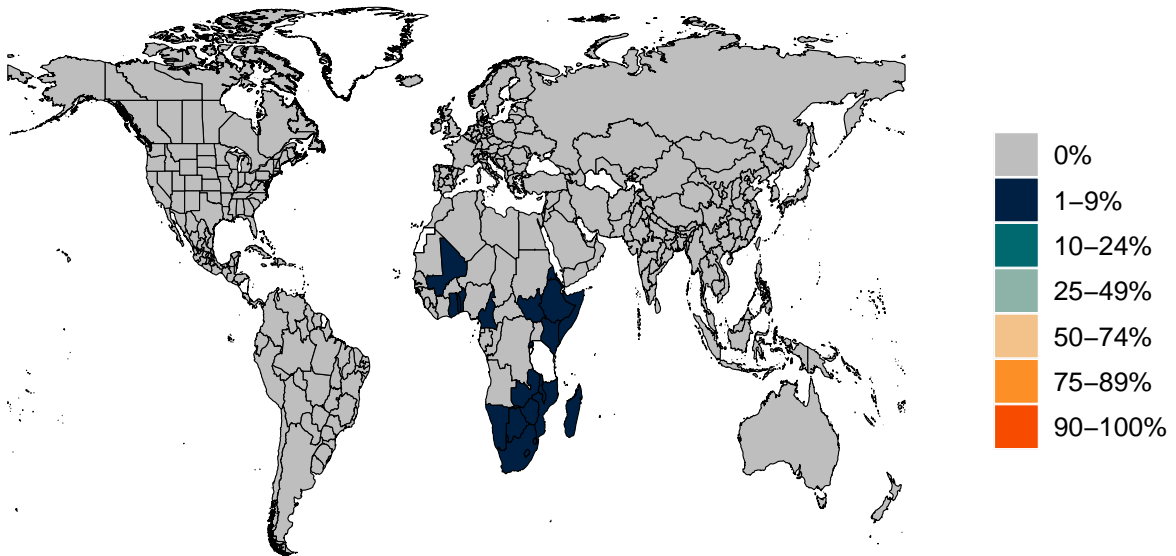
Figure 9.3: Estimated percent of new infections that are Delta variant

	0%
	1–9%
	10–24%
	25–49%
	50–74%
	75–89%
	90–100%
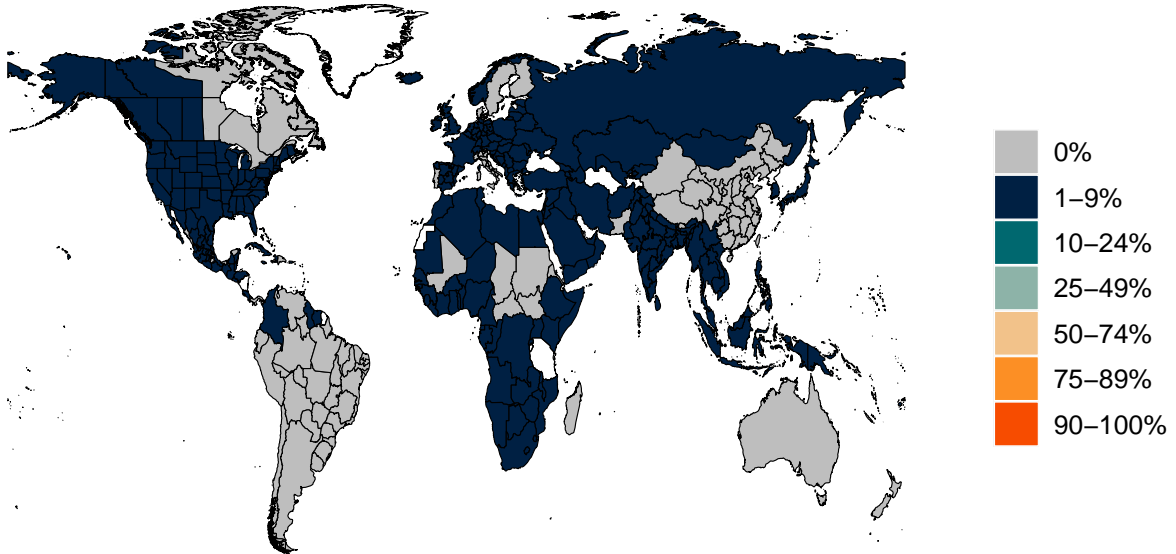
Figure 9.4: Estimated percent of new infections that are Gamma variant

	0%
	1–9%
	10–24%
	25–49%
	50–74%
	75–89%
	90–100%

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

▨	0%
▨	1–9%
▨	10–24%
▨	25–49%
▨	50–74%
▨	75–89%
▨	90–100%

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

▨	0%
▨	1–9%
▨	10–24%
▨	25–49%
▨	50–74%
▨	75–89%
▨	90–100%

Figure 10.1: Infection-fatality rate on December 12, 2022. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.
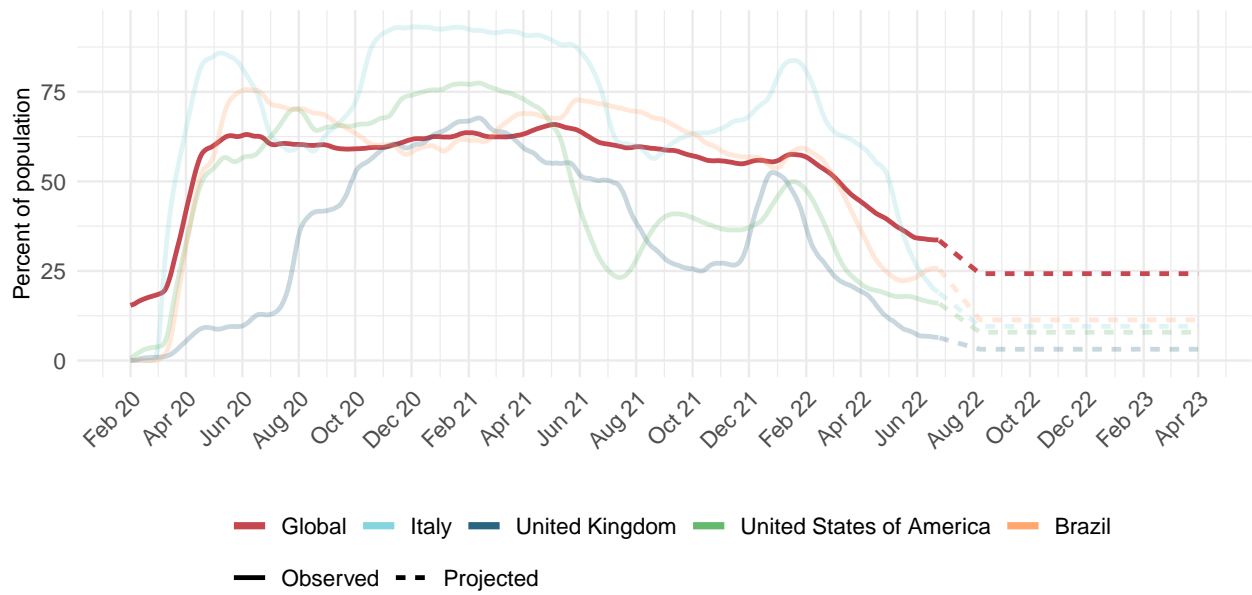

Legend:
- < 0.2%
- 0.2% to 0.39%
- 0.4% to 0.59%
- 0.6% to 0.79%
- 0.8% to 0.99%
- > 1%
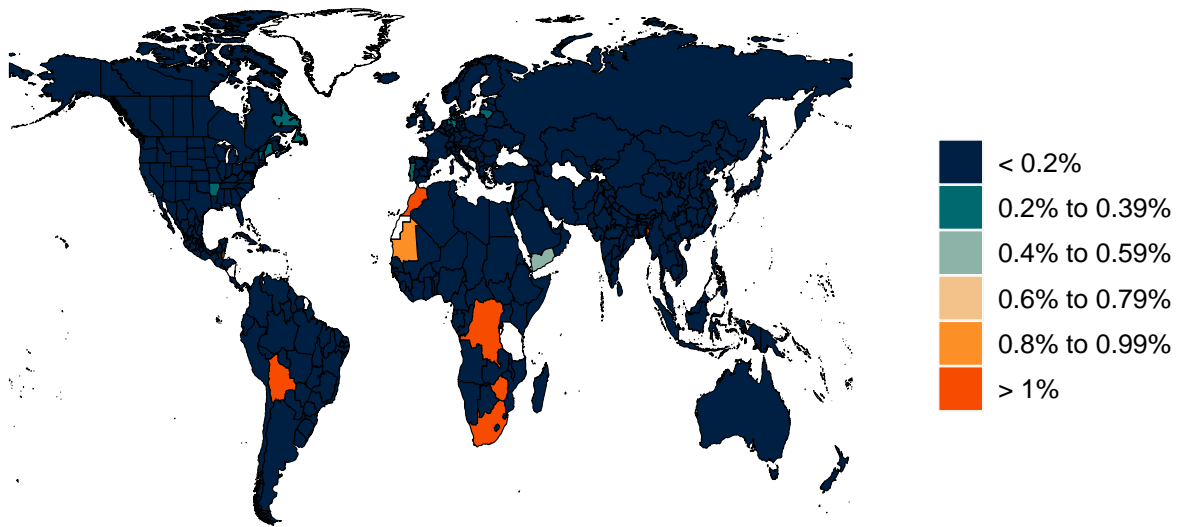
Figure 11.1: Trend in the proportion of the population reporting always wearing a mask when leaving home

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 | | BA.1/BA.2 | | BA.5 | |
Vaccine	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection	Severe disease	Infection
AstraZeneca	94%	63%	94%	63%	94%	69%	94%	69%	94%	69%	71%	36%	71%	36%
CanSino	66%	62%	66%	62%	64%	61%	64%	61%	64%	61%	48%	32%	48%	32%
CoronaVac	50%	47%	50%	47%	49%	46%	49%	46%	49%	46%	37%	24%	37%	24%
Covaxin	78%	73%	78%	73%	76%	72%	76%	72%	76%	72%	57%	38%	57%	38%
Johnson & Johnson	86%	72%	86%	72%	76%	64%	76%	64%	76%	64%	57%	33%	57%	33%
Moderna	97%	92%	97%	92%	97%	91%	97%	91%	97%	91%	73%	48%	73%	48%
Novavax	89%	83%	89%	83%	86%	82%	86%	82%	86%	82%	65%	43%	65%	43%
Pfizer/BioNTech	95%	86%	95%	86%	95%	84%	95%	84%	95%	84%	72%	44%	72%	44%
Sinopharm	73%	68%	73%	68%	71%	67%	71%	67%	71%	67%	53%	35%	53%	35%
Sputnik-V	92%	86%	92%	86%	89%	85%	89%	85%	89%	85%	67%	44%	67%	44%
Other vaccines	75%	70%	75%	70%	73%	69%	73%	69%	73%	69%	55%	36%	55%	36%
Other vaccines (mRNA)	91%	86%	91%	86%	88%	85%	88%	85%	88%	85%	67%	45%	67%	45%

Percent of the population having received at least one dose (12.1) and fully vaccinated against SARS-CoV-2 (12.2) by December 12, 2022

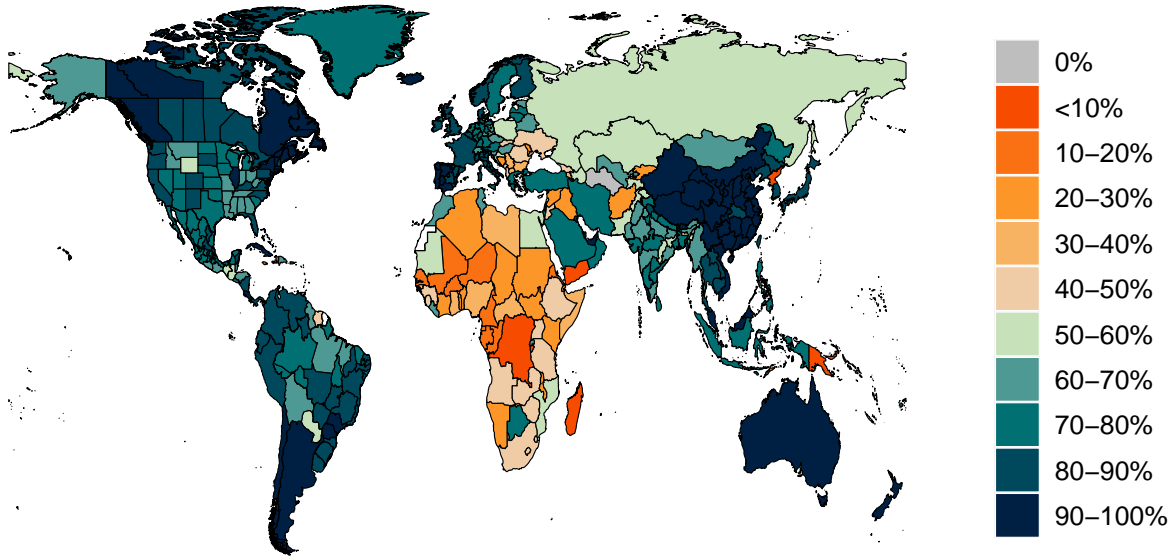**Figure 12.1: Percent of the population having received one dose of a COVID-19 vaccine**

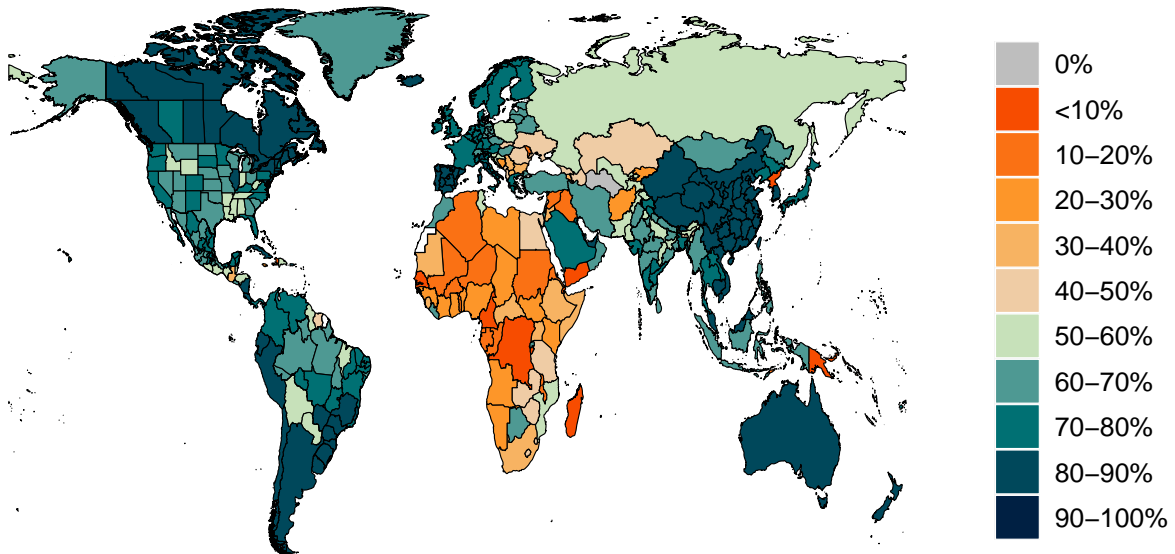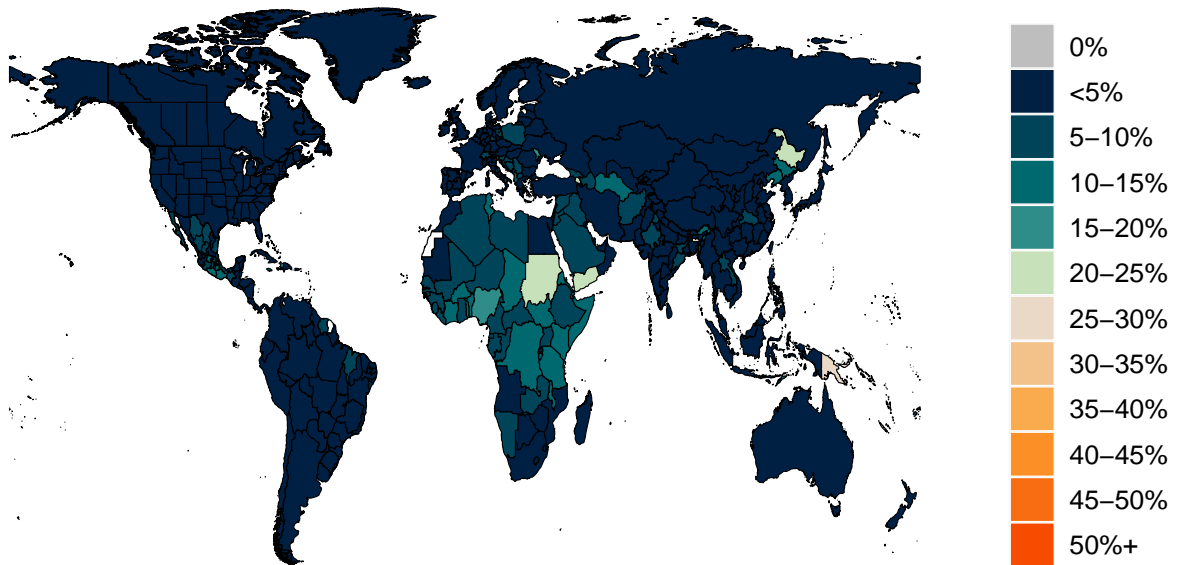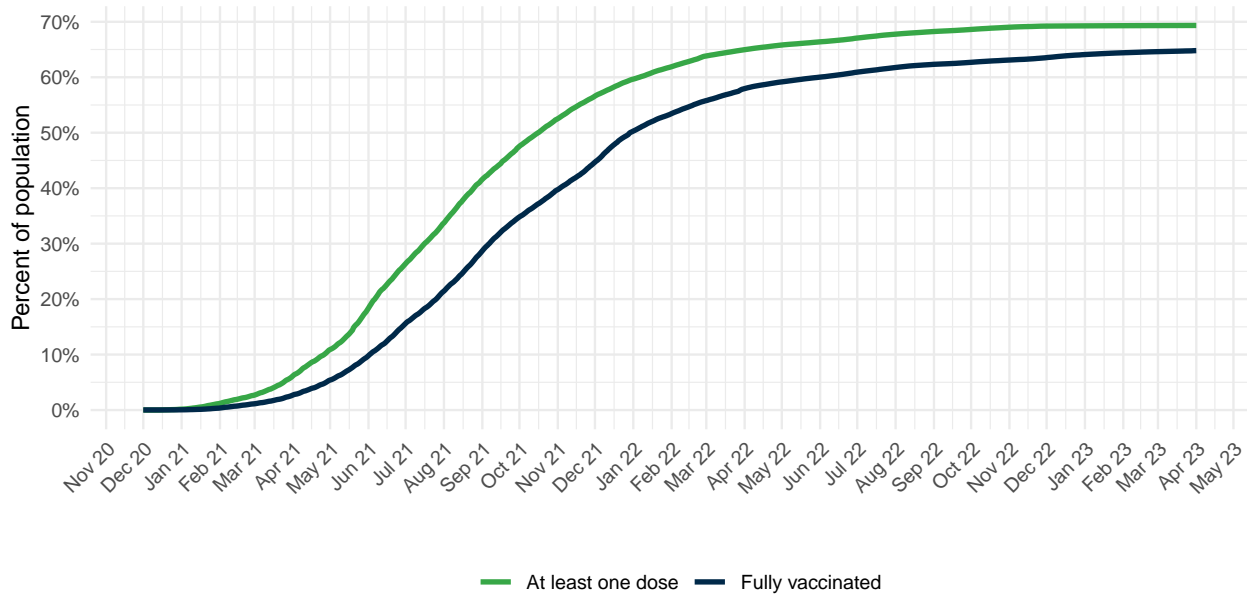**Figure 12.2: Percent of the population fully vaccinated against SARS-CoV-2**

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


Legend: — At least one dose   — 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.

Legend: — Delta   — BA.1/BA.2   — BA.5
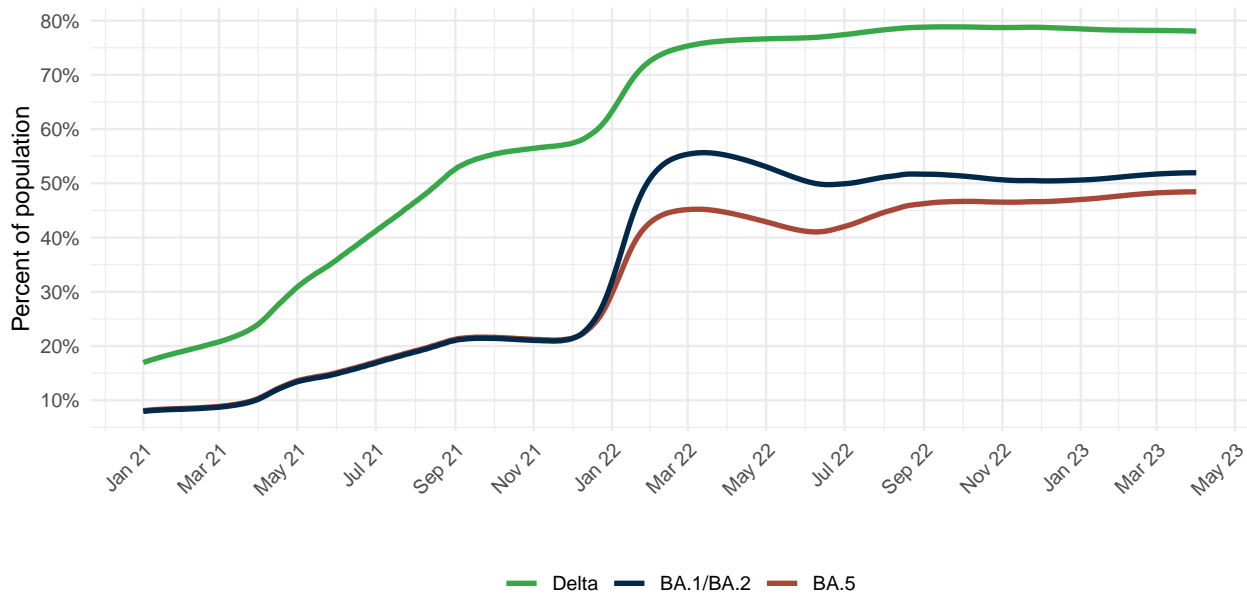
Projections and scenarios

Figure 16.1: Daily COVID-19 infections until April 01, 2023 for three scenarios
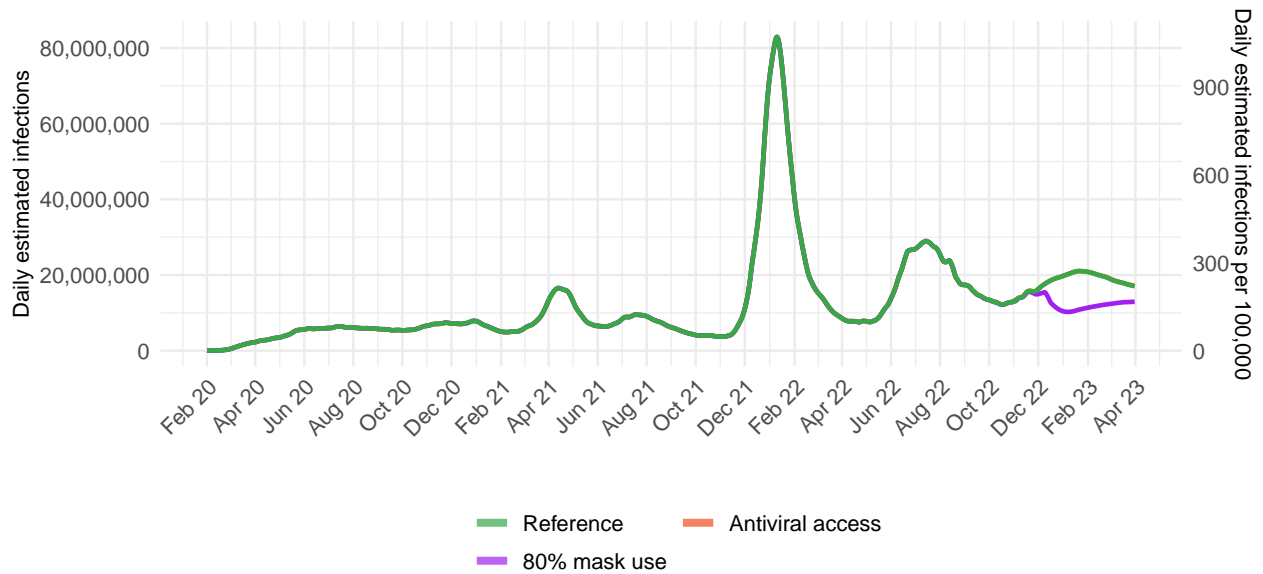
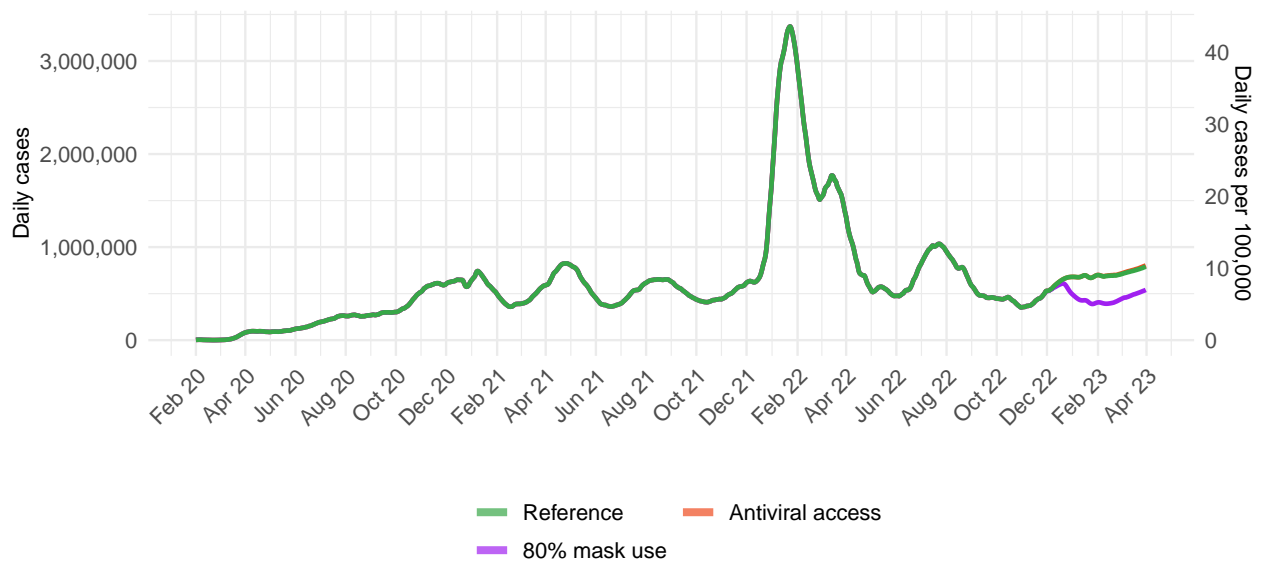**Figure 16.2: Daily COVID-19 reported cases until April 01, 2023 for three scenarios**

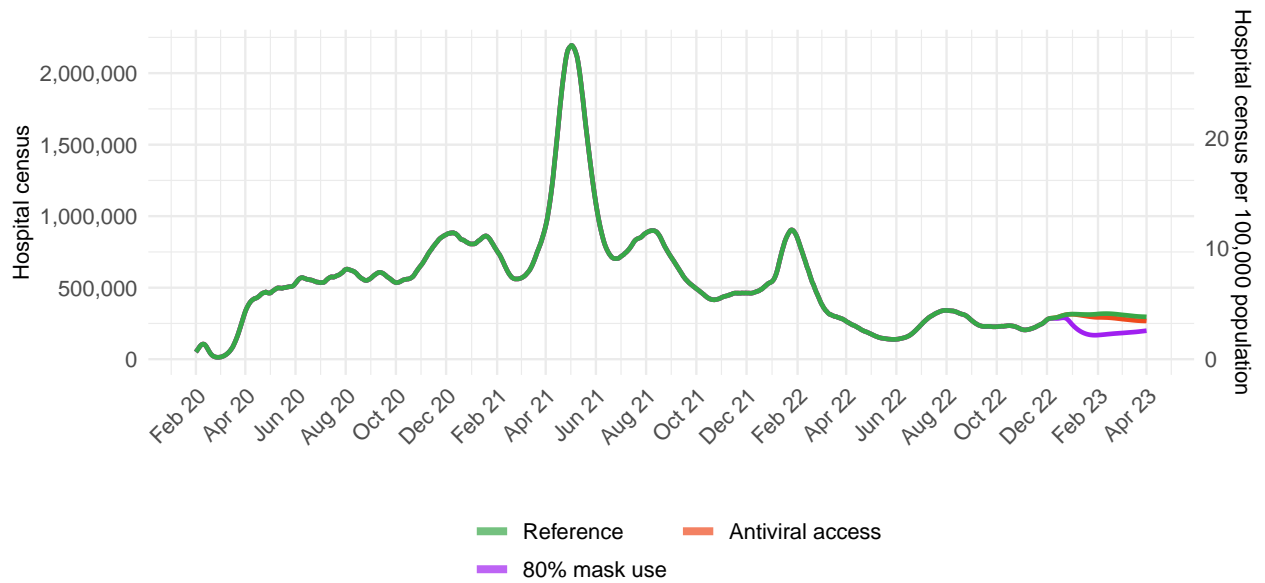**Figure 16.3: Daily COVID-19 hospital census until April 01, 2023 for three scenarios**
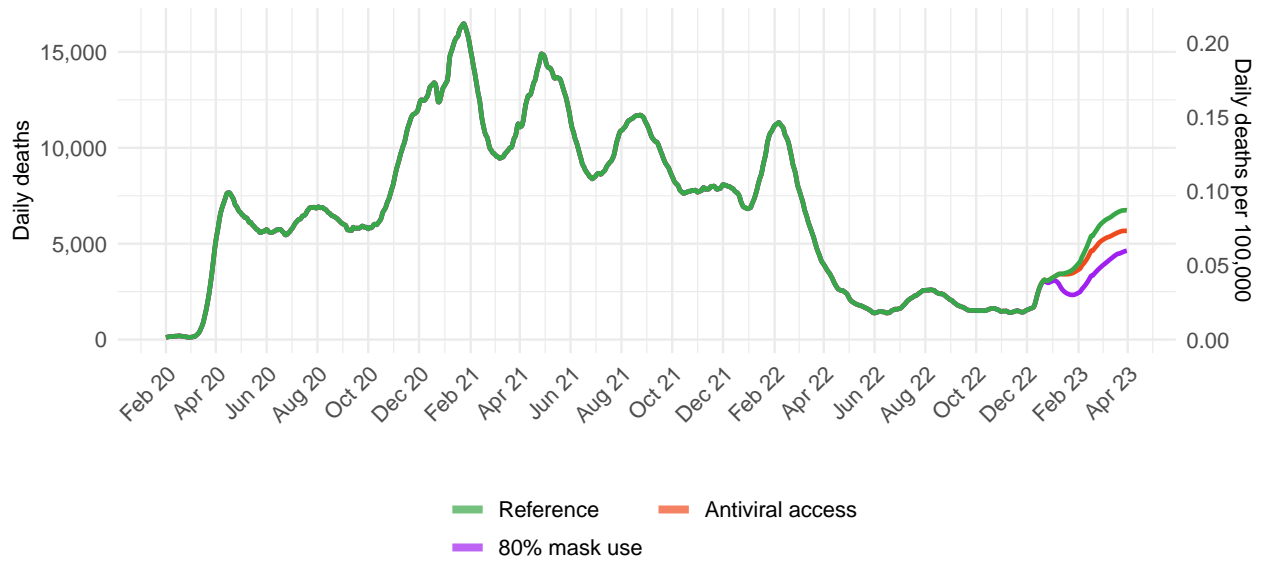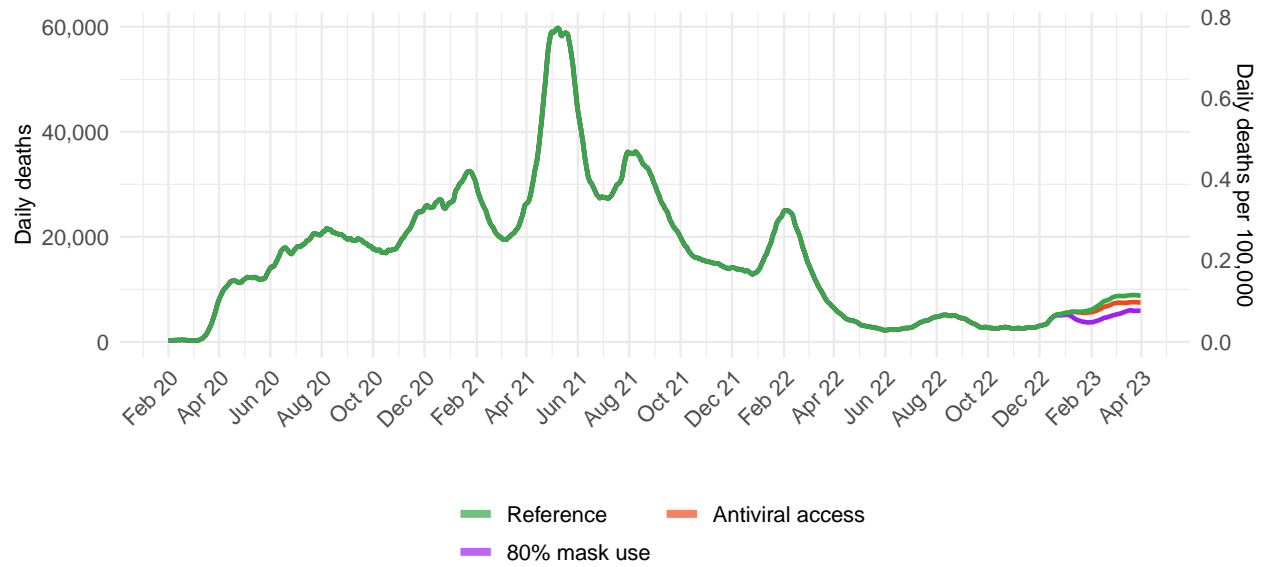
Figure 16.4: Reported daily COVID-19 deaths per 100,000

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.