COVID-19 Results Briefing

The South-East Asia Region

December 22, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in the South-East Asia Region. The model was run on December 21, 2021, with data through December 13, 2021.

Across the South-East Asia Region, the highly infectious Omicron variant has led to higher infections, estimated to have increased to 529,400 per day over the last week. However, hospitalizations and deaths have decreased as recent evidence indicates Omicron is less likely than previous variants to lead to severe disease, hospitalization, or death.

In this release, we have substantially revised our model to reflect the emergence of the Omicron variant, waning infection-acquired and vaccine-acquired immunity, and the matrix of immunity across variants. Our reference scenario suggests that by February 7, daily infections will rise to over 11 million per day across South-East Asian countries. Although we expect diagnosed cases will increase to a peak of over 100,000 per day by early February, we project a much greater fraction of asymptomatic infections (likely over 90%) and thus a lower infection-detection rate.

Based on the data from South Africa, the United Kingdom, Denmark, and Norway, we expect that the infection-hospitalization rate (IHR) for Omicron compared to Delta will be 90%–96% lower. Despite the lower IHR, the pressure on hospitals is likely to be considerable in some countries. The global peak of hospital admissions will likely be lower than for Delta and similar to the peak in January 2021. Likewise, based on the available data, we expect the infection-fatality rate (IFR) will be 97%–99% lower than for Delta. Huge numbers of infections and moderate numbers of hospitalizations may still translate into a peak of reported daily deaths over 290 by early March for the South-East Asia Region.

Our forecasts are more optimistic than some forecasts such as those from the SAGE group in the United Kingdom, who have put out numbers suggesting massively higher daily deaths than at any prior point in time. While we believe our reference forecast reflects the available evidence on Omicron, huge uncertainties remain for key assumptions: Omicron immune escape, increased transmissibility, substantial reduced vaccine-specific efficacy for preventing infection, moderate reductions in vaccine-specific efficacy in preventing hospitalization and death, the speed of waning vaccine-derived immunity for infection and hospitalization/death, the speed of waning of infection-acquired immunity, and severity of Omicron infection. The most important uncertainty is how severe Omicron infection is. Our assumptions on reduced severity may turn out to be pessimistic; for example, hospital admissions in the UK are rising extremely slowly.

In our more severe Omicron scenario for the South-East Asia Region, hospital census could reach levels above 88,000 and reported daily deaths could exceed 720 by early March. Decision-makers need to choose courses of action in the face of very considerable uncertainty. We expect holiday period lags in reporting cases, hospitalizations, and deaths will heighten uncertainty until early January. Sufficient data to revise our assessment of severity may not emerge until the second or third week of January.

What policy responses are available? We have included in this release scenarios of increasing mask use to 80%, increasing third-dose vaccine delivery from 80% in the reference scenario to 100% of those who received two doses, and making progress against vaccine hesitancy. Given the speed of global spread of Omicron and the very short doubling time for Omicron transmission, increasing mask use to 80% has the most immediate and largest impact. Our third dose scenario has a small effect because of two assumptions: third doses are only delivered 6 months after the second dose, and the reference scenario already has 80% receiving the third dose. In future releases, we will test the impact of shorter intervals for the third dose such as 3-4 months. Those countries that have low vaccination rates due to lack of access to supply are not affected by the third dose scenario. While not explicitly modeled, given the transmissibility of Omicron, promoting the use of higher-quality masks such as KN95 or N95 would be consistent with the available data. Given the rapid spread and much reduced IHR and IFR, we do not believe elementary or secondary school closures are appropriate. More aggressive lockdowns to control transmission may reduce the pressure on some hospital systems but will come at considerable economic and social cost. Given that screening programs are likely to yield many asymptomatic cases, workplace screening and protocols on how long individuals need to stay away from work may need to be modified – otherwise there may be a considerable impact on some employers and on some supply chains. Extremely high rates of transmission and reported cases may also mean that contact tracing may be ineffective and potentially a waste of resources. With high infection rates and the projected stress on some hospitals, hospitalization rates should be used as a metric to drive policy at the local level. The medical system is already exhausted, and some medical staff may get infected and have to isolate, so the workforce may be impacted even more. There are huge variations in the capacity of hospitals to expand to meet the surge, and local metrics are needed.

Individuals can act to protect themselves by getting vaccinated if not already vaccinated and getting a third does as soon as they are eligible. Individuals at any elevated risk due to age or comorbidities who wish to reduce their risk of hospitalization or death should wear a mask, preferably a high-quality mask such as an N95 mask, and avoid situations where transmission is more likely, such as any indoor gathering or outdoor gathering where distancing is not possible. Individuals who are not vaccinated or have never been infected should also be particularly concerned.

Current situation

- Daily infections in the last week increased to 529,400 per day on average compared to 307,400 the week before (Figure 1.1). Daily hospital census in the last week (through December 13) decreased to 9,800 per day on average compared to 11,300 the week before.
- Daily reported cases in the last week were constant at 14,600 per day on average compared to 14,600 the week before (Figure 2.1).

- Reported deaths due to COVID-19 in the last week decreased to 170 per day on average compared to 210 the week before (Figure 3.1).
- Total deaths due to COVID-19 in the last week decreased to 650 per day on average compared to 800 the week before (Figure 3.1). This makes COVID-19 the number 14 cause of death in the South-East Asia Region this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 3.9 times larger than the reported number of deaths.
- No locations had daily reported COVID-19 death rates greater than 4 per million (Figure 4.1).
- No countries had daily rates of COVID-19 deaths greater than 4 per million, but one subnational location had daily rates of COVID-19 deaths greater than 4 per million. (Figure 4.2).
- We estimate that 55% of people in the South-East Asia Region have been infected at least once as of December 13 (Figure 6.1). Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in four countries in the region – Nepal, Bangladesh, Sri Lanka, and the Maldives – and 21 subnational locations across India (Figure 7.1).
- The infection-detection rate in the South-East Asia Region was close to 6% on December 13 (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 9.1–9.5). We estimate that the Alpha variant is circulating in 0 countries and 0 subnational locations, that the Beta variant is circulating in 0 countries and 0 subnational locations, that the Delta variant is circulating in 10 countries and 30 subnational locations, that the Gamma variant is circulating in 0 countries and 0 subnational locations and that the Omicron variant is circulating in 9 countries and 29 subnational locations.

Trends in drivers of transmission

- Mobility last week was 1% lower than the pre-COVID-19 baseline (Figure 11.1). Mobility was lower than 30% of baseline in one country in the region.
- As of December 13, in the COVID-19 Trends and Impact Survey, 61% of people self-report that they always wore a mask when leaving their home compared to 60% last week (Figure 13.1).
- There were 79 diagnostic tests per 100,000 people on December 13 (Figure 15.1).
- As of December 13, four countries and 12 subnational locations have reached 70% or more of the population who have received at least one vaccine dose, and two countries and two subnational locations have reached 70% or more of the population who are fully vaccinated (Figure 17.1). 56% of people in the South-East Asia Region have received at least one vaccine dose and 36% are fully vaccinated.

- In the South-East Asia Region, 90% of the population that is 12 years and older say they would accept or would probably accept a vaccine for COVID-19. Note that vaccine acceptance is calculated using survey data from the 18+ population. This is up by 1.5 percentage points from last week. The proportion of the population who are open to receiving a COVID-19 vaccine ranges from 71% in Timor-Leste to 100% in Bhutan (Figure 19.1).
- In our current reference scenario, we expect that 1.3 billion people will be vaccinated with at least one dose by April 1 (Figure 20.1). We expect that 56% of the population will be fully vaccinated by April 1.

Projections

Infections

- Daily estimated infections in the **reference scenario**, which represents what we think is most likely to happen, will rise to 11,777,830 by February 7, 2022 (Figure 21.1).
- Daily estimated infections in the **high severity of Omicron scenario** will rise to 11,775,970 by February 7, 2022 (Figure 21.1).
- Daily estimated infections in the **80% mask coverage scenario** will rise to 8,624,870 by February 9, 2022 (Figure 21.1).
- Daily estimated infections in the **third dose scenario** will rise to 10,619,650 by February 6, 2022 (Figure 21.1).
- Daily estimated infections in the **reduced vaccine hesitancy scenario** will rise to 11,710,430 by February 7, 2022 (Figure 21.1).

Cases

- Daily cases in the **reference scenario** will rise to 108,520 by February 17, 2022 (Figure 21.2).
- Daily cases in the **high severity of Omicron scenario** will rise to 108,370 by February 17, 2022 (Figure 21.2).
- Daily cases in the **80% mask coverage scenario** will rise to 89,280 by February 17, 2022 (Figure 21.2).
- Daily cases in the **third dose scenario** will rise to 96,490 by February 15, 2022 (Figure 21.2).
- Daily cases in the **reduced vaccine hesitancy scenario** will rise to 107,820 by February 16, 2022 (Figure 21.2).

Hospitalizations

- Daily hospital census in the **reference scenario** will rise to 46,160 by March 6, 2022 (Figure 21.3).

- Daily hospital census in the **high severity of Omicron scenario** will rise to 88,390 by March 7, 2022 (Figure 21.3).
- Daily hospital census in the **80% mask coverage scenario** will rise to 34,040 by March 7, 2022 (Figure 21.3).
- Daily hospital census in the **third dose scenario** will rise to 38,430 by March 4, 2022 (Figure 21.3).
- Daily hospital census in the **reduced vaccine hesitancy scenario** will rise to 45,710 by March 6, 2022 (Figure 21.3).

Deaths

- In our **reference scenario**, our model projects 734,000 cumulative reported deaths due to COVID-19 on April 1. This represents 22,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **reference scenario** will rise to 290 by March 2, 2022 (Figure 21.4).
- Under our **reference scenario**, our model projects 3,960,000 cumulative total deaths due to COVID-19 on April 1. This represents 105,000 additional deaths from December 13 to April 1 (Figure 24.2).
- In our **high severity of Omicron scenario**, our model projects 759,000 cumulative reported deaths due to COVID-19 on April 1. This represents 48,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **high severity of Omicron scenario** will rise to 720 by March 5, 2022 (Figure 21.4).
- In our **80% mask coverage scenario**, our model projects 731,000 cumulative reported deaths due to COVID-19 on April 1. This represents 19,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **80% mask coverage scenario** will rise to 230 by February 28, 2022 (Figure 21.4).
- In our **third dose scenario**, our model projects 730,000 cumulative reported deaths due to COVID-19 on April 1. This represents 19,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **third dose scenario** will rise to 230 by February 26, 2022 (Figure 21.4).
- In our **reduced vaccine hesitancy scenario**, our model projects 734,000 cumulative reported deaths due to COVID-19 on April 1. This represents 22,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **reduced vaccine hesitancy scenario** will rise to 280 by March 2, 2022 (Figure 21.4).
- Figure 22.1 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.
- At some point from December through April 1, one country will have high or extreme stress on hospital beds (Figure 23.1). At some point from December through April 1, four countries will have high or extreme stress on intensive care unit (ICU) capacity (Figure 24.1).

Model updates

In this update, we have substantially revised our model to explicitly account for several important factors that have a profound influence on the likely trajectory of the epidemic in the coming months. First, the model tracks infections from different variants separately, including ancestral, Alpha, Beta, Gamma, Delta, Omicron, and other. Second, we take into account that infection-derived and vaccine-derived immunity wanes over time. Immunity that prevents infection wanes more quickly than immunity preventing hospitalization and death, so we derive separate waning curves for infection and for hospitalization and death. Based on a systematic analysis of published studies, reports, and archived studies, we derive vaccine-specific waning curves. Third, infection with different COVID-19 variants can confer different protection for each variant in the model. The matrix of cross-variant immunity allows us to take into account the greater immune escape seen with Omicron. Third, we explicitly model the delivery of a third dose of vaccine (and second dose for J&J recipients). Fourth, the variant spread model is now based on both spatial spread and patterns of airline traffic. The technical appendix provides details of the model structure and the analysis of waning immunity. The critical driver of our forecasts in the next months is the spread of the Omicron variant. Critical assumptions about the Omicron variant are based on our analysis of all the available lab data on vaccine efficacy, test-negative vaccine effectiveness studies in South Africa and the UK, population-level data on PCR positivity in representative samples of the population, and detected cases, hospitalization, and deaths in South Africa, the UK, Denmark, and Norway. More details on this analysis are in the technical appendix. The key assumptions that substantially influence the forecasts include the following: First, prior infection provides 40% to 60% protection against infection with Omicron. Second, vaccine effectiveness in preventing infection is reduced by approximately 50% compared to the efficacy against the Delta variant, and vaccine effectiveness in preventing hospitalization and death is reduced by 25% compared to the efficacy against the Delta variant. Third, the fraction asymptomatic is assumed to increase from near 40% to 90%–95%; this fraction influences the future estimates of the infection-detection rate. Fourth, the infection-hospitalization rate for Omicron is estimated to be 90%–96% lower than for Delta variant. Fifth, the infection-fatality rate for Omicron is estimated to be 97%–99% lower than for Delta.

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

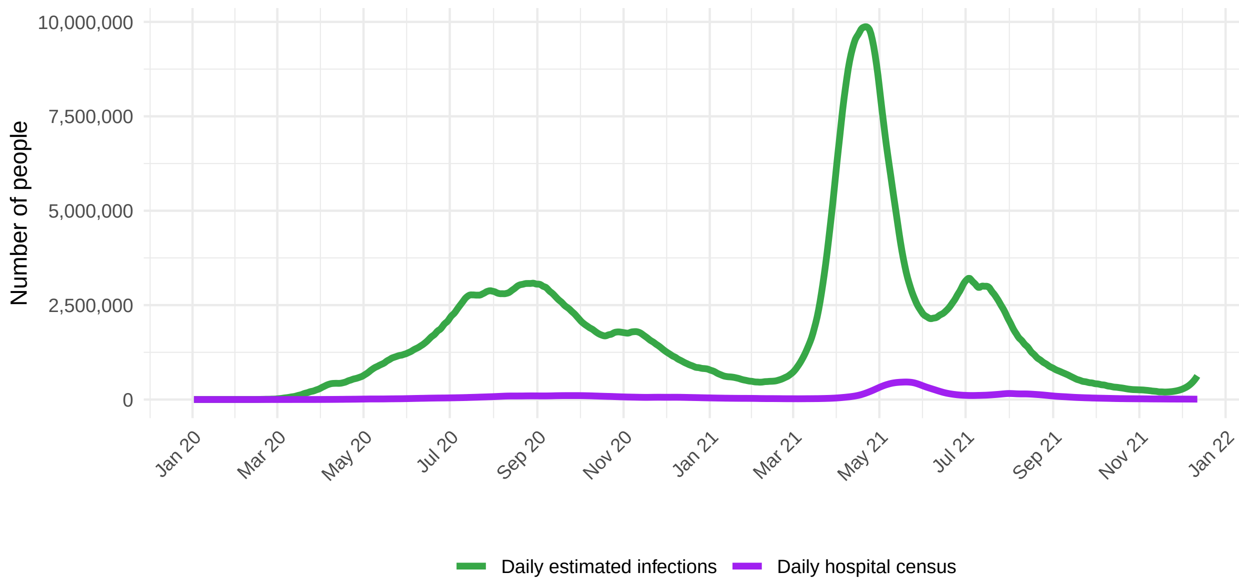


Figure 2.1. Reported daily COVID-19 cases, moving average

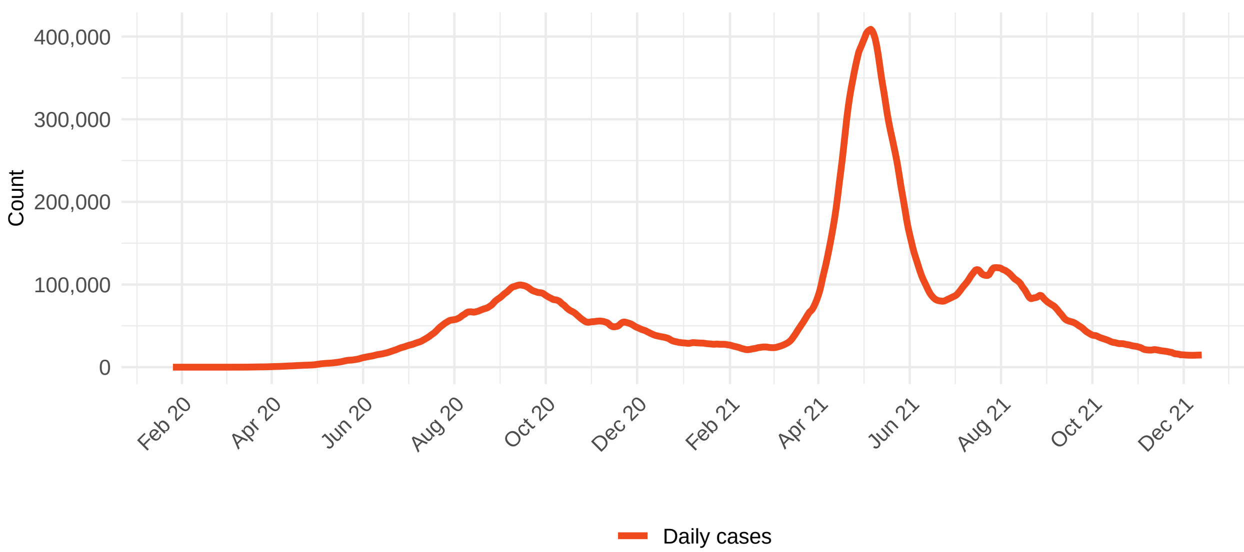
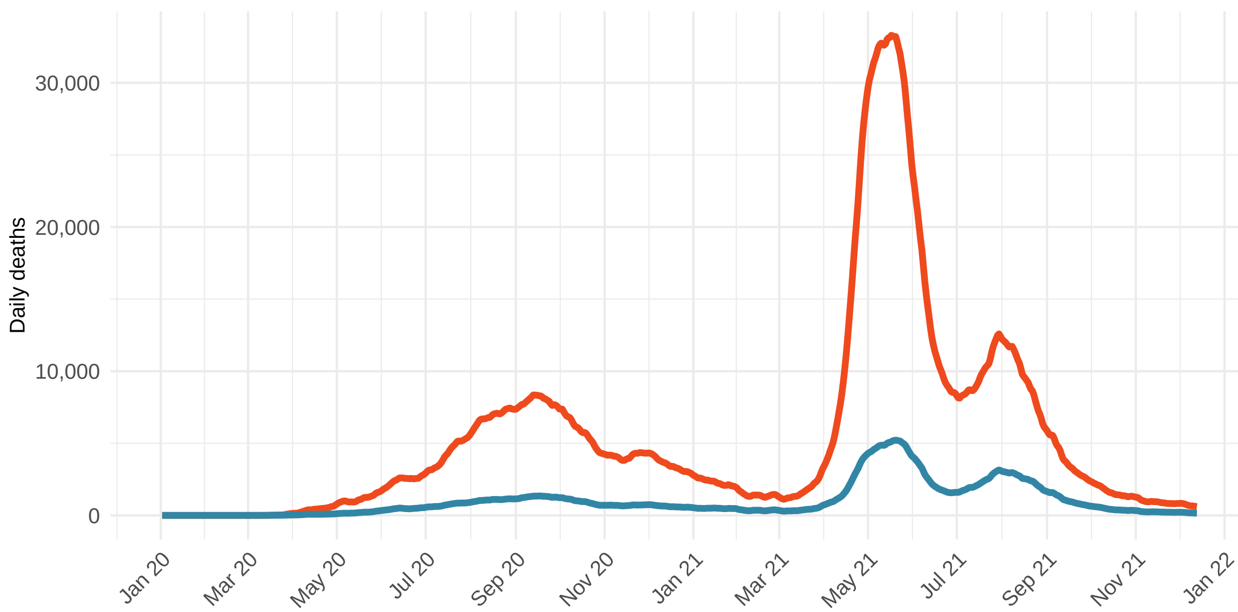


Table 1. Ranking of total deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Ischemic heart disease	39,868	1
Stroke	27,102	2
Chronic obstructive pulmonary disease	21,984	3
Diarrheal diseases	14,328	4
Lower respiratory infections	11,327	5
Tuberculosis	10,815	6
Neonatal disorders	10,504	7
Diabetes mellitus	9,152	8
Cirrhosis and other chronic liver diseases	8,514	9
Chronic kidney disease	6,390	10
COVID-19	4,556	14

Figure 3.1. Smoothed trend estimate of reported daily COVID-19 deaths (blue) and total daily deaths due to COVID-19 (orange)



Daily COVID-19 death rate per 1 million on December 13, 2021

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 December 13, 2021

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

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

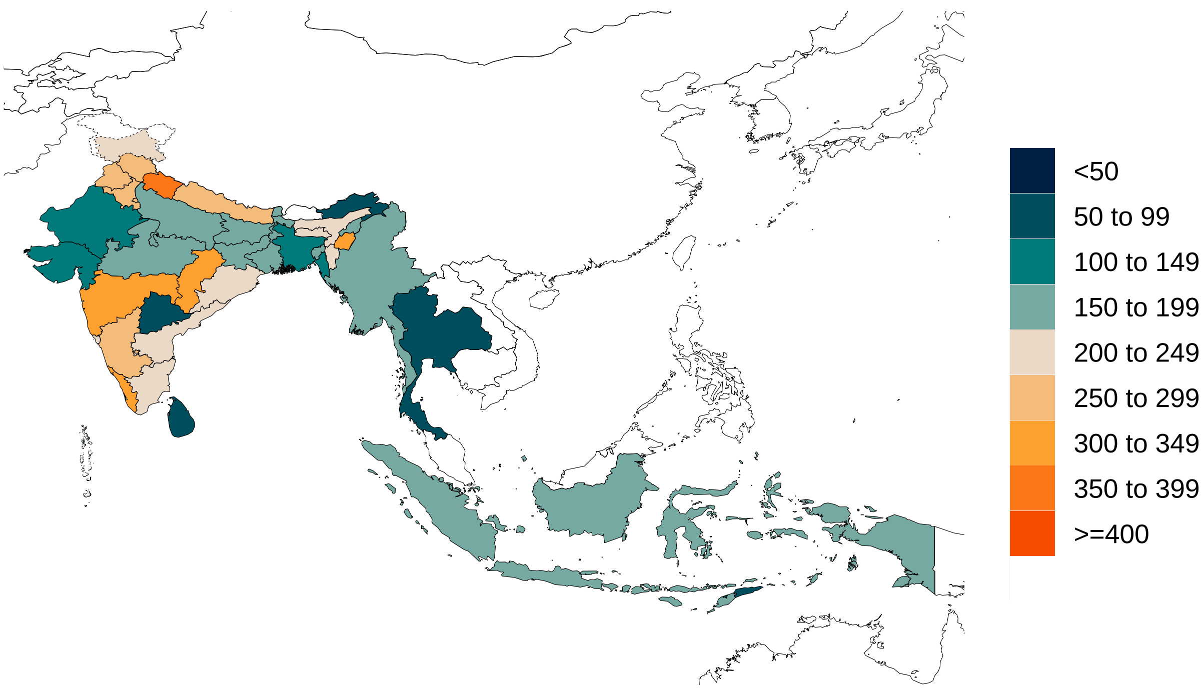


Figure 6.1. Estimated percent of the population infected with COVID-19 on December 13, 2021

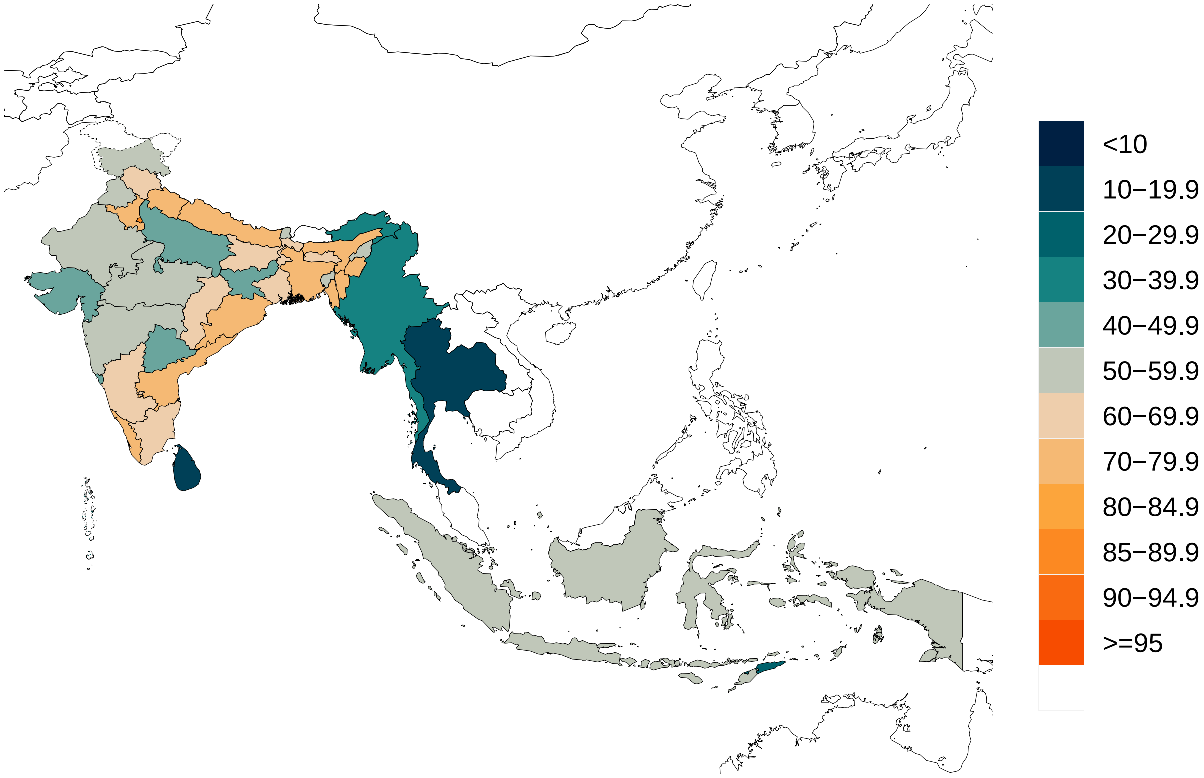
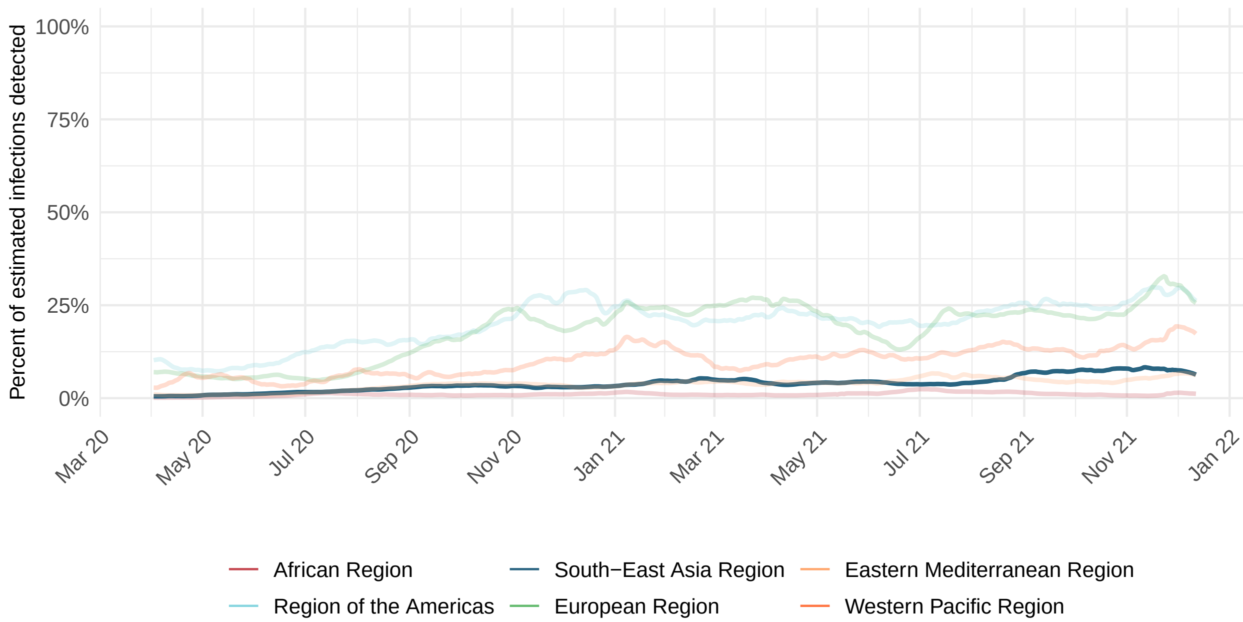


Figure 7.1. Mean effective R on December 2, 2021. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.

Figure 8.1. 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 13, 2021

Figure 9.1 Estimated percent Alpha variant

Figure 9.2 Estimated percent Beta variant

Figure 9.3 Estimated percent Delta variant

Figure 9.4 Estimated percent Gamma variant

Figure 9.5 Estimated percent Omicron variant

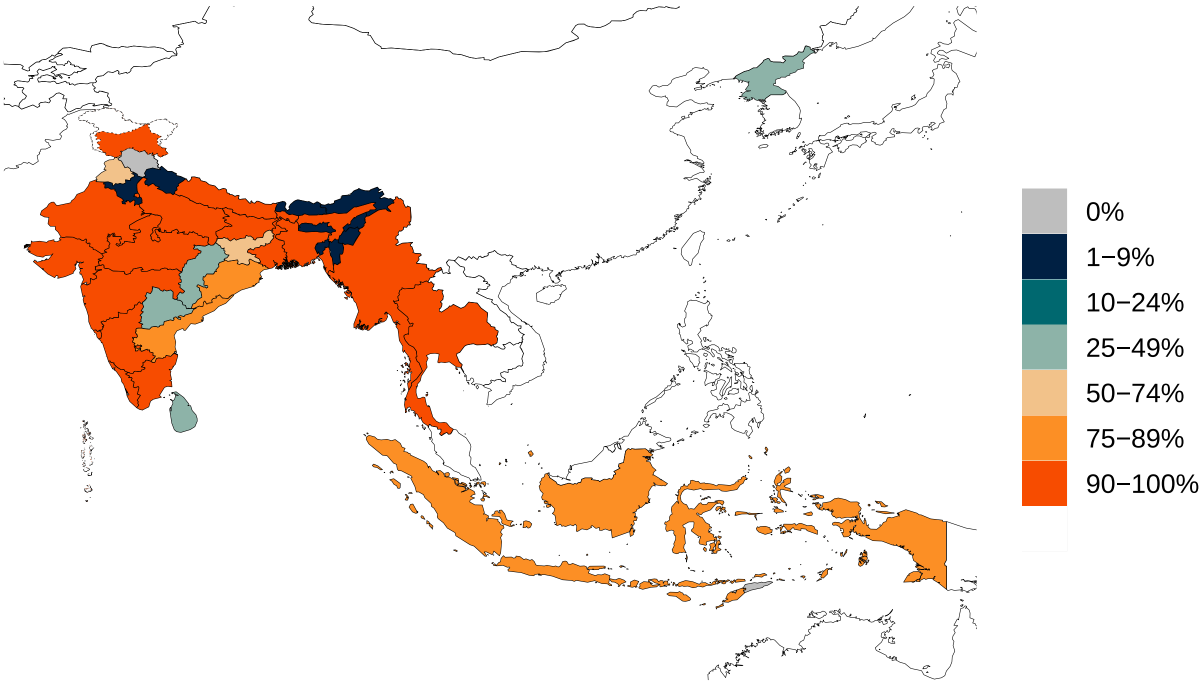


Figure 10.1. Infection-fatality rate on December 13, 2021. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.

Critical drivers

Table 2. Current mandate implementation

	Primary school closure	Secondary school closure	Higher school closure	Entry restrictions for some non−residents	Entry restrictions for all non−residents	Individual movements restricted	Curfew for businesses	Individual curfew	Gathering limit: 6 indoor, 10 outdoor	Gathering limit: 10 indoor, 25 outdoor	Gathering limit: 25 indoor, 50 outdoor	Gathering limit: 50 indoor, 100 outdoor	Gathering limit: 100 indoor, 250 outdoor	Restaurants closed	Bars closed	Restaurants / bars closed	Restaurants / bars curbside only	Gyms, pools, other leisure closed	Non−essential retail closed	Non−essential retail curbside only	Non−essential workplaces closed	Stay home order	Stay home fine	Mask mandate	Mask mandate fine
Bangladesh	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	Mandate in place
Bhutan	Mandate in place	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	No mandate
Democratic People's Republic of Korea	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	No mandate
India	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate in place	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	Mandate imposed in some subnational locations	No mandate	Mandate imposed in some subnational locations	No mandate	No mandate	Mandate imposed in some subnational locations	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	Mandate imposed in some subnational locations
Indonesia	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate
Maldives	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	Mandate in place	No mandate	No mandate	Mandate in place	No mandate
Myanmar	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	Mandate in place
Nepal	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	Mandate in place
Sri Lanka	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	Mandate in place	No mandate	No mandate	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	No mandate
Thailand	No mandate	No mandate	No mandate	Mandate in place	No mandate	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate
Timor−Leste	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	Mandate in place	Mandate in place	Mandate in place	Mandate in place	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	No mandate	Mandate in place	No mandate

Mandate in place
Mandate in place (imposed this week)
Mandate in place (updated from previous reporting)
Mandate imposed in some subnational locations
Mandate imposed in some subnational locations (imposed this week)
Mandate imposed in some subnational locations (updated from previous reporting)
No mandate
No mandate (lifted this week
No mandate (updated from p

*Not all locations are measured at the subnational level.

Figure 11.1. Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

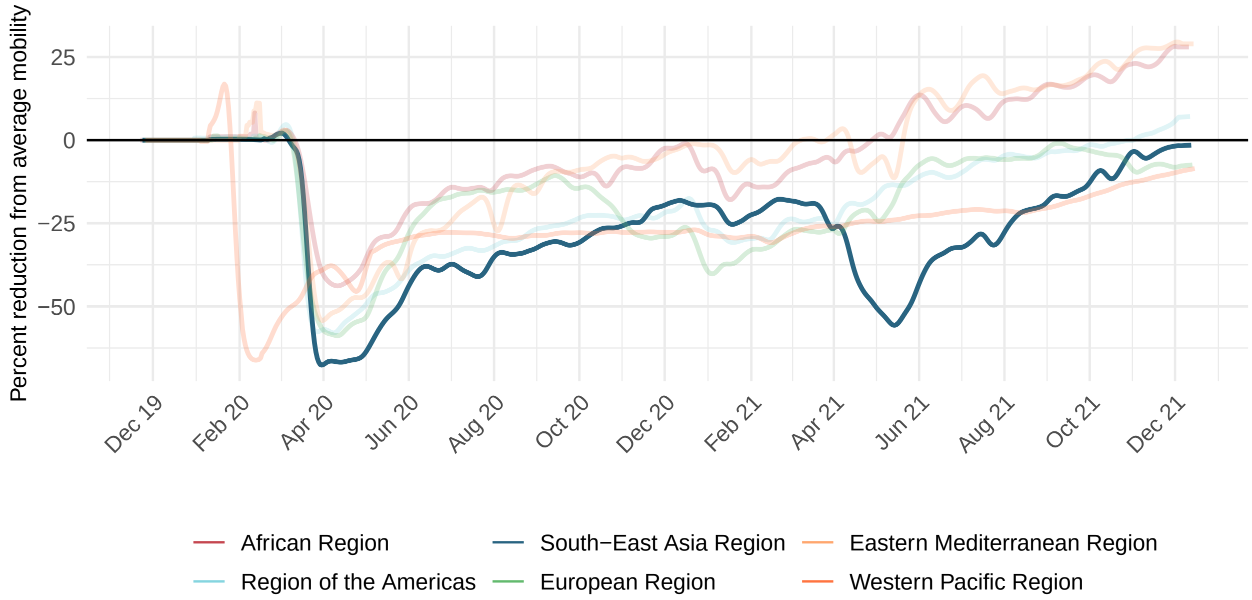


Figure 12.1. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on December 13, 2021

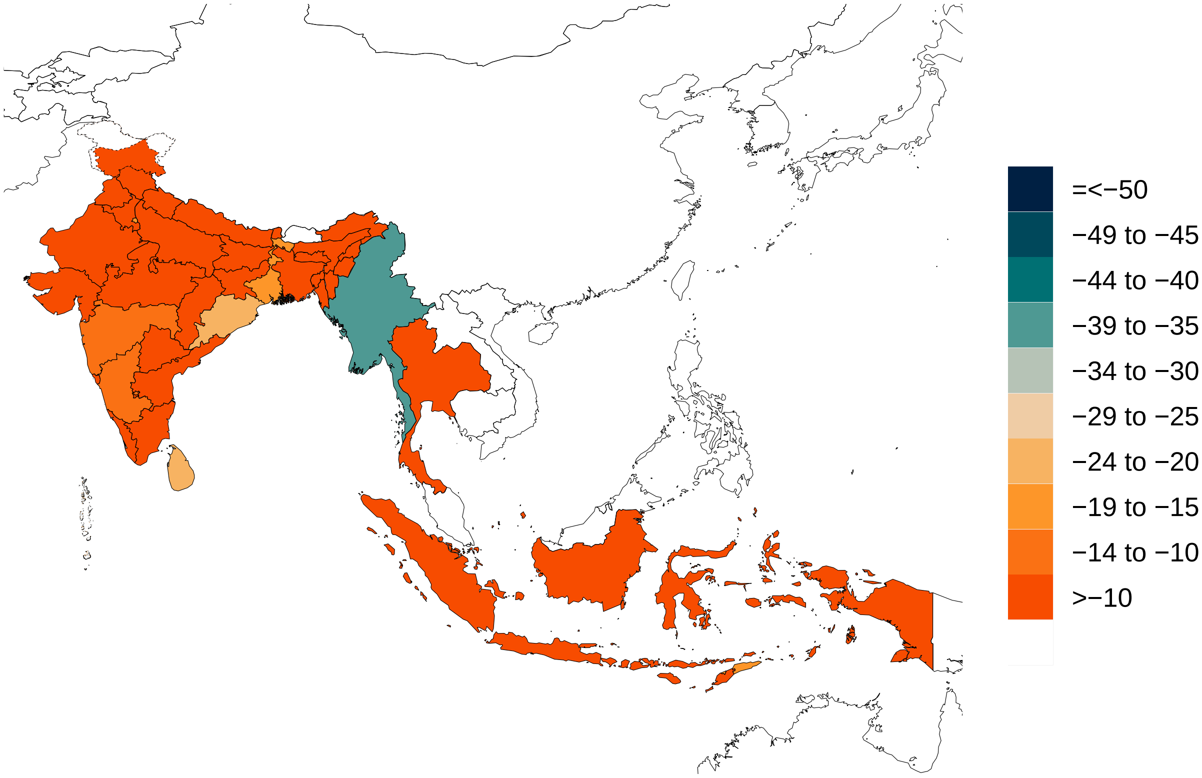


Figure 13.1. Trend in the proportion of the population reporting always wearing a mask when leaving home

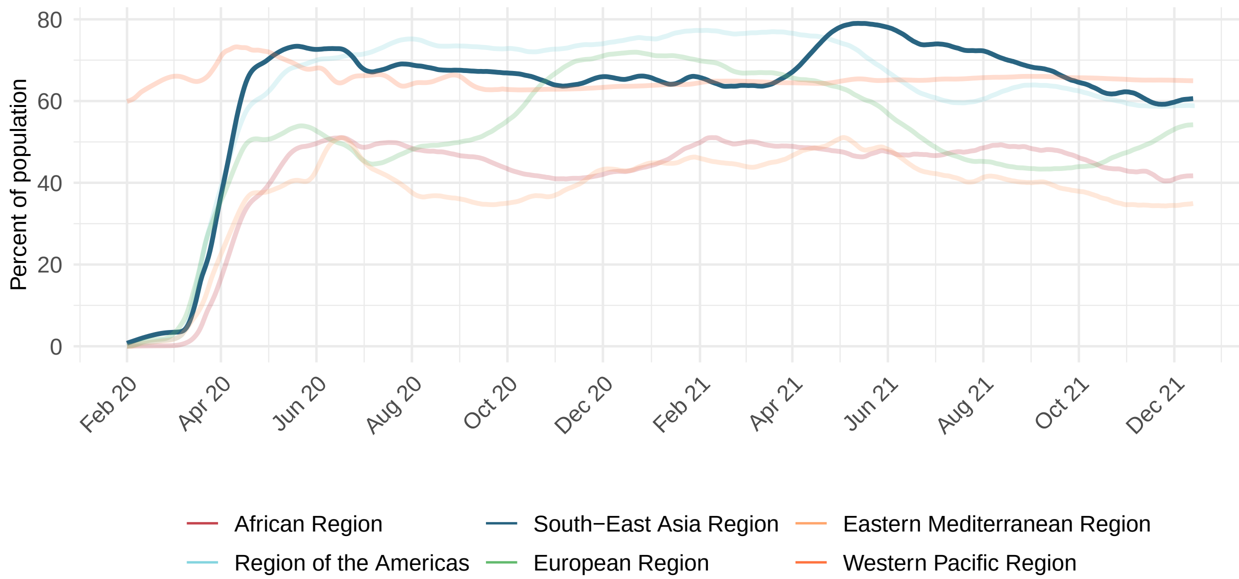


Figure 14.1. Proportion of the population reporting always wearing a mask when leaving home on December 13, 2021

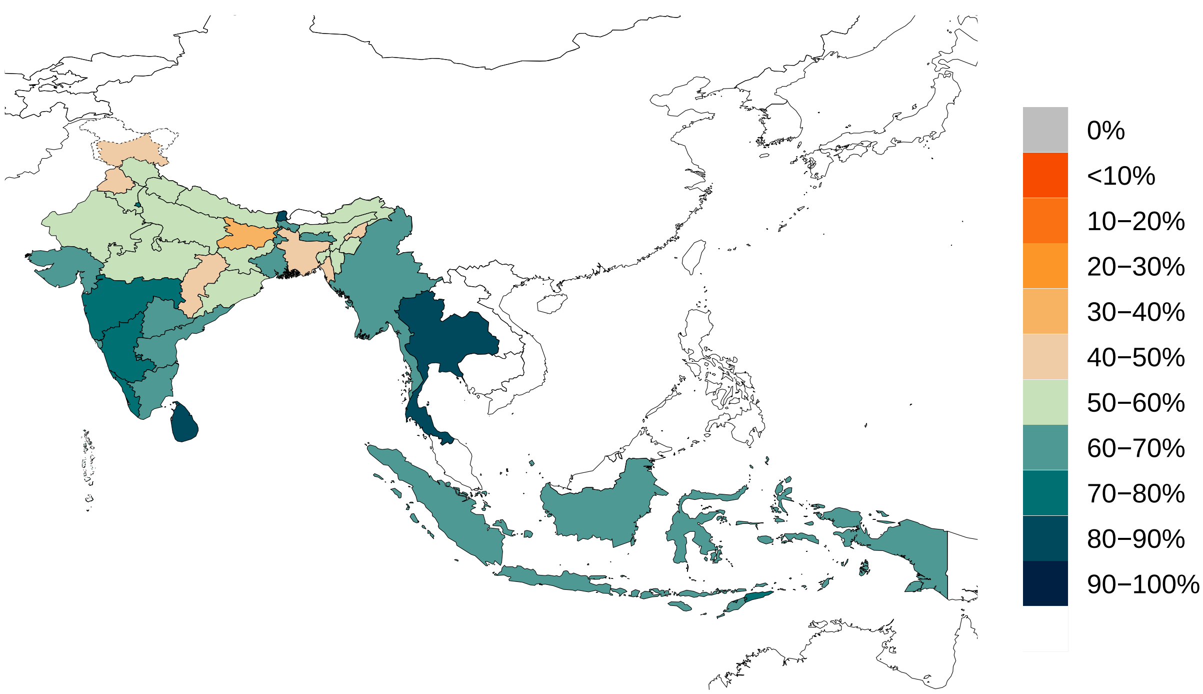


Figure 15.1. Trend in COVID-19 diagnostic tests per 100,000 people

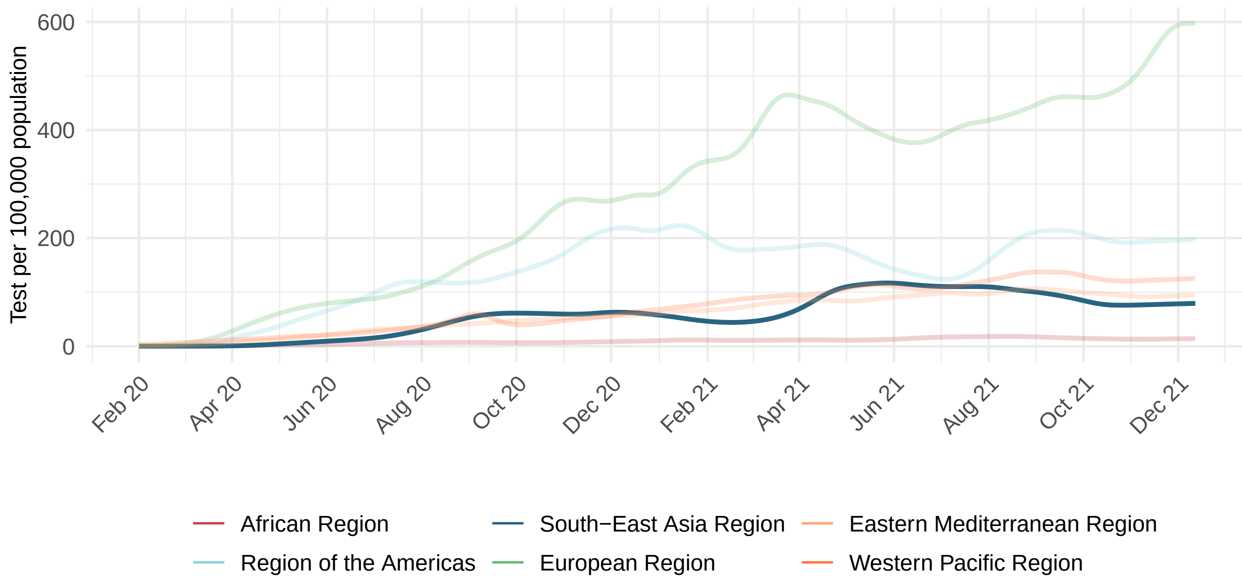


Figure 16.1. COVID-19 diagnostic tests per 100,000 people on December 13, 2021

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

Percent of the population having received at least one dose (17.1) and fully vaccinated against SARS-CoV-2 (17.2) by December 13, 2021

Figure 17.1 Percent of the population having received one dose of a COVID-19 vaccine

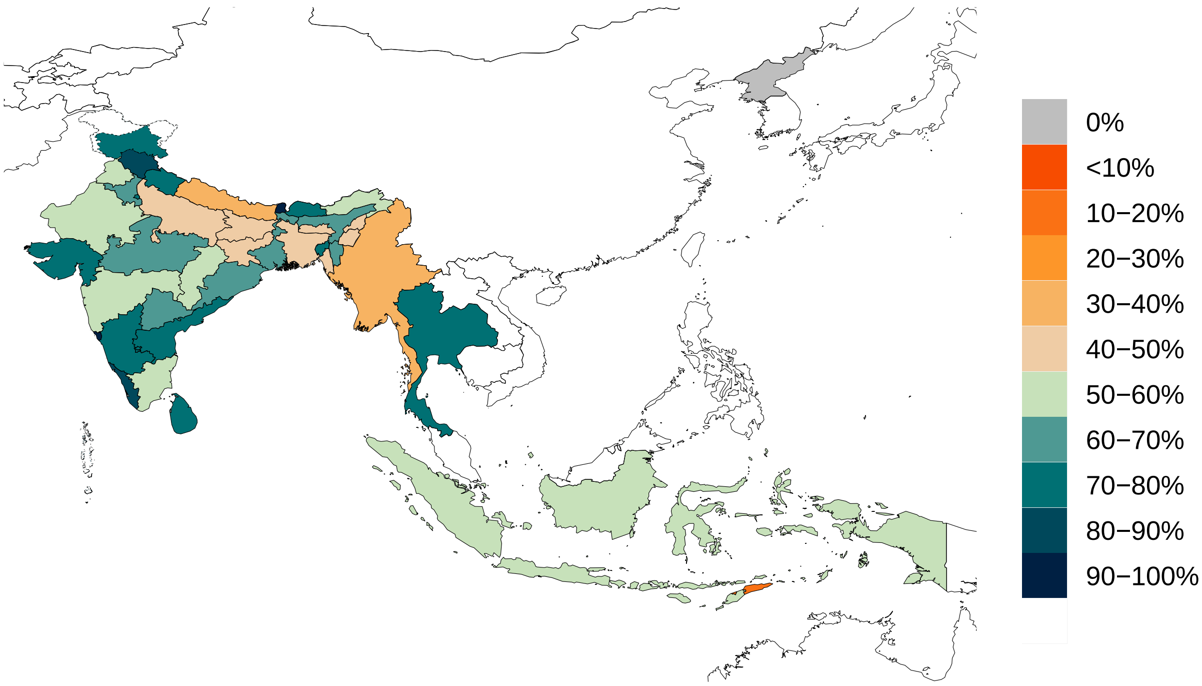


Figure 17.2 Percent of the population fully vaccinated against SARS-CoV-2

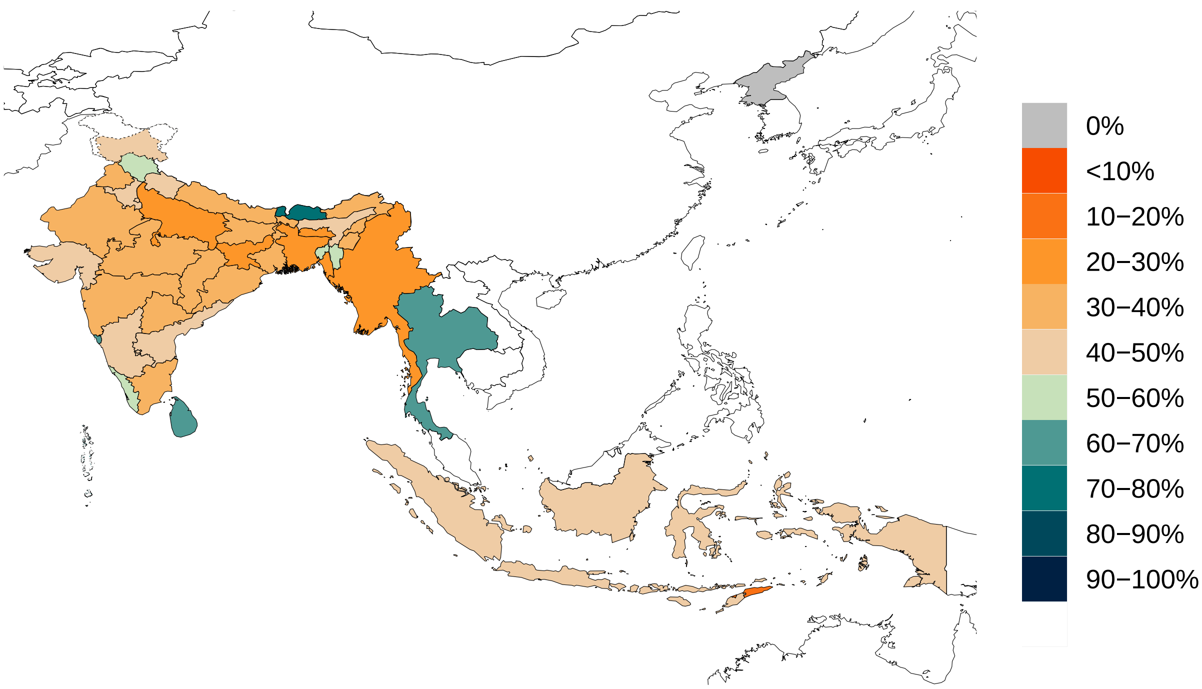


Figure 18.1. Trend in the estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

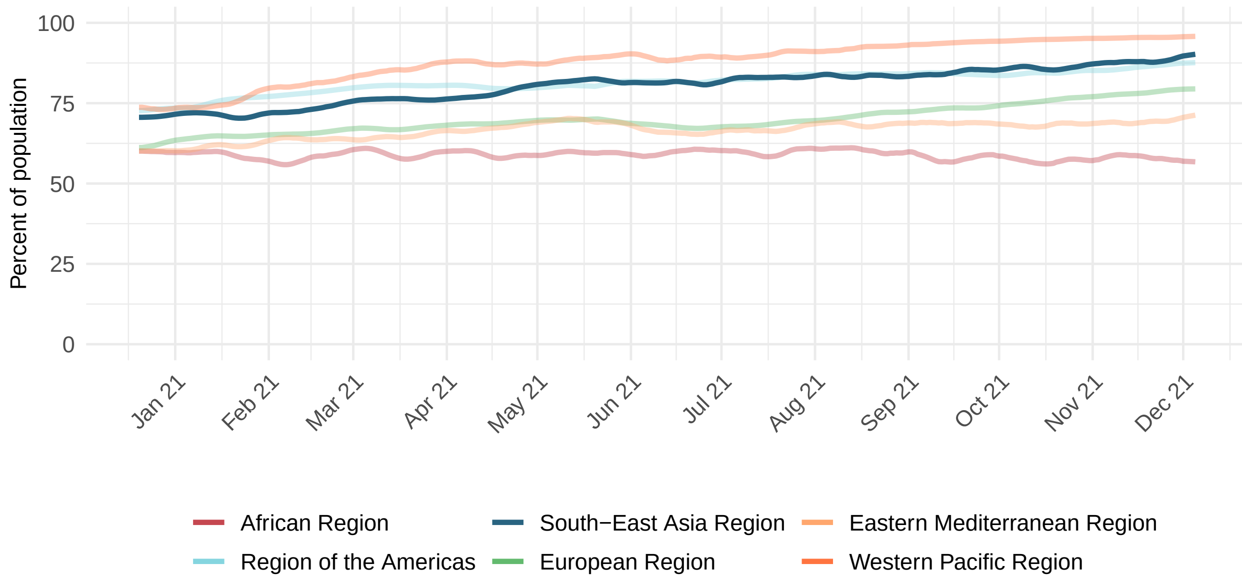


Figure 19.1. Estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

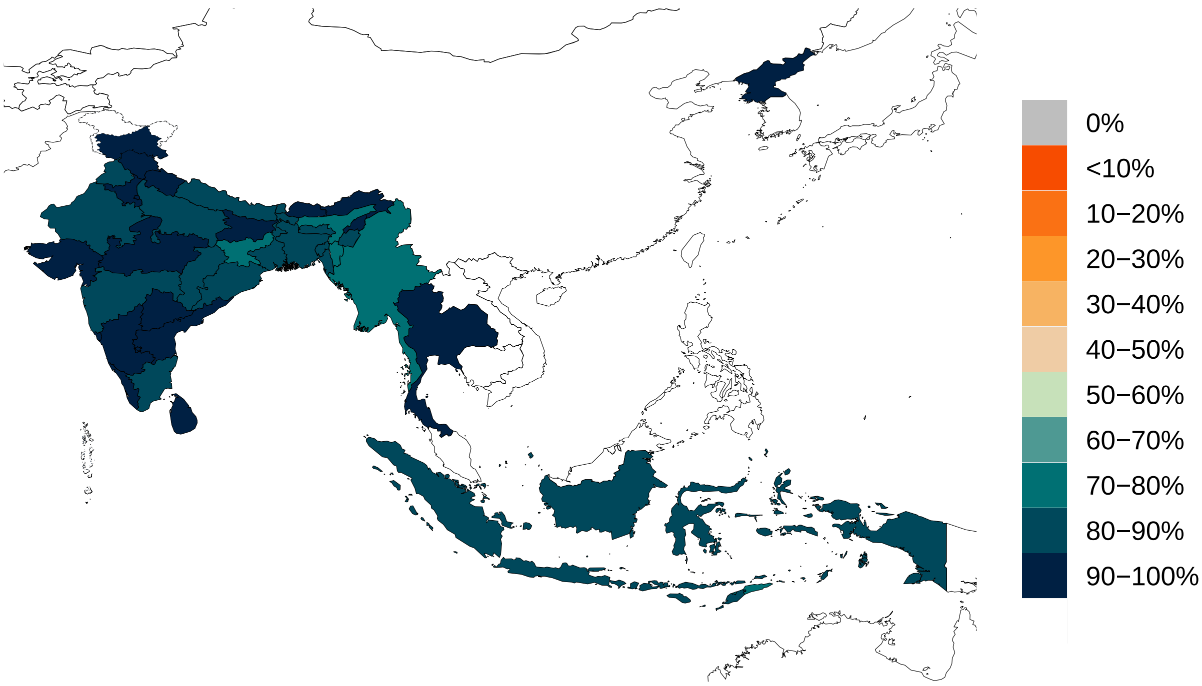
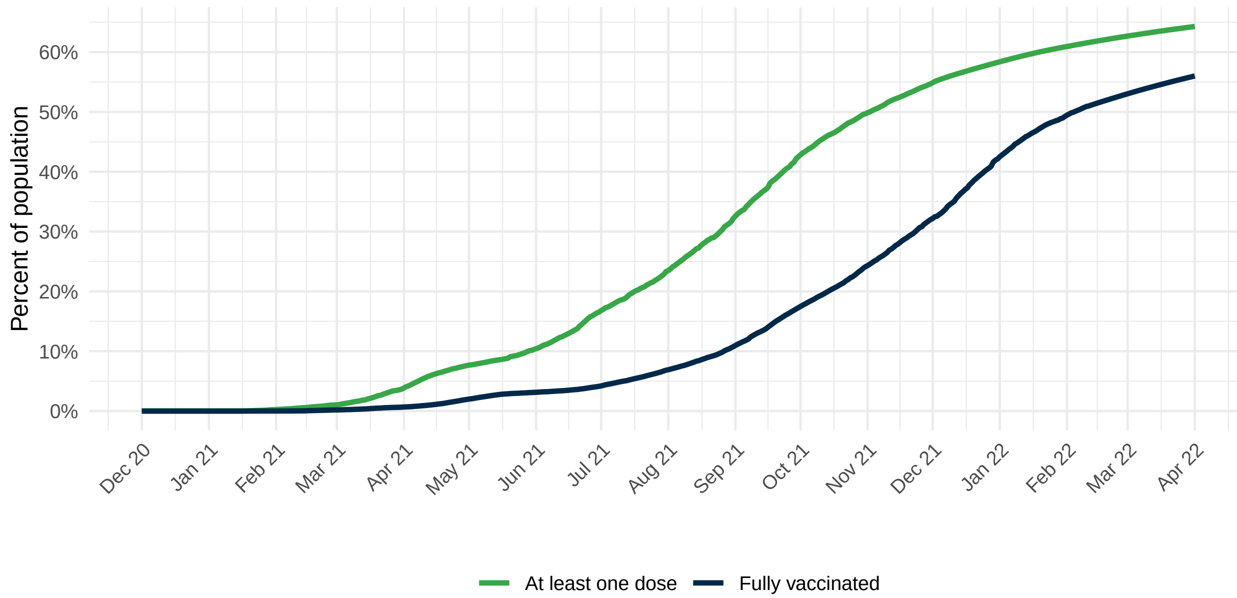


Figure 20.1. Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated



Projections and scenarios

We produce five 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.
- Omicron variant spreads according to our flight and local spread model.

- 80% of those who have had two doses of vaccine (or one dose for Johnson & Johnson) receive a third dose at 6 months after their second dose.

The **high severity of Omicron scenario** modifies the reference scenario assumption in two ways: * The infection-hospitalization ratio for Omicron is 2.3 times as high as compared to the reference scenario. * The infection-fatality rate is 4.6 times as high as compared to the reference scenario.

The **80% mask use scenario** makes all the same assumptions as the reference scenario but assumes all locations reach 80% mask use within 7 days. If a location currently has higher than 80% use, mask use remains at the current level.

The **third dose scenario** is the same as the reference scenario but assumes that 100% of those who have received two doses of vaccine will get a third dose at 6 months.

The **reduced vaccine hesitancy scenario** assumes that those in each location who respond on surveys that they probably will not receive a vaccine are persuaded or mandated to receive a vaccine.

Figure 21.1. Daily COVID-19 infections until April 01, 2022 for five scenarios

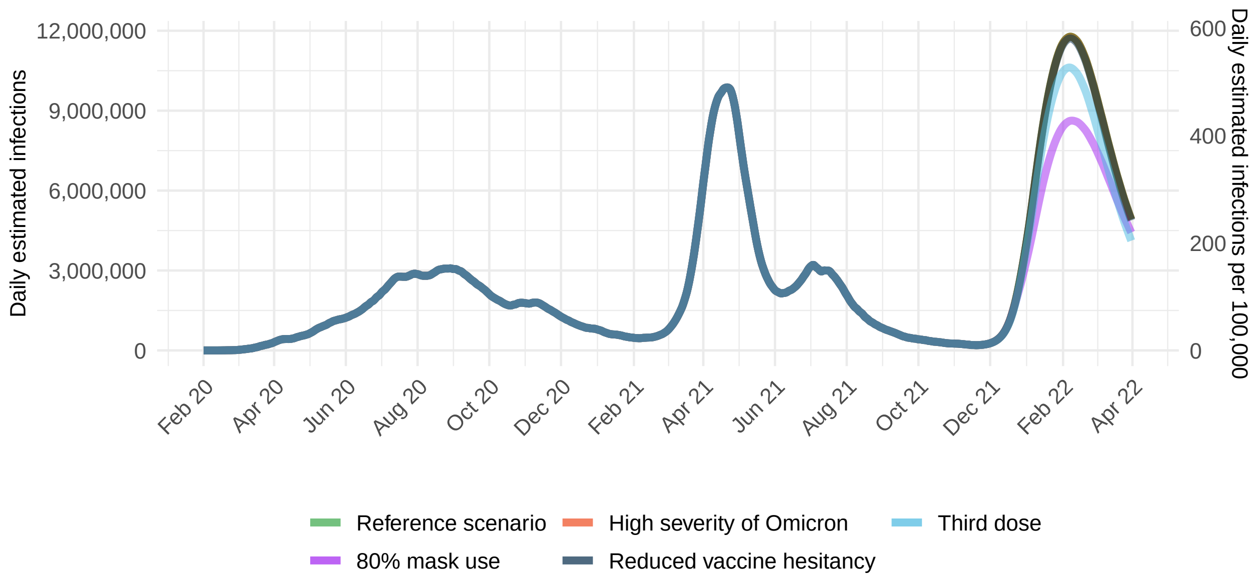


Figure 21.2. Daily COVID-19 reported cases until April 01, 2022 for five scenarios

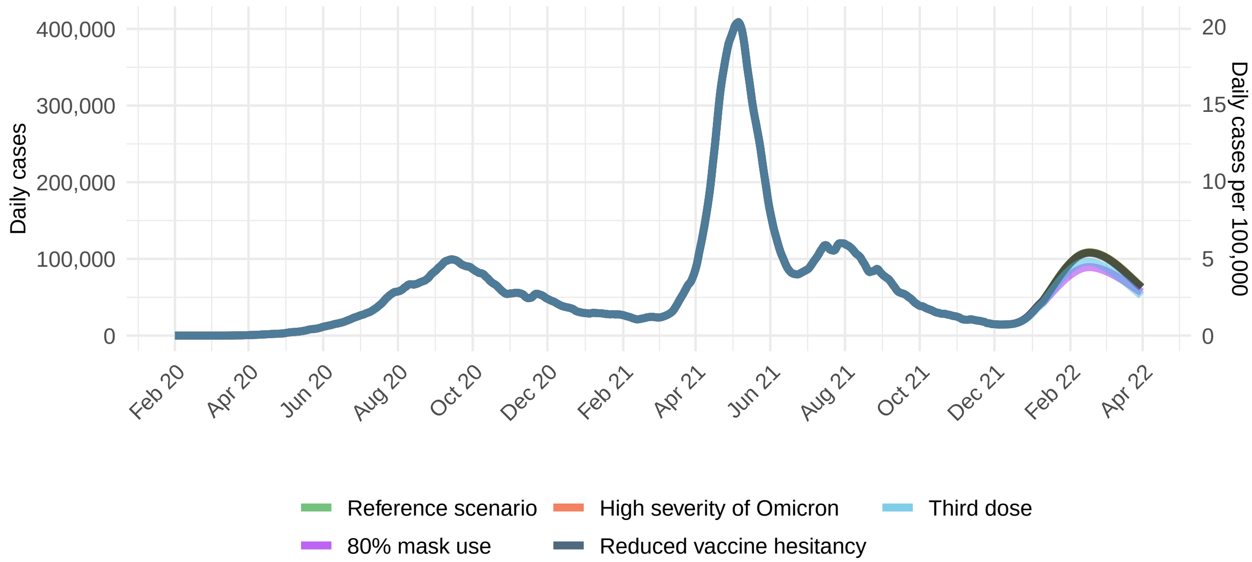


Figure 24.2. Daily COVID-19 hospital census until April 01, 2022 for five scenarios

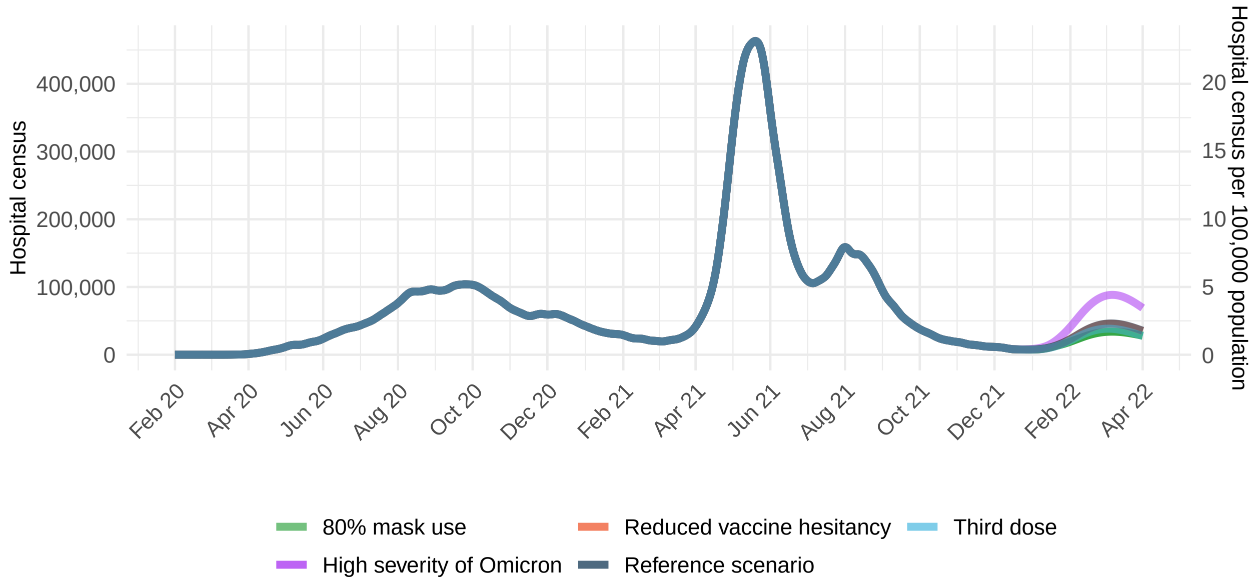


Figure 24.3 Reported daily COVID-19 deaths per 100,000

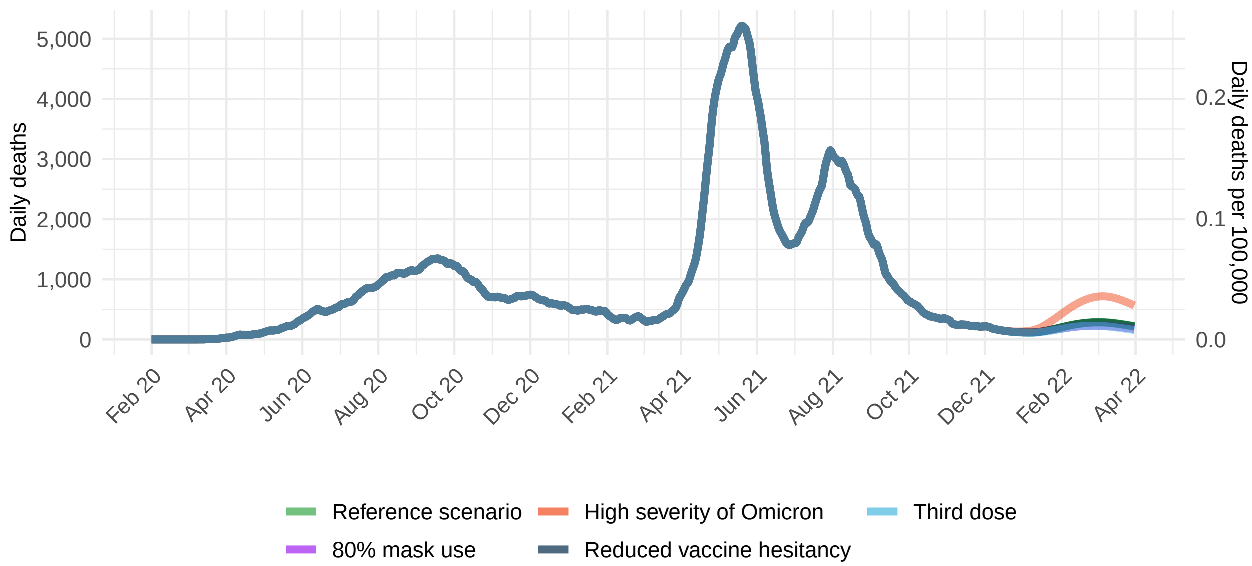


Figure 24.4 Total daily COVID-19 deaths per 100,000

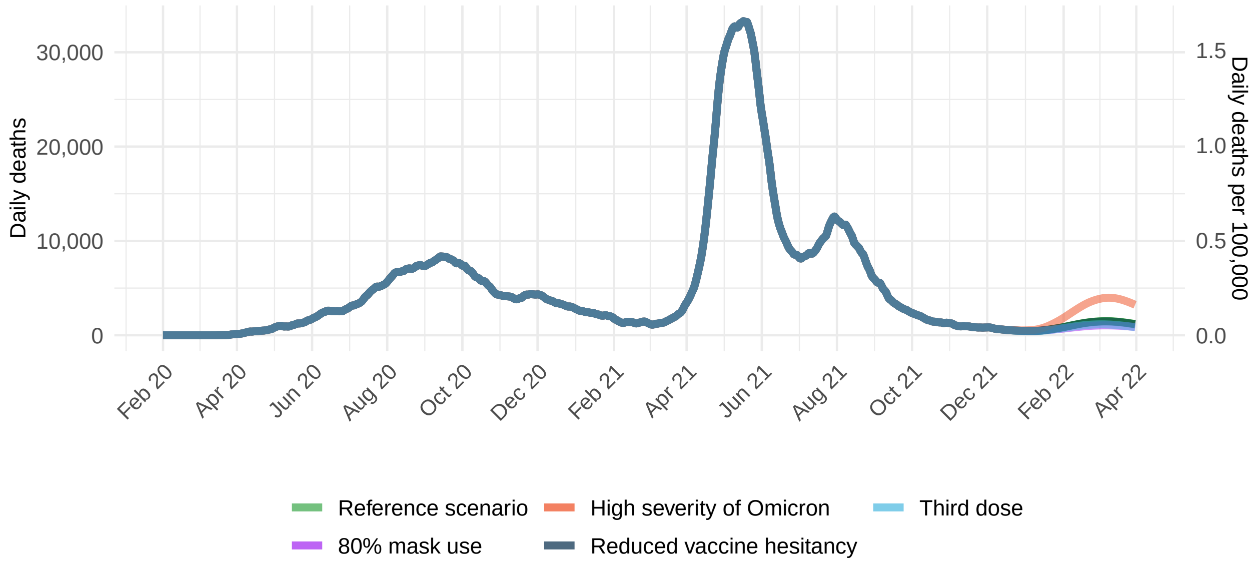


Figure 22.1. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available, last model update in brackets: Delphi from the Massachusetts Institute of Technology (Delphi) [December 21, 2021], Imperial College London (Imperial) [December 5, 2021], the SI-KJalpha model from the University of Southern California (SIKJalpha) [December 19, 2021]. Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from available locations in that region.

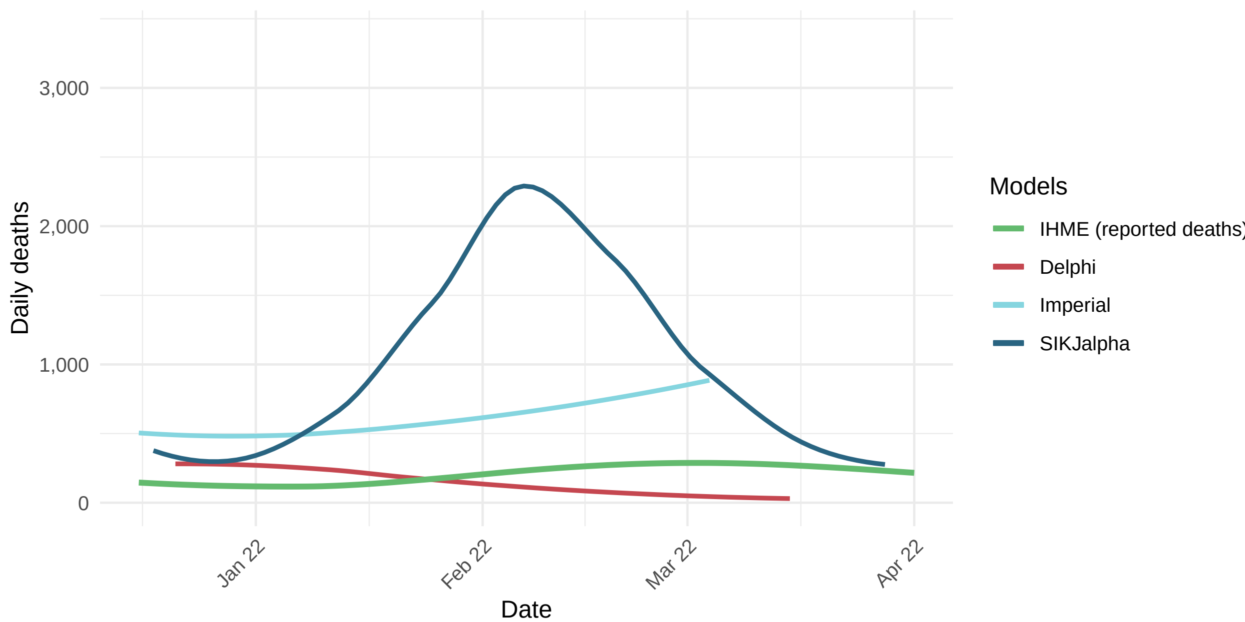


Figure 23.1. The estimated inpatient hospital usage is shown over time. The percent of hospital beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of beds occupied by COVID-19 patients. Less than 5% is considered *low stress*, 5-9% is considered *moderate stress*, 10-19% is considered *high stress*, and 20% or greater is considered *extreme stress*.

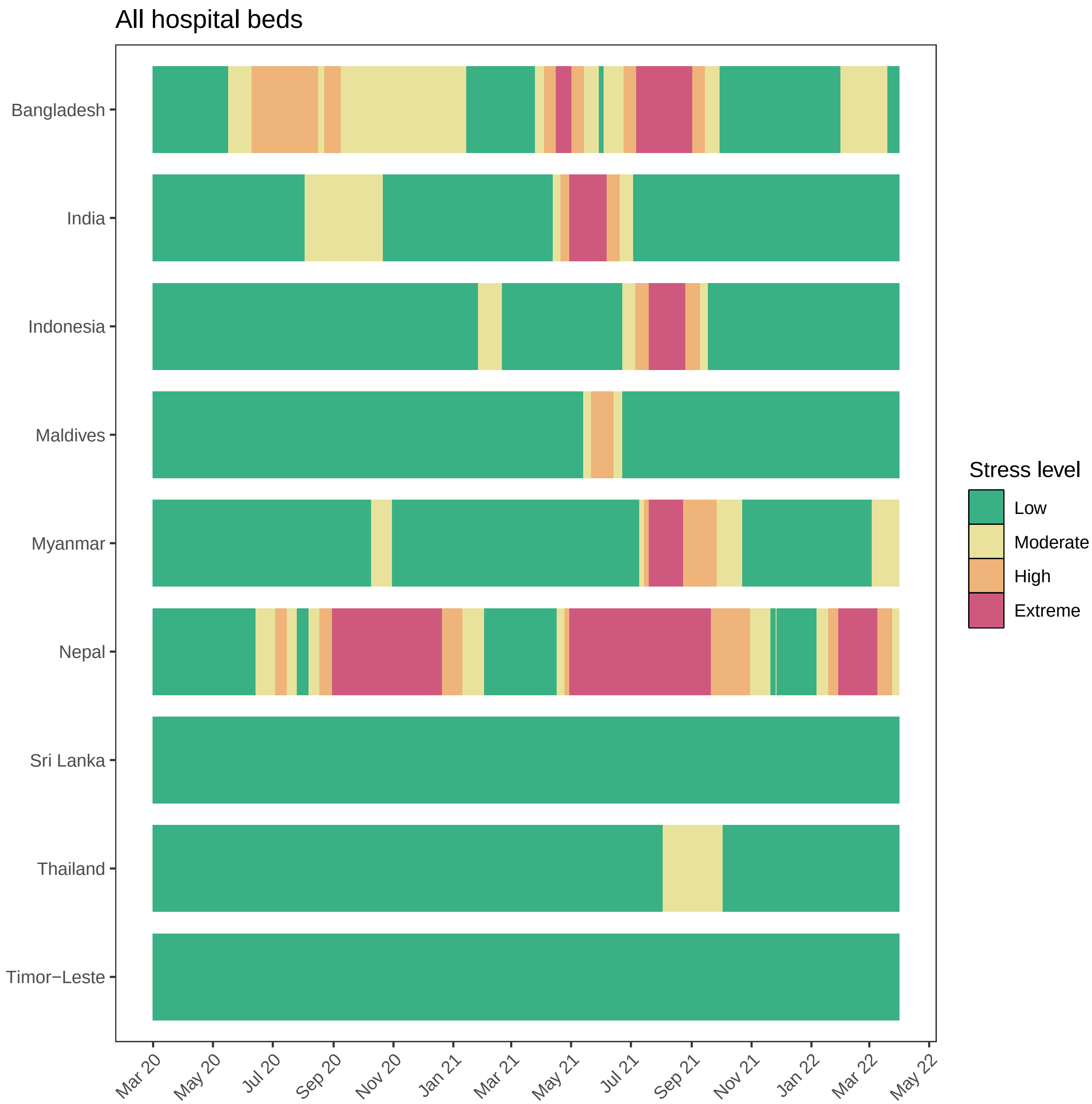
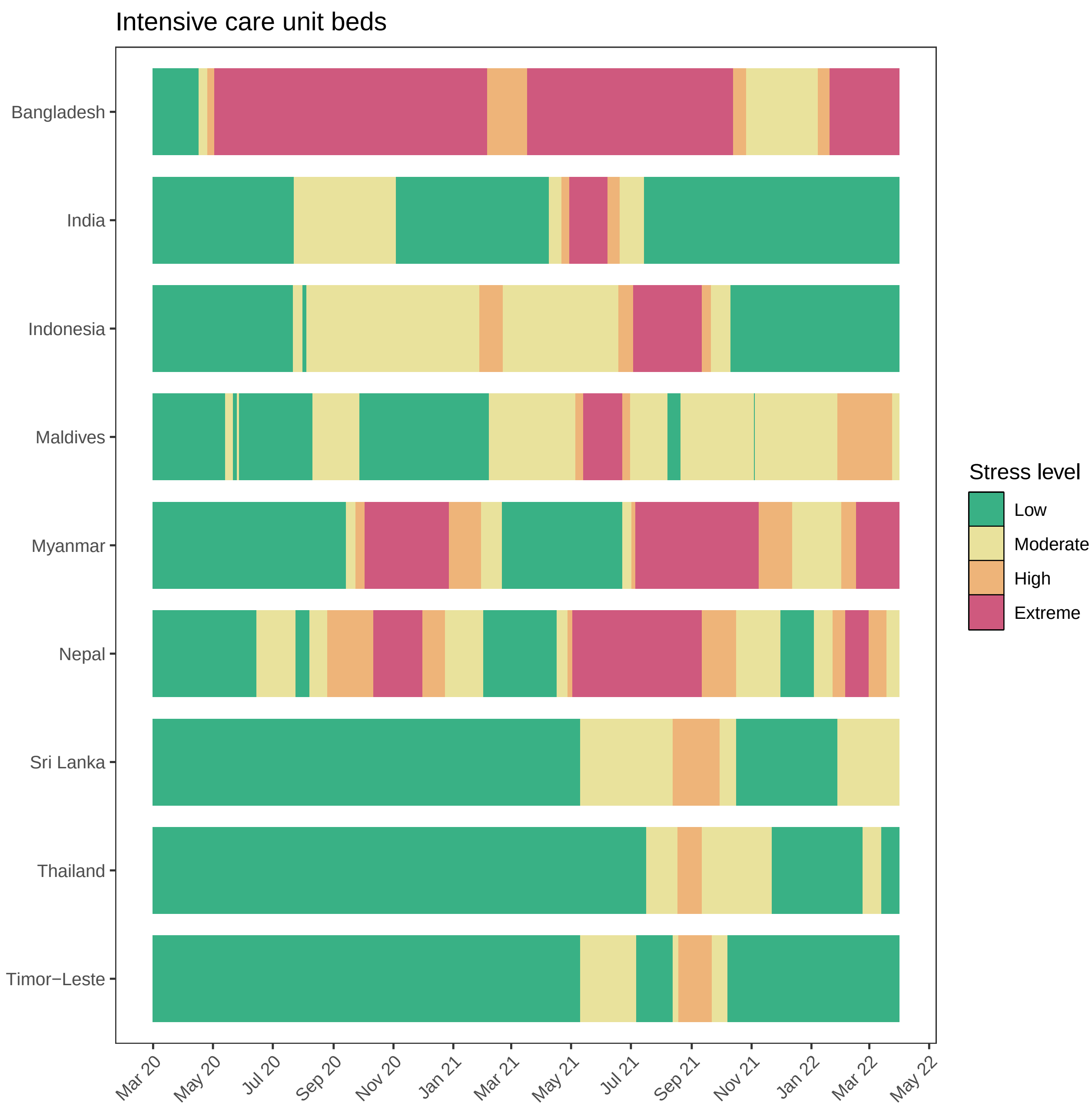


Figure 24.1. The estimated intensive care unit (ICU) usage is shown over time. The percent of ICU beds occupied by COVID-19 patients is color-coded based on observed quantiles of the maximum proportion of ICU beds occupied by COVID-19 patients. Less than 10% is considered *low stress*, 10-29% is considered *moderate stress*, 30-59% is considered *high stress*, and 60% or greater is considered *extreme stress*.



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.