COVID-19 Results Briefing

The African Region

December 22, 2021

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

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 infections peaked around December 19, with daily infections just over 7 million. Because of a much greater fraction of asymptomatic infections (likely over 90%) and thus a lower infection-detection rate, we expect daily diagnosed cases will increase to a peak of 40,380 by late December. 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 340 in early January, although we estimate total daily deaths due to COVID-19 in Africa are 9.3 times larger than the reported number of deaths.

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, hospital admissions could reach levels above 54,000 and reported daily deaths could exceed 490. 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 next year.

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 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 dose 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 6,040,200 per day on average compared to 3,834,400 the week before (Figure 1.1). Daily hospital census in the last week (through December 13) increased to 4,600 per day on average compared to 3,300 the week before.
- Daily reported cases in the last week increased to 23,300 per day on average compared to 13,400 the week before (Figure 2.1).
- Reported deaths due to COVID-19 in the last week increased to 95 per day on average compared to 58 the week before (Figure 3.1).

- Total deaths due to COVID-19 in the last week increased to 880 per day on average compared to 550 the week before (Figure 3.1). This makes COVID-19 the number 9 cause of death in African Region this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 9.3 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).
- The daily rate of reported deaths due to COVID-19 is greater than 4 per million in four countries and no subnational locations (Figure 4.2).
- We estimate that 49% of people in the African 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 37 countries and no subnational locations in the region (Figure 7.1).
- The infection-detection rate in the African Region was close to 1% 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 (Figure 9.1-Figure 9.5). We estimate that the Alpha variant is circulating in one country, that the Beta variant is circulating in one country, that the Delta variant is circulating in 43 countries, that the Gamma variant is circulating in 8 countries, and that the Omicron variant is circulating in 41 countries.

Trends in drivers of transmission

- Mobility last week was 28% higher than the pre-COVID-19 baseline (Figure 11.1). Mobility was lower than 30% of baseline in no locations.
- As of December 13, in the COVID-19 Trends and Impact Survey, 42% of people self-report that they always wore a mask when leaving their home compared to 41% last week (Figure 13.1).
- There were 14 diagnostic tests per 100,000 people on December 13 (Figure 15.1).
- As of December 13, 47 countries and no subnational locations have reached 70% or more of the population who have received at least one vaccine dose, and 47 countries and no subnational locations have reached 70% or more of the population who are fully vaccinated (Figure 17.1). 10% of people in the African Region have received at least one vaccine dose and 6% are fully vaccinated.
- In the African Region, 56.8% 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 down by 0.6 percentage points from last week. The proportion of the population who are open to receiving a COVID-19 vaccine ranges from 30% in Namibia to 86% in Cabo Verde (Figure 19.1).

- In our current reference scenario, we expect that 177.9 million people will be vaccinated with at least one dose by April 1 (Figure 20.1). We expect that 11% 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 7,442,000 by December 19, 2021 (Figure 21.1).
- Daily estimated infections in the **high severity of Omicron scenario** will rise to 7,585,690 by December 19, 2021 (Figure 21.1).
- Daily estimated infections in the **80% mask coverage scenario** will rise to 7,442,000 by December 19, 2021 (Figure 21.1).
- Daily estimated infections in the **third dose scenario** will rise to 7,418,280 by December 19, 2021 (Figure 21.1).
- Daily estimated infections in the **reduced vaccine hesitancy scenario** will rise to 7,436,110 by December 19, 2021 (Figure 21.1).

Cases

- Daily cases in the **reference scenario** will rise to 40,380 by December 24, 2021 (Figure 21.2).
- Daily cases in the **high severity of Omicron scenario** will rise to 42,350 by December 25, 2021 (Figure 21.2).
- Daily cases in the **80% mask coverage scenario** will rise to 40,380 by December 24, 2021 (Figure 21.2).
- Daily cases in the **third dose scenario** will rise to 40,110 by December 24, 2021 (Figure 21.2).
- Daily cases in the **reduced vaccine hesitancy scenario** will rise to 40,340 by December 24, 2021 (Figure 21.2).

Hospitalizations

- Daily hospital census in the **reference scenario** will rise to 46,740 by January 14, 2022 (Figure 21.3).
- Daily hospital census in the **high severity of Omicron scenario** will rise to 54,150 by January 15, 2022 (Figure 21.3).
- Daily hospital census in the **80% mask coverage scenario** will rise to 46,470 by January 14, 2022 (Figure 21.3).
- Daily hospital census in the **third dose scenario** will rise to 46,480 by January 14, 2022 (Figure 21.3).

- Daily hospital census in the **reduced vaccine hesitancy scenario** will rise to 46,590 by January 14, 2022 (Figure 21.3).

Deaths

- In our **reference scenario**, our model projects 174,000 cumulative reported deaths due to COVID-19 on April 1. This represents 21,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **reference scenario** will rise to 340 by January 3, 2022 (Figure 21.4).
- Under our **reference scenario**, our model projects 1,280,000 cumulative total deaths due to COVID-19 on April 1. This represents 271,000 additional deaths from December 13 to April 1 (Figure 24.2).
- In our **high severity of Omicron scenario**, our model projects 182,000 cumulative reported deaths due to COVID-19 on April 1. This represents 28,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **high severity of Omicron scenario** will rise to 490 by January 5, 2022 (Figure 21.4).
- In our **80% mask coverage scenario**, our model projects 169,000 cumulative reported deaths due to COVID-19 on April 1. This represents 15,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **80% mask coverage scenario** will rise to 340 by January 3, 2022 (Figure 21.4).
- In our **third dose scenario**, our model projects 173,000 cumulative reported deaths due to COVID-19 on April 1. This represents 20,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **third dose scenario** will rise to 340 by January 2, 2022 (Figure 21.4).
- In our **reduced vaccine hesitancy scenario**, our model projects 173,000 cumulative reported deaths due to COVID-19 on April 1. This represents 20,000 additional deaths from December 13 to April 1. Daily reported COVID-19 deaths in the **reduced vaccine hesitancy scenario** will rise to 340 by January 3, 2022 (Figure 21.4).
- Figure 22.1 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.

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

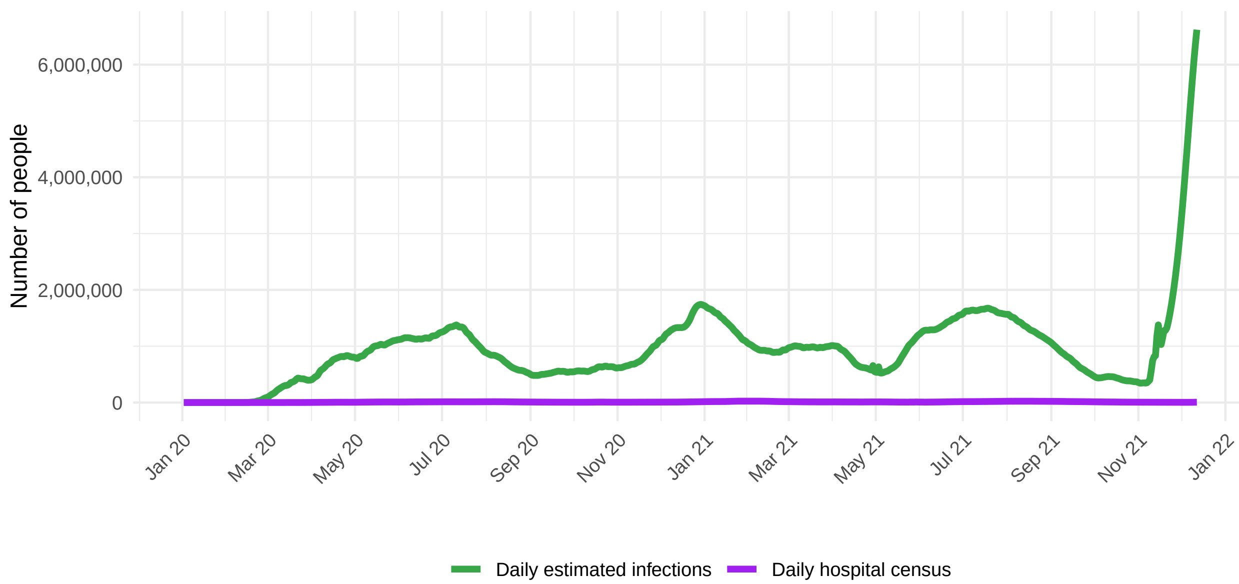


Figure 2.1. Reported daily COVID-19 cases, moving average

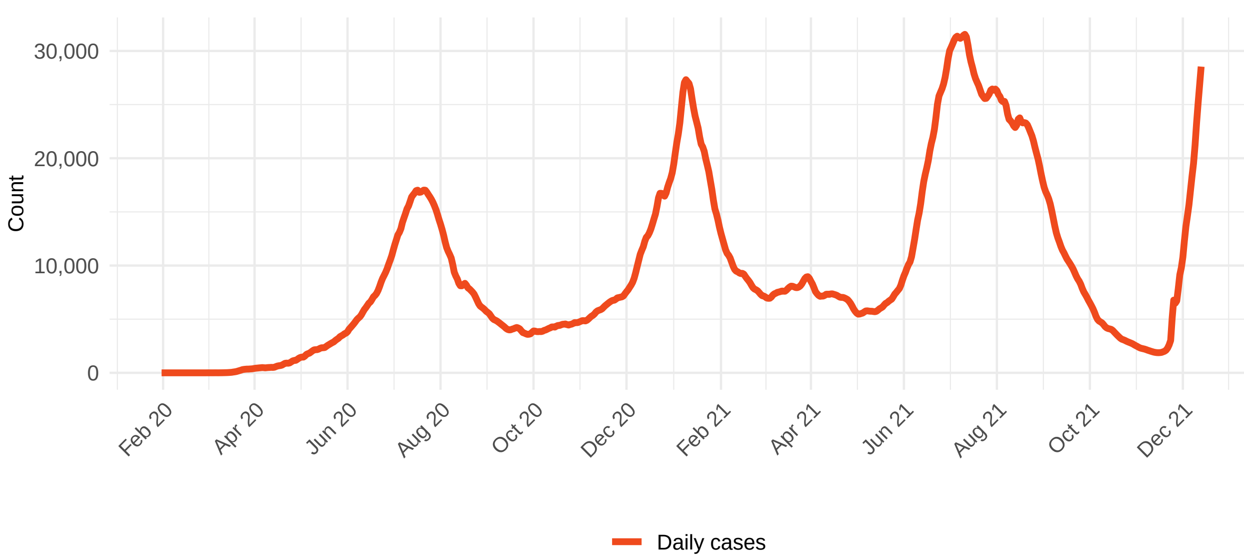
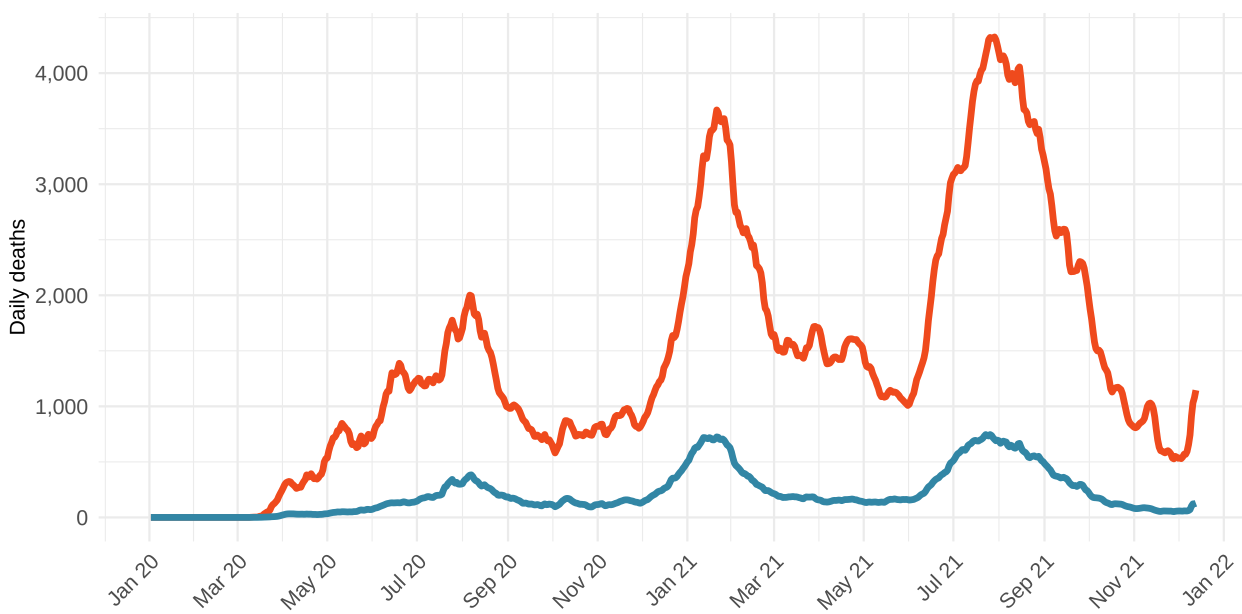


Table 1. Ranking of total deaths due to COVID-19 among the leading causes of mortality this week, assuming uniform deaths of non-COVID causes throughout the year

Cause name	Weekly deaths	Ranking
Neonatal disorders	14,422	1
Lower respiratory infections	12,732	2
HIV/AIDS	12,224	3
Malaria	11,351	4
Diarrheal diseases	11,088	5
Ischemic heart disease	8,306	6
Stroke	8,063	7
Tuberculosis	7,097	8
COVID-19	6,161	9
Congenital birth defects	3,721	10

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

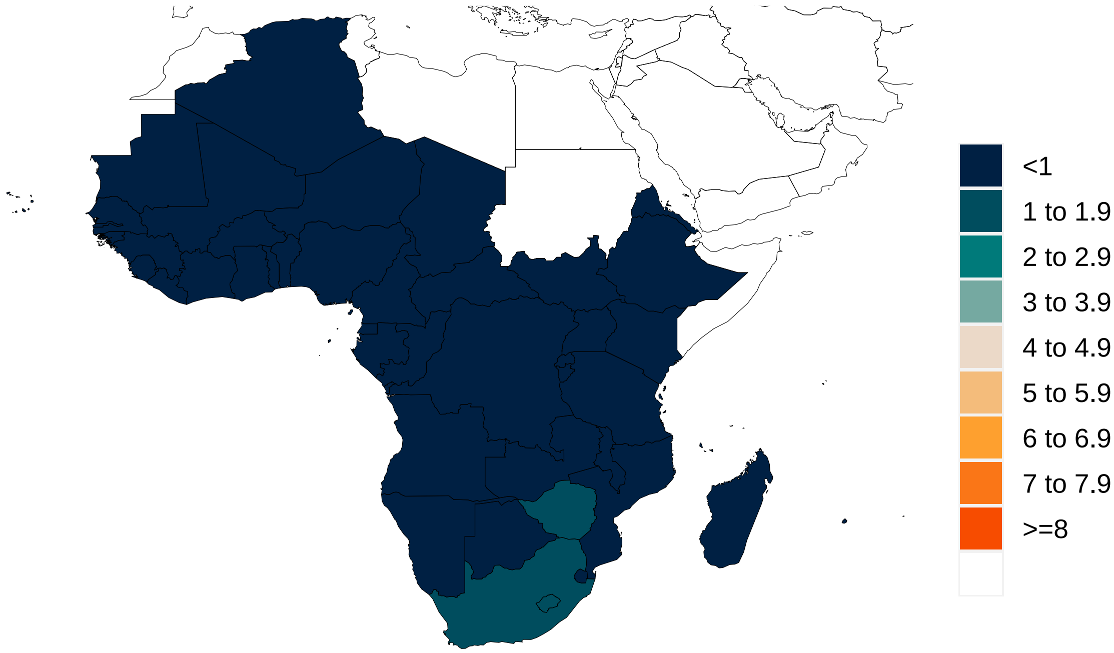
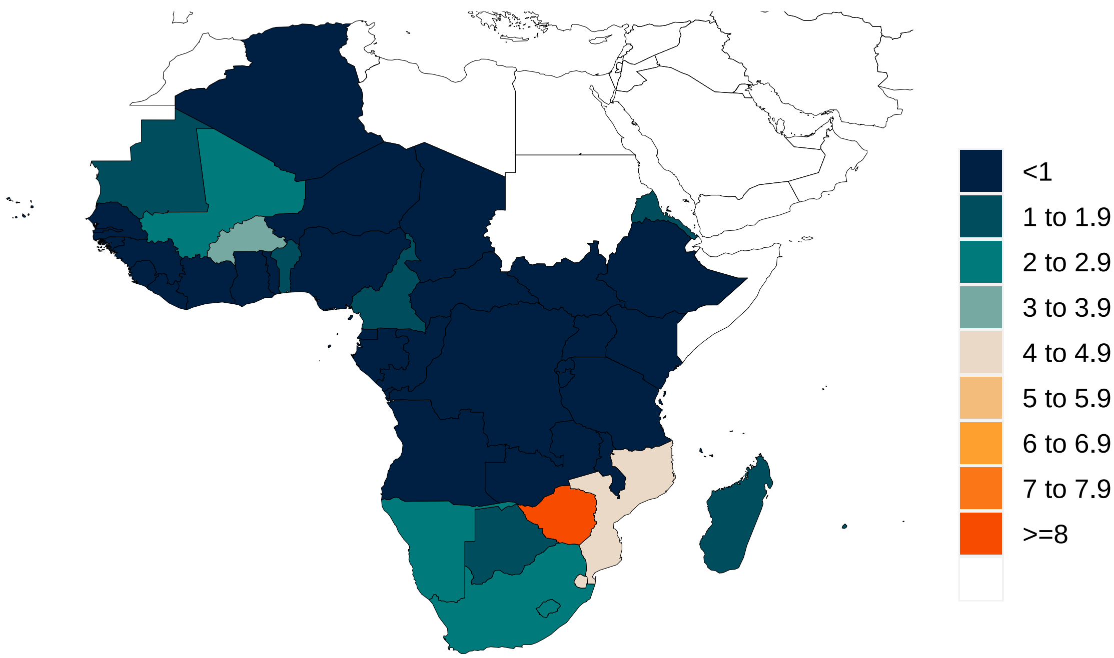


Figure 4.2 Daily total COVID-19 death rate per 1 million



Cumulative COVID-19 deaths per 100,000 on December 13, 2021

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

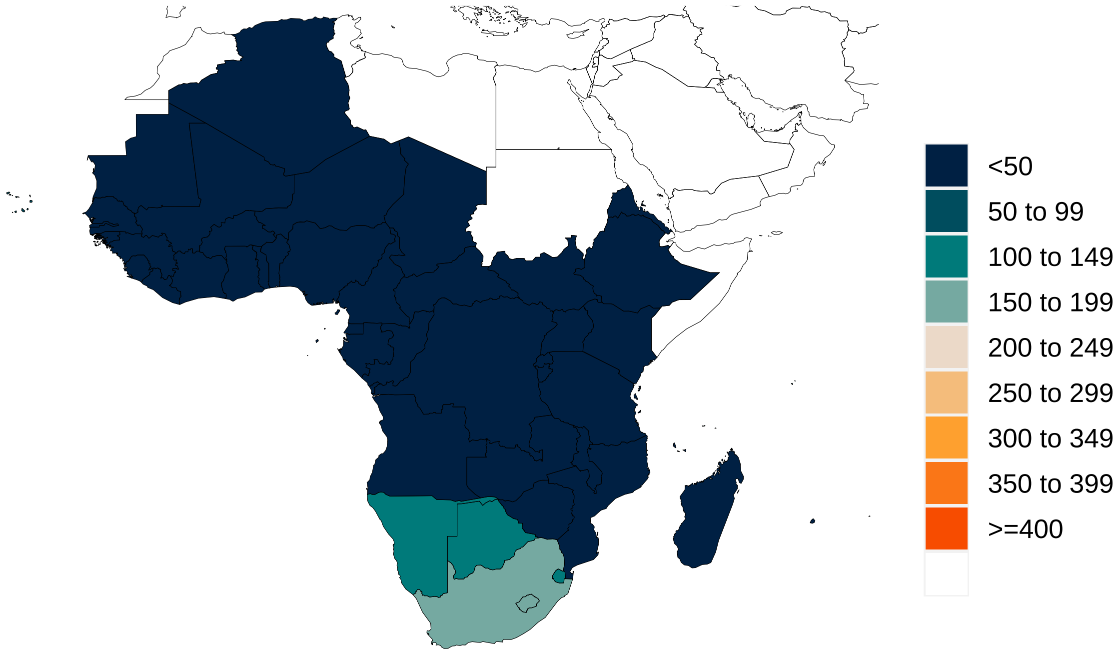


Figure 5.2 Total cumulative COVID-19 deaths per 100,000

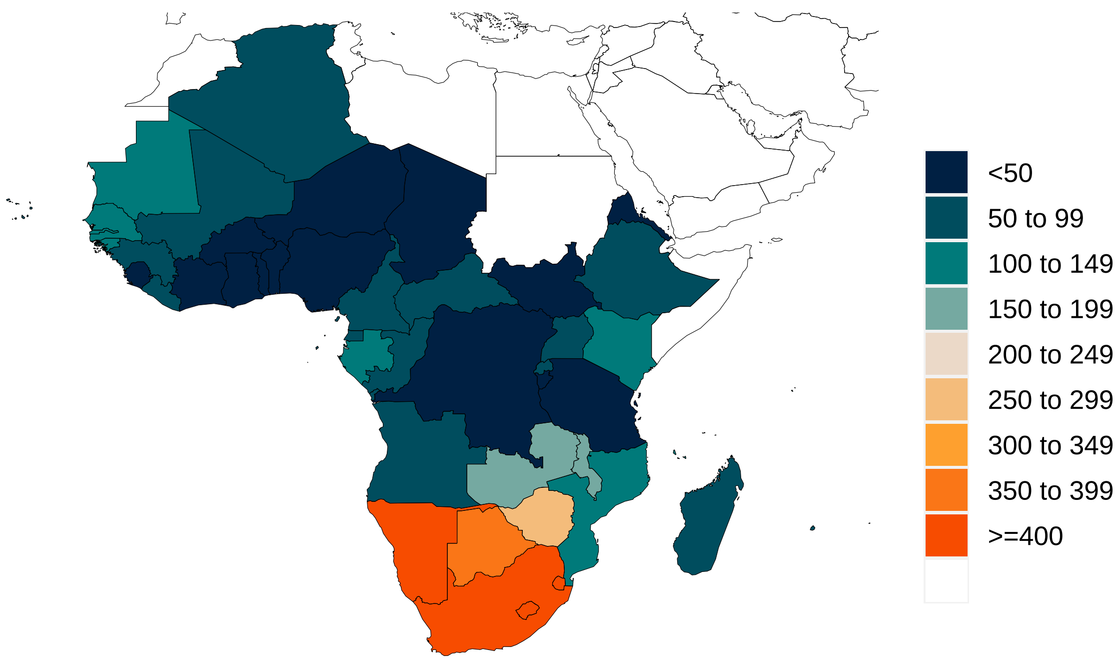


Figure 6.1. Estimated percent of the population infected with COVID-19 on December 13, 2021

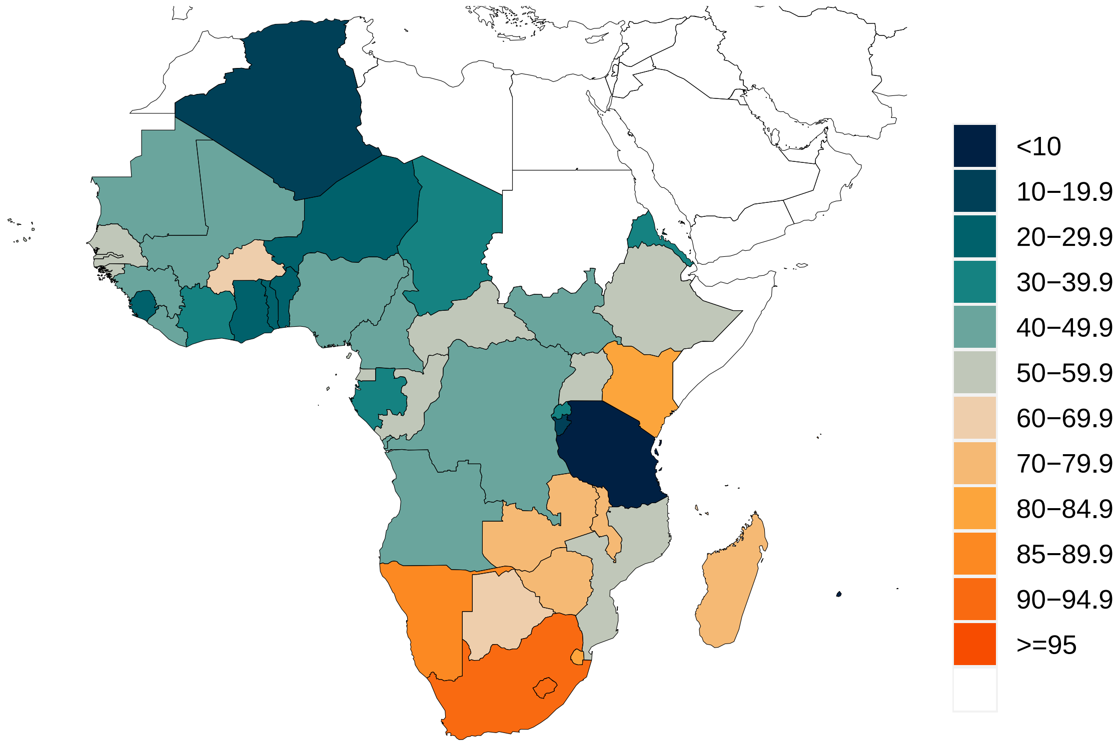


Figure 7.1. Mean effective R on December 2, 2021. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases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

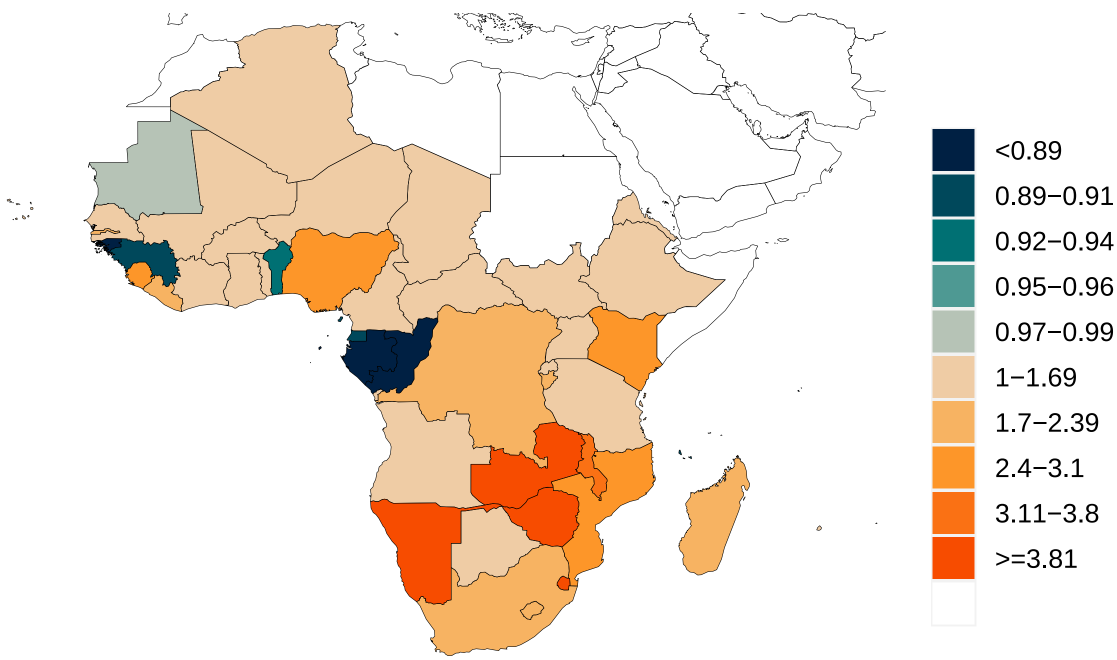
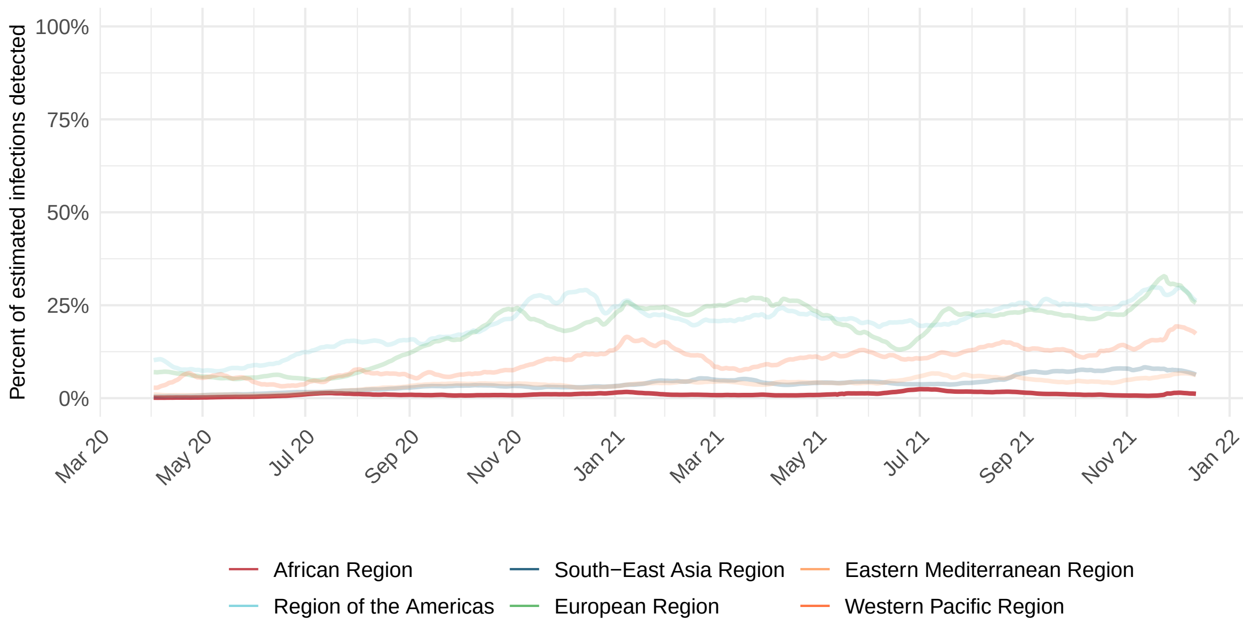


Figure 8.1. Percent of estimated COVID-19 infections detected. This is estimated as the ratio of reported daily COVID-19 cases to estimated daily COVID-19 infections based on the SEIR disease transmission model. Due to measurement errors in cases and testing rates, the infection-detection rate can exceed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

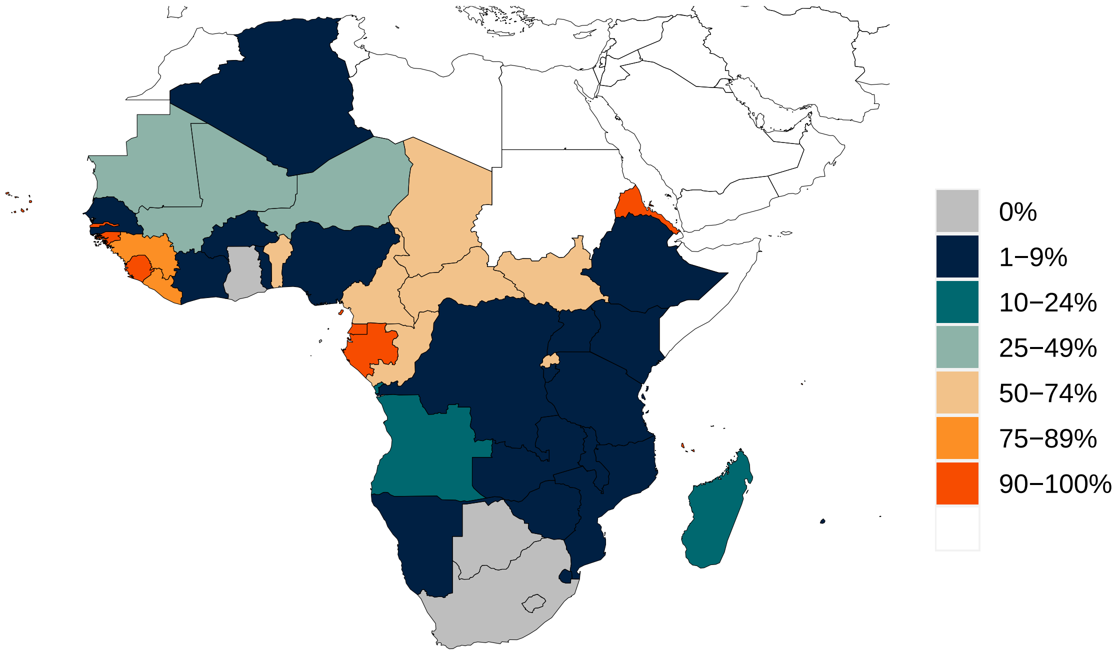


Figure 9.4 Estimated percent Gamma variant

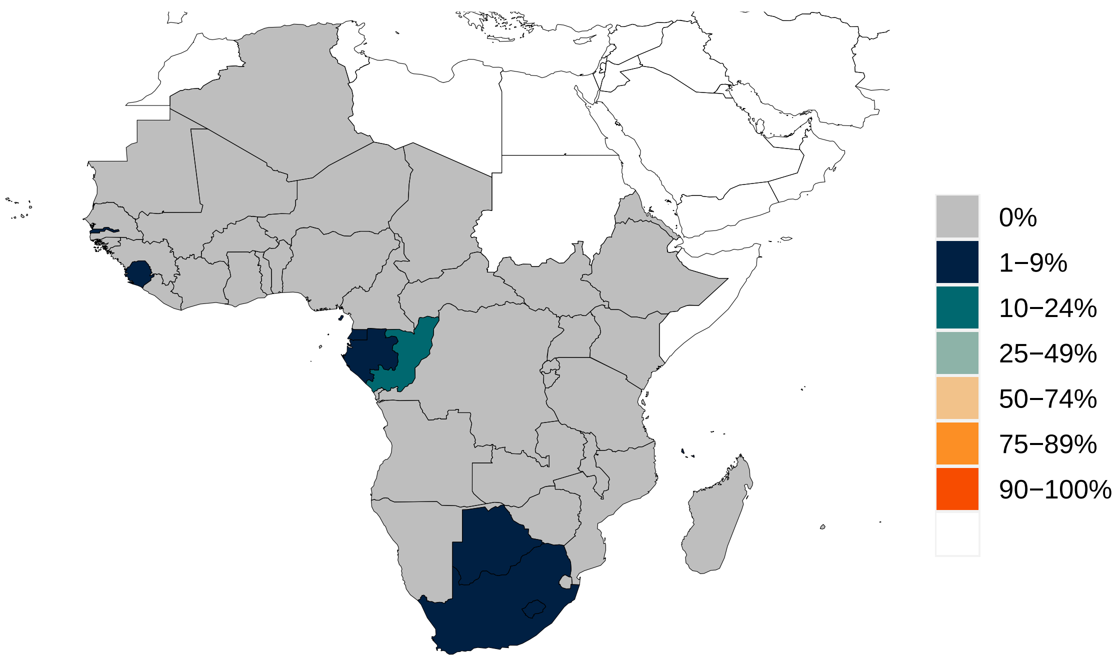


Figure 9.5 Estimated percent Omicron variant

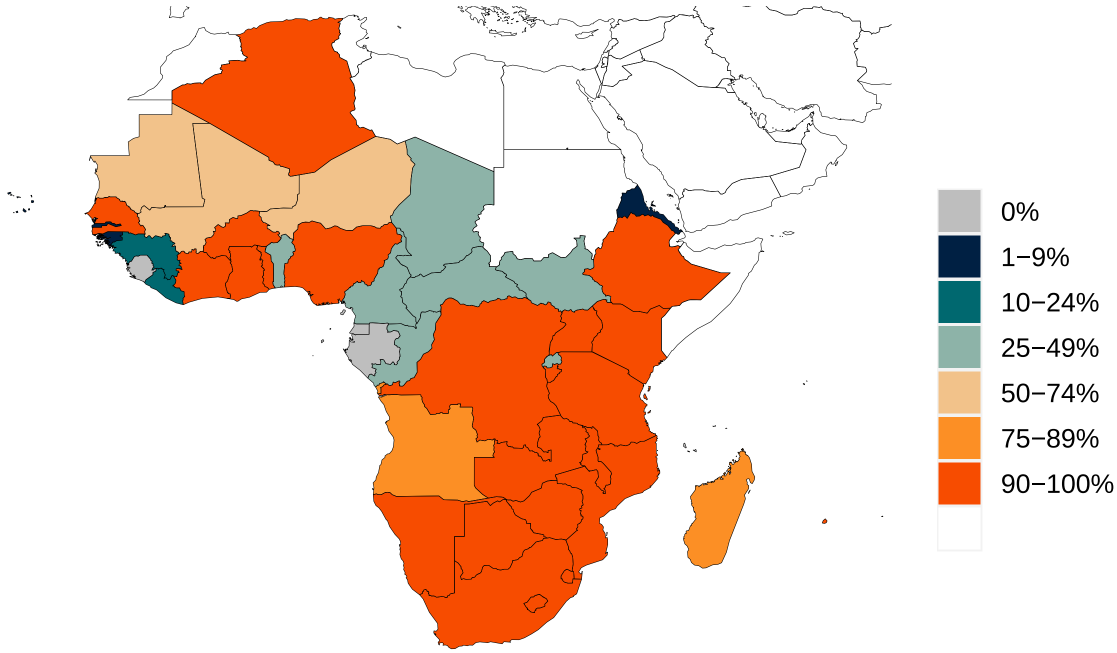
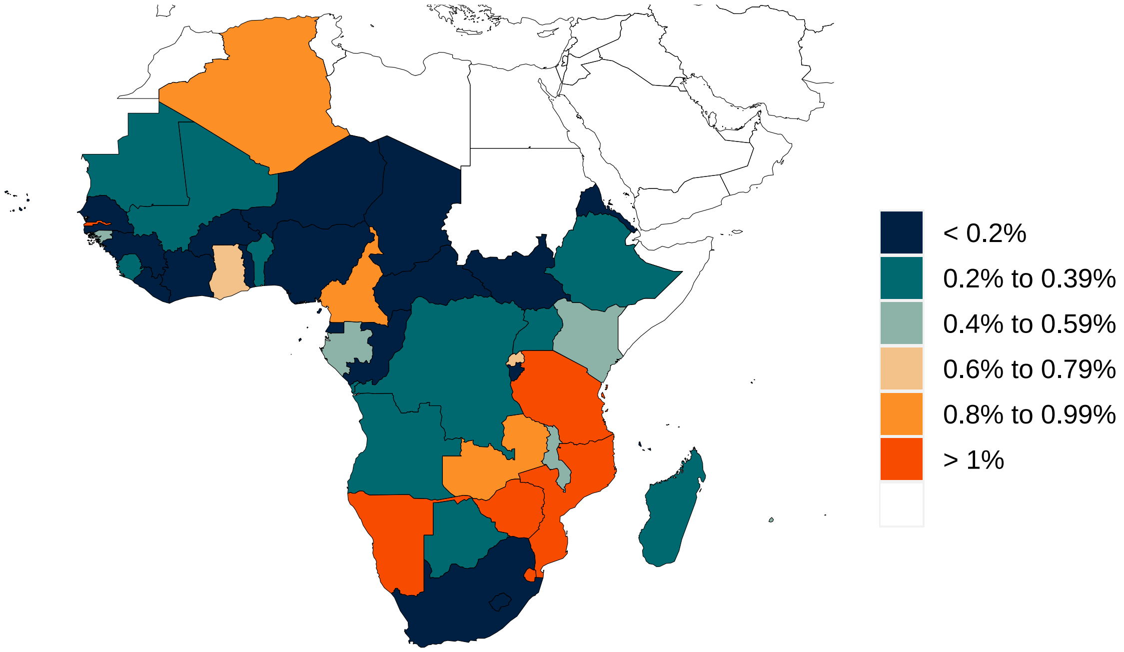


Figure 10.1. Infection-fatality rate on December 13, 2021. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.



Critical drivers

Table 2. Current mandate implementation

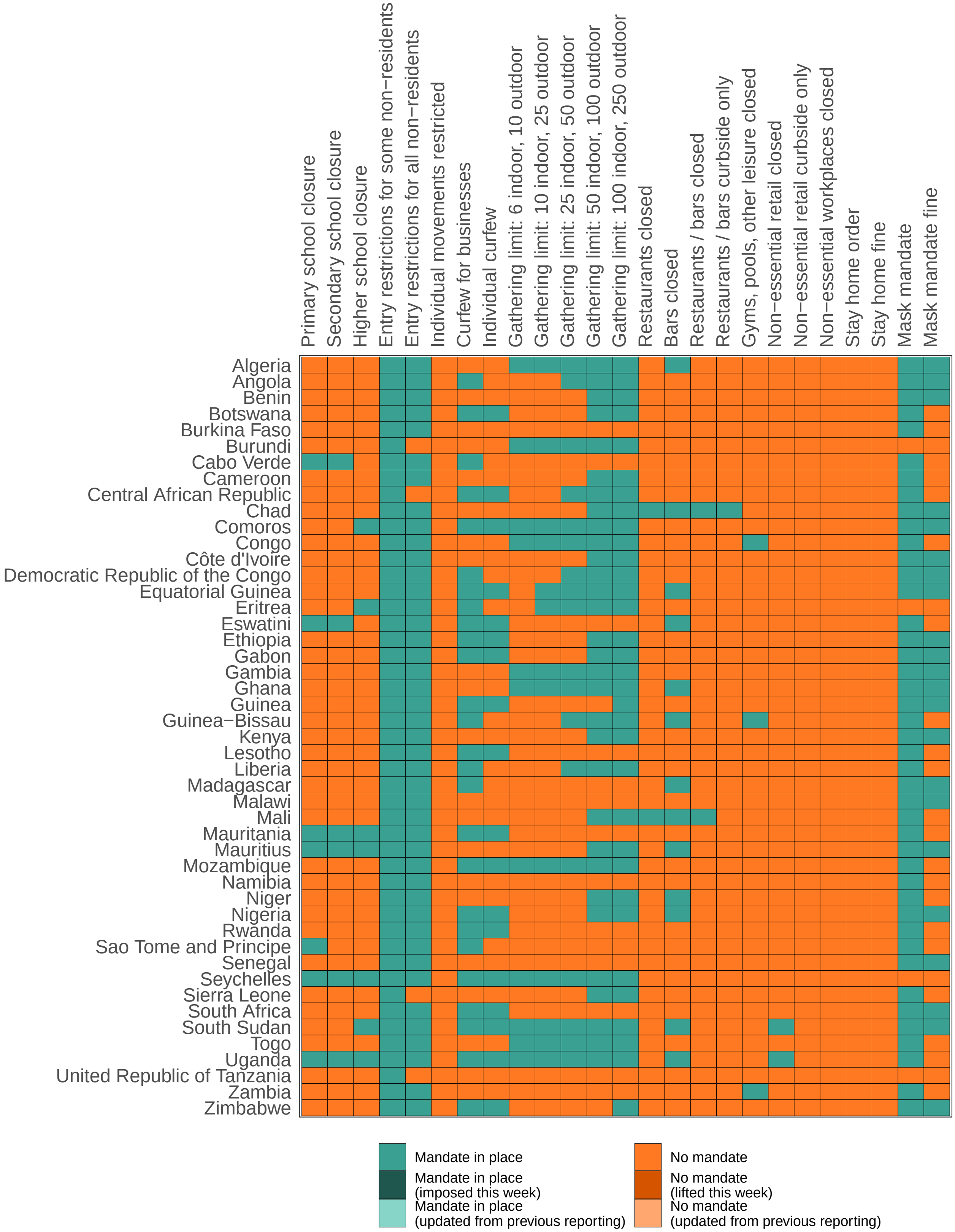


Figure 11.1. Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

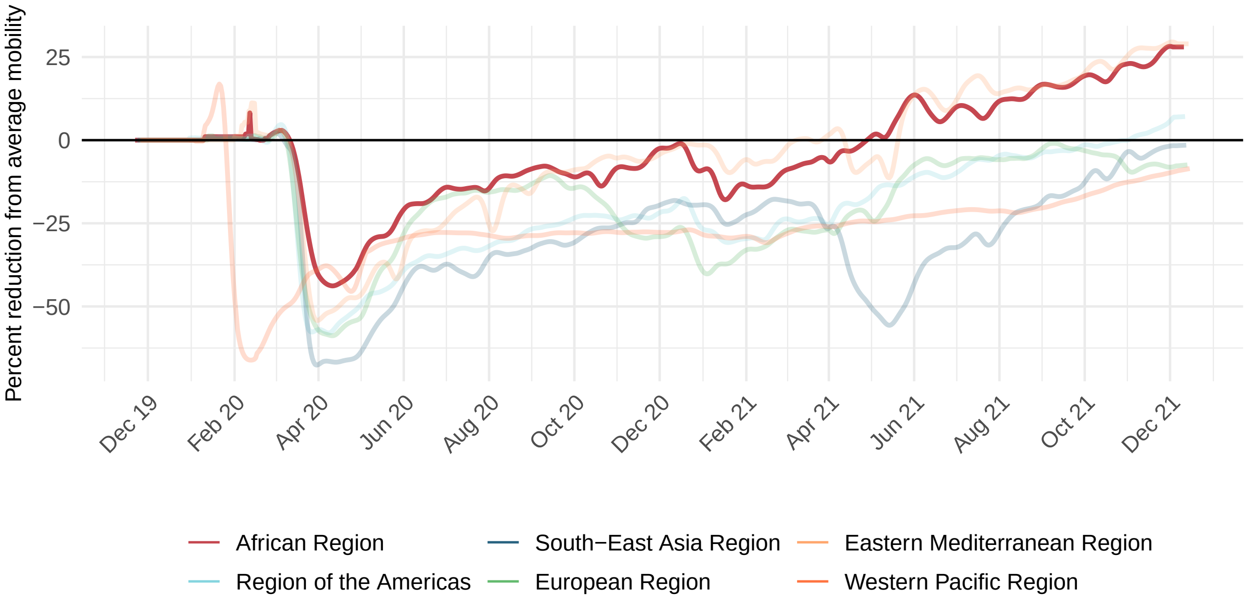


Figure 12.1. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on December 13, 2021

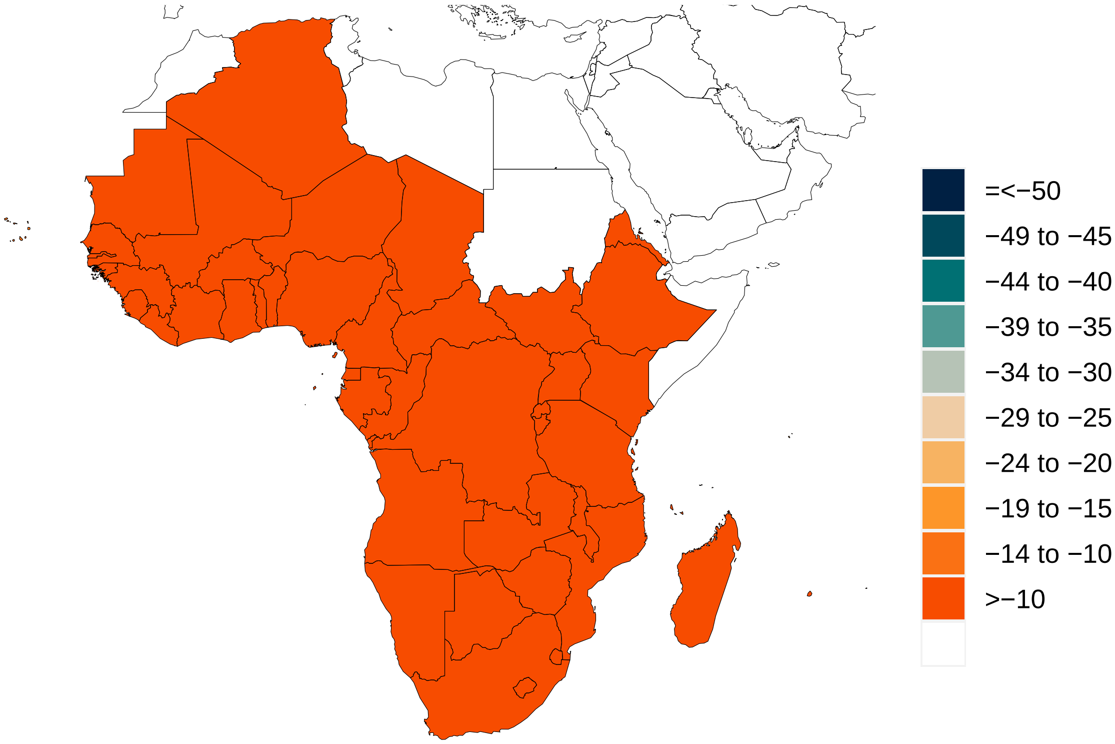


Figure 13.1. Trend in the proportion of the population reporting always wearing a mask when leaving home

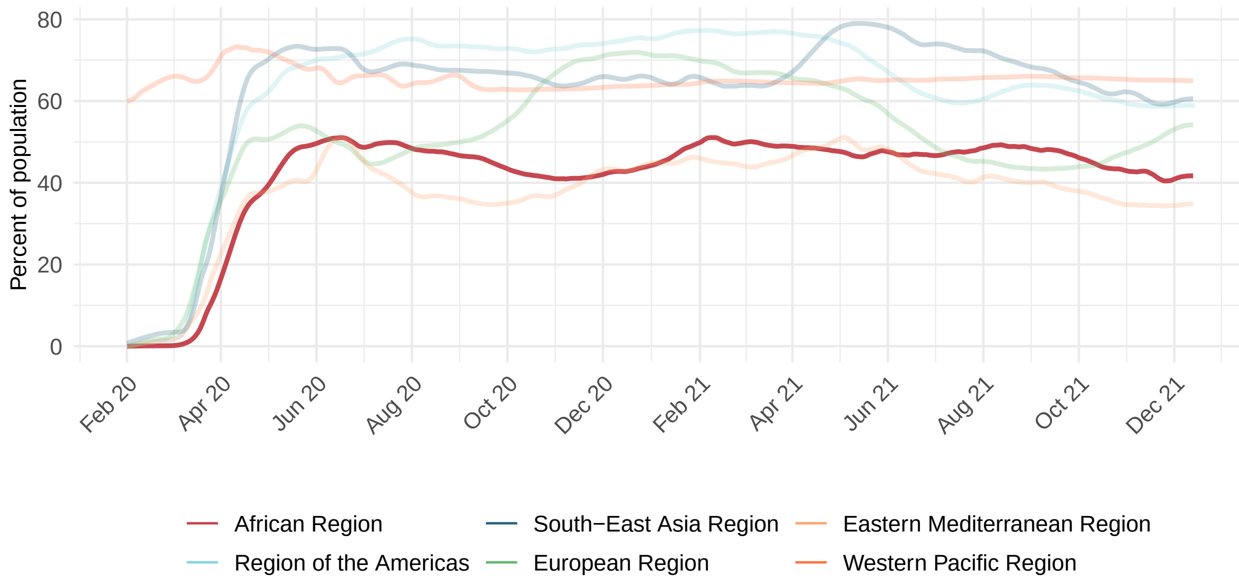


Figure 14.1. Proportion of the population reporting always wearing a mask when leaving home on December 13, 2021

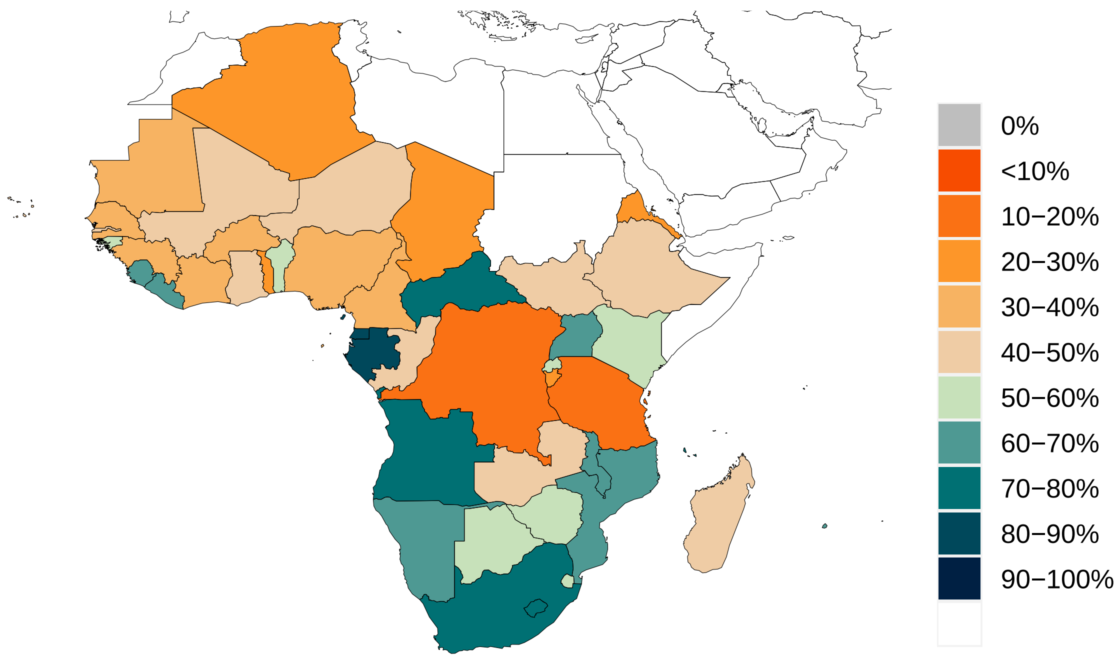


Figure 15.1. Trend in COVID-19 diagnostic tests per 100,000 people

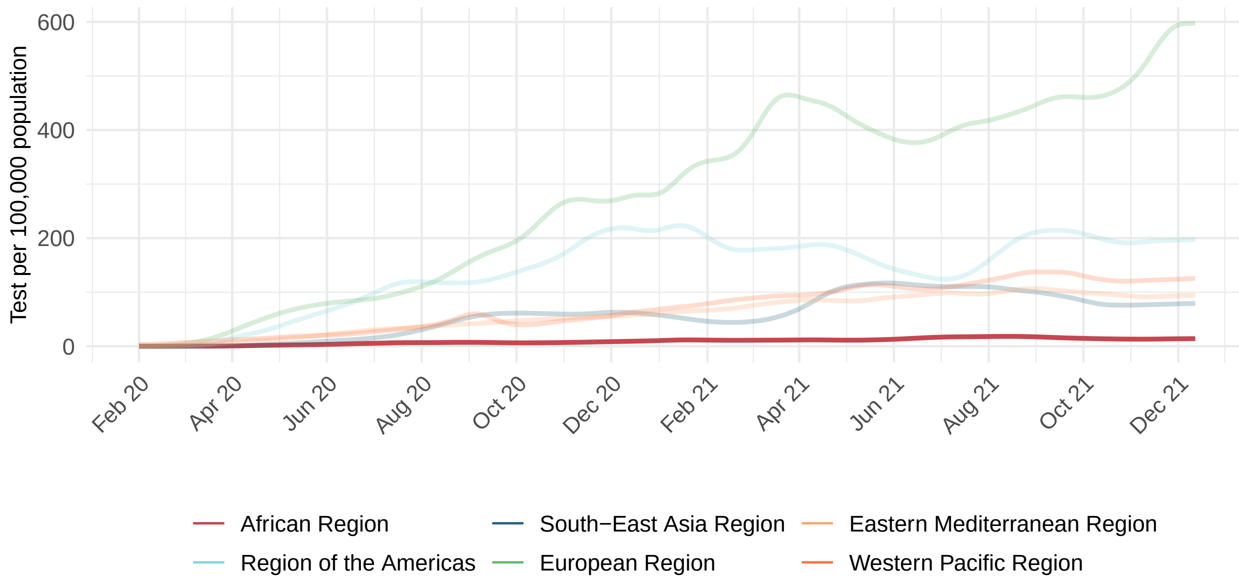


Figure 16.1. COVID-19 diagnostic tests per 100,000 people on December 13, 2021

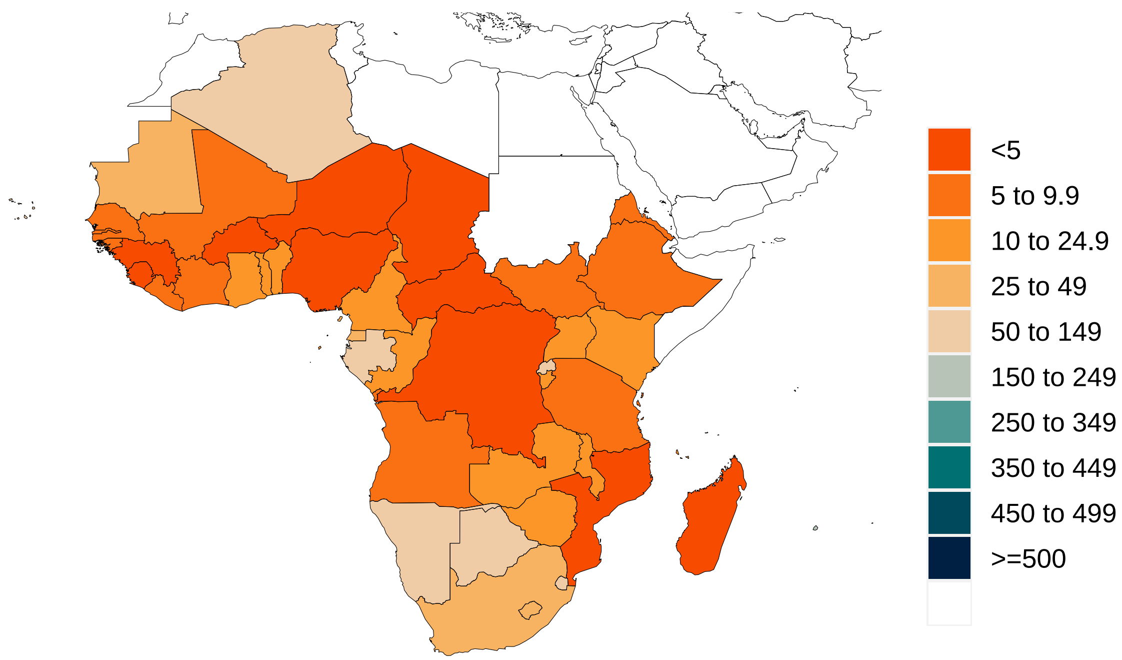


Table 3. Estimates of vaccine effectiveness for specific vaccines used in the model at preventing severe disease and infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our website.

	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

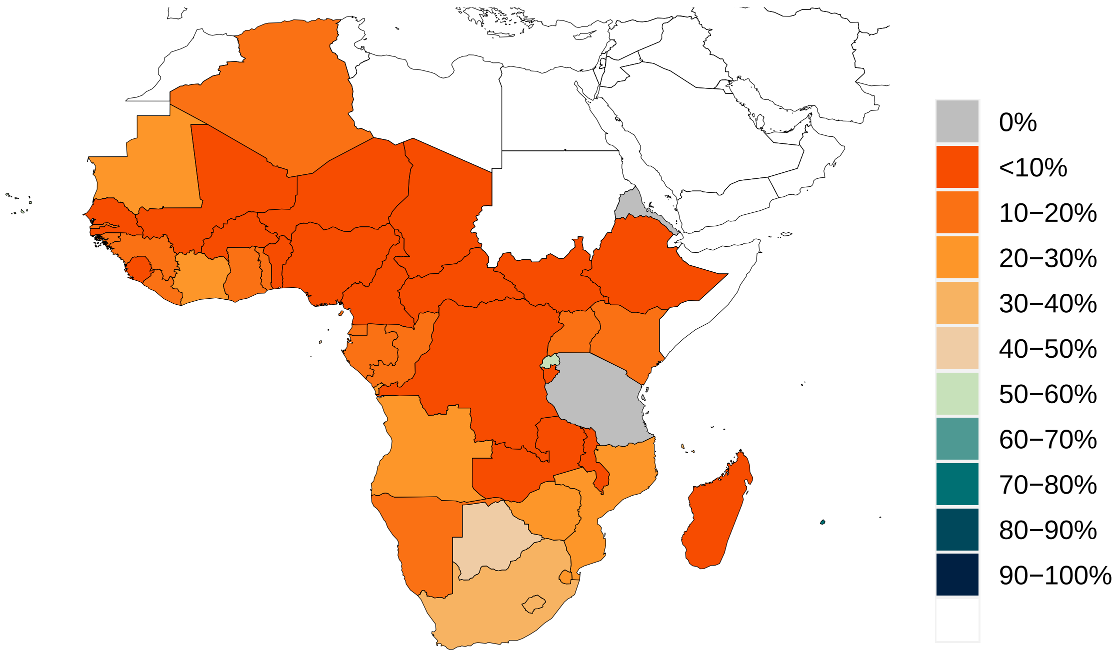


Figure 17.2 Percent of the population fully vaccinated against SARS-CoV-2

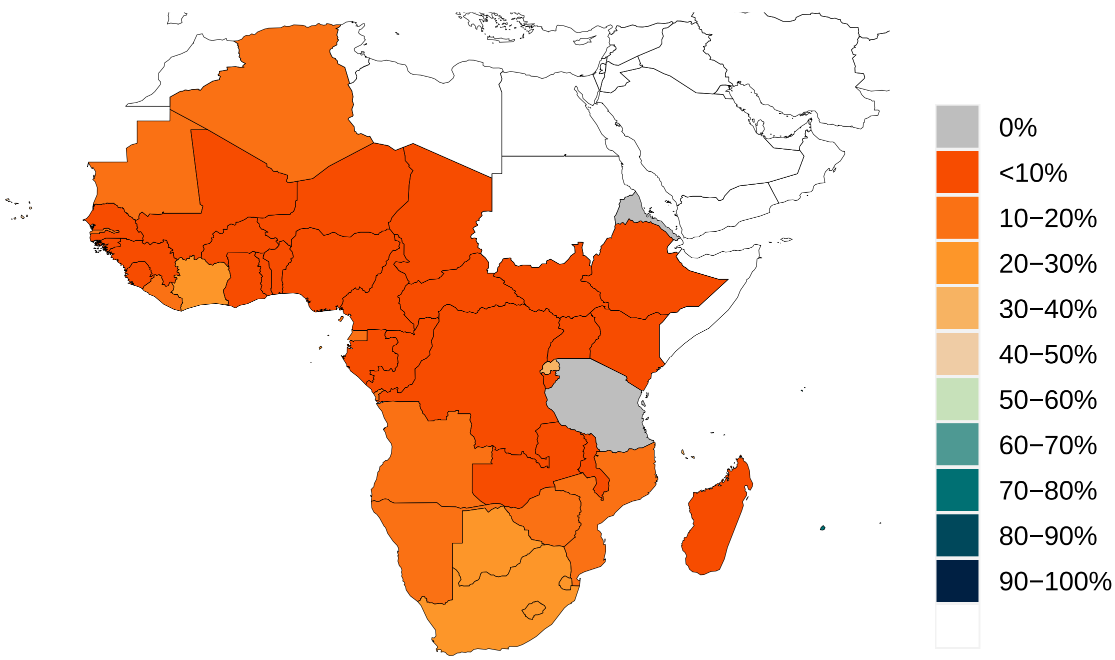


Figure 18.1. Trend in the estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

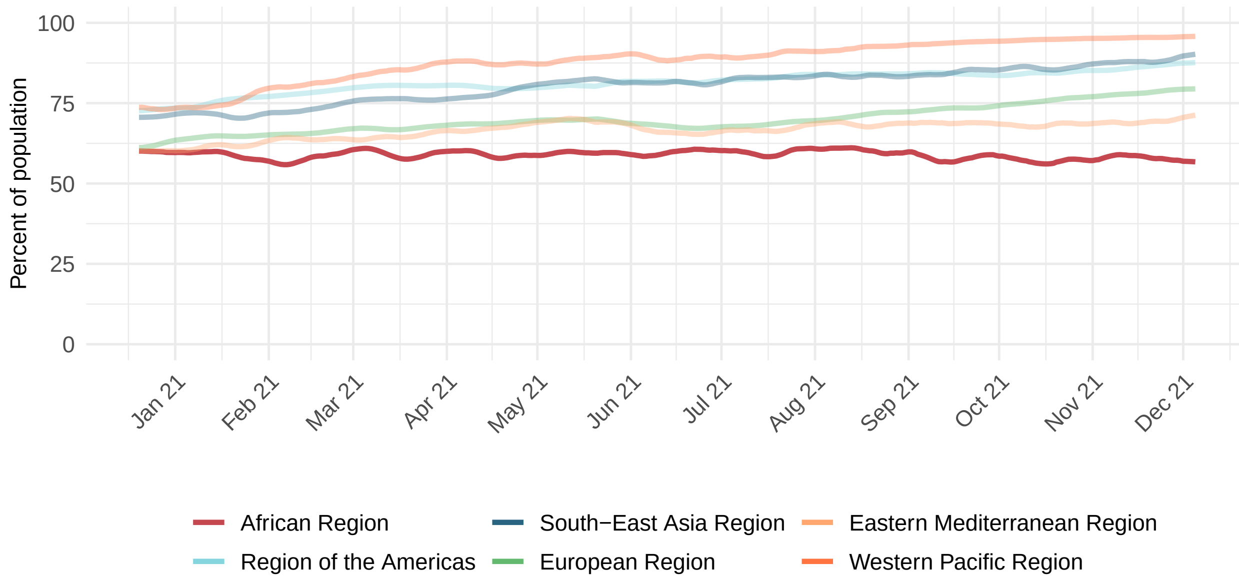


Figure 19.1. Estimated proportion of the population that is 12 years and older that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available. Note that vaccine acceptance is calculated using survey data from the 18+ population.

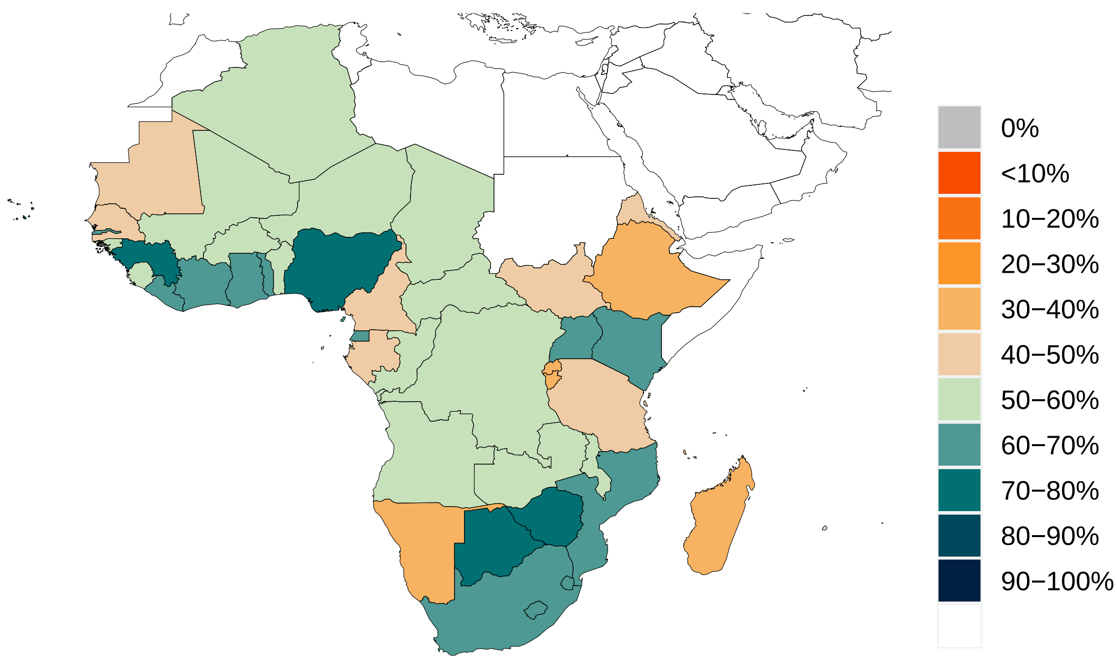
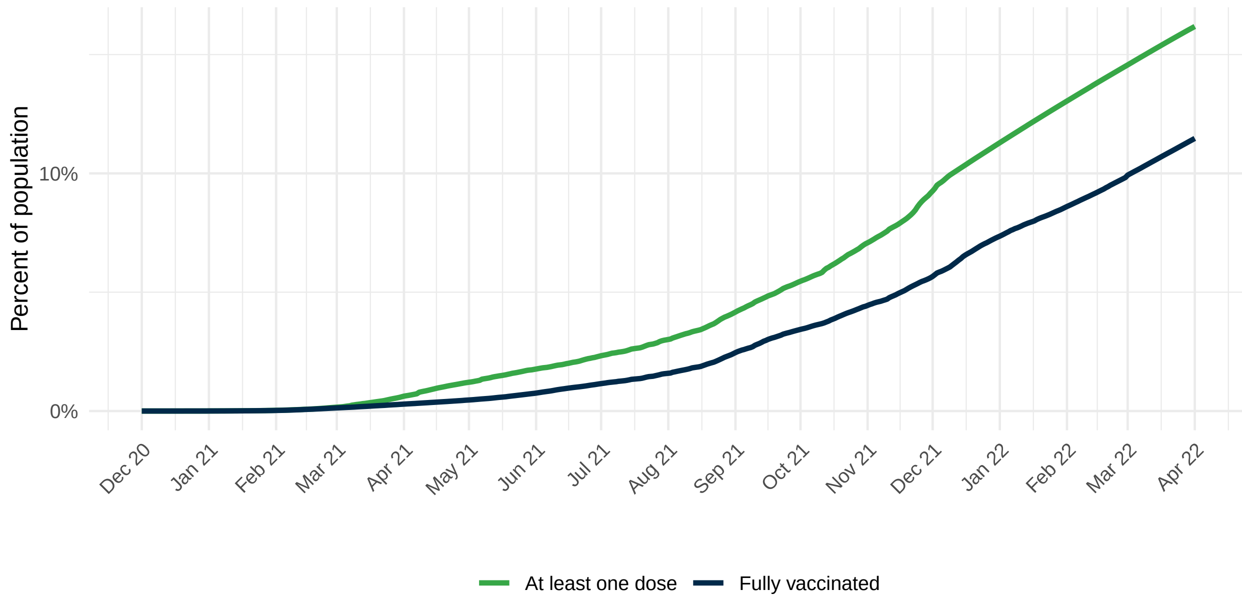


Figure 20.1. Percent of people who receive at least one dose of a COVID-19 vaccine and those who are fully vaccinated



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

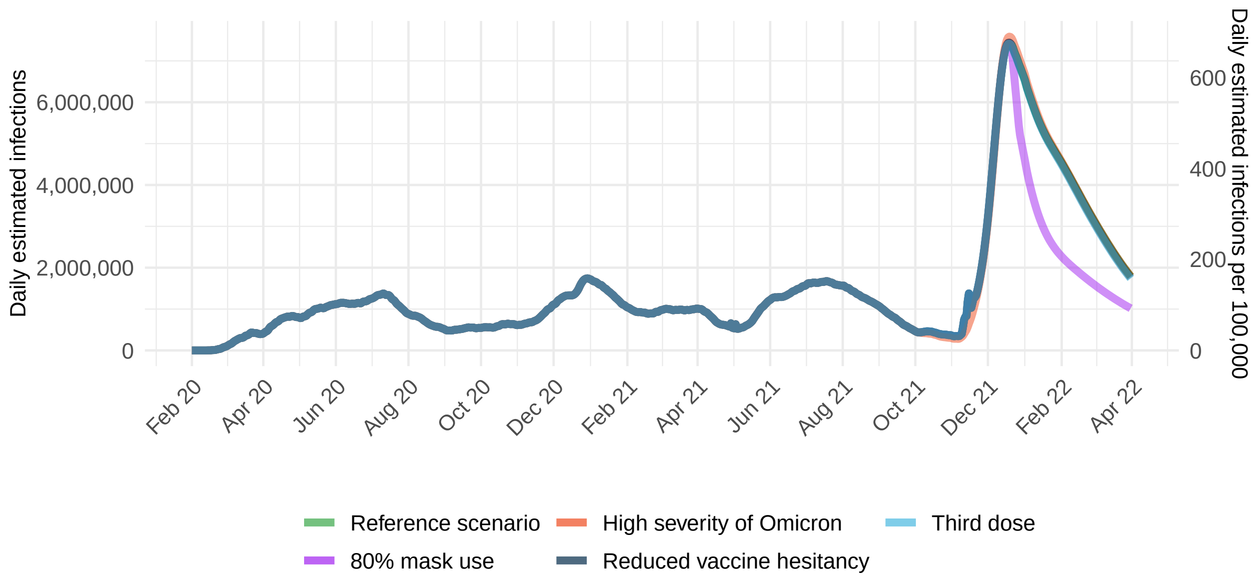


Figure 21.2. Daily COVID-19 reported cases until April 01, 2022 for five scenarios

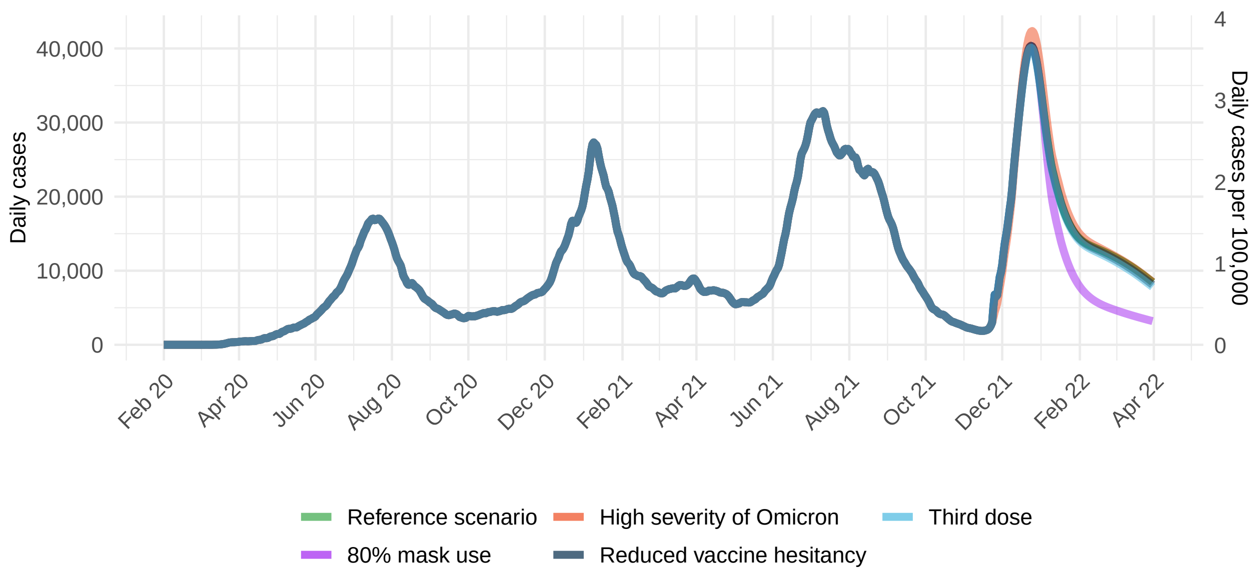


Figure 21.3. Daily COVID-19 hospital census until April 01, 2022 for five scenarios

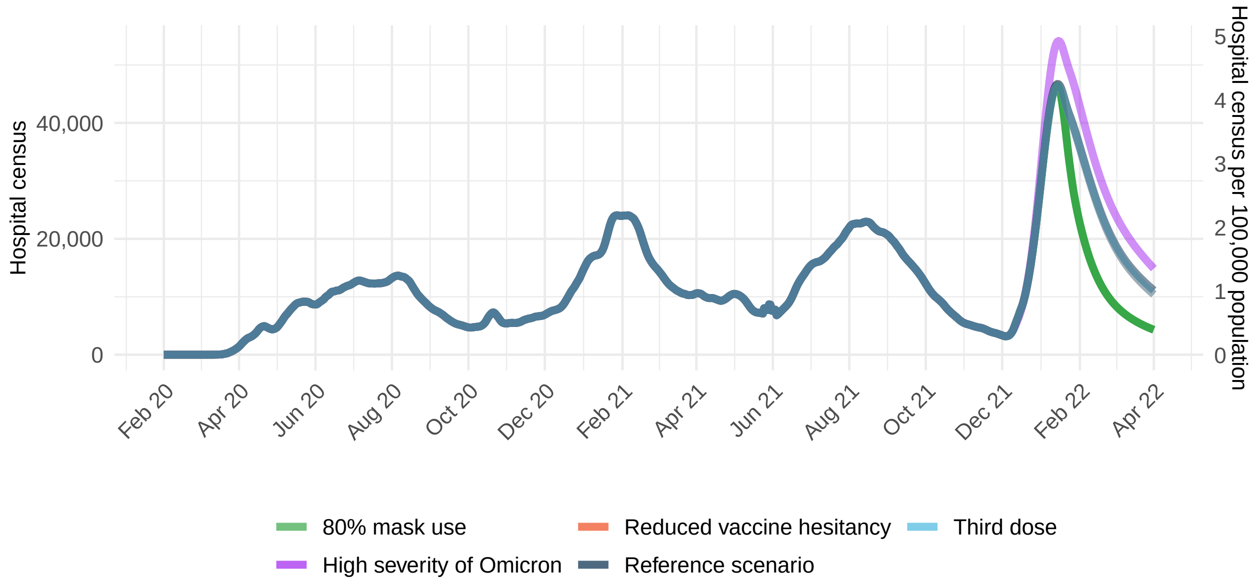


Figure 21.4 Reported daily COVID-19 deaths per 100,000

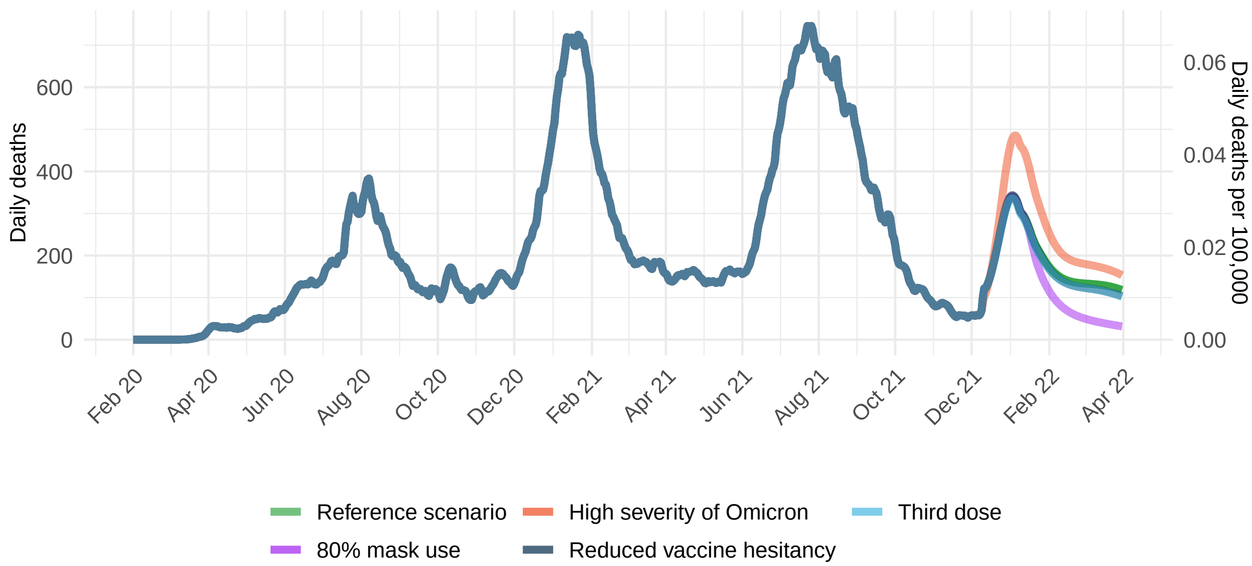


Figure 21.5 Total daily COVID-19 deaths per 100,000

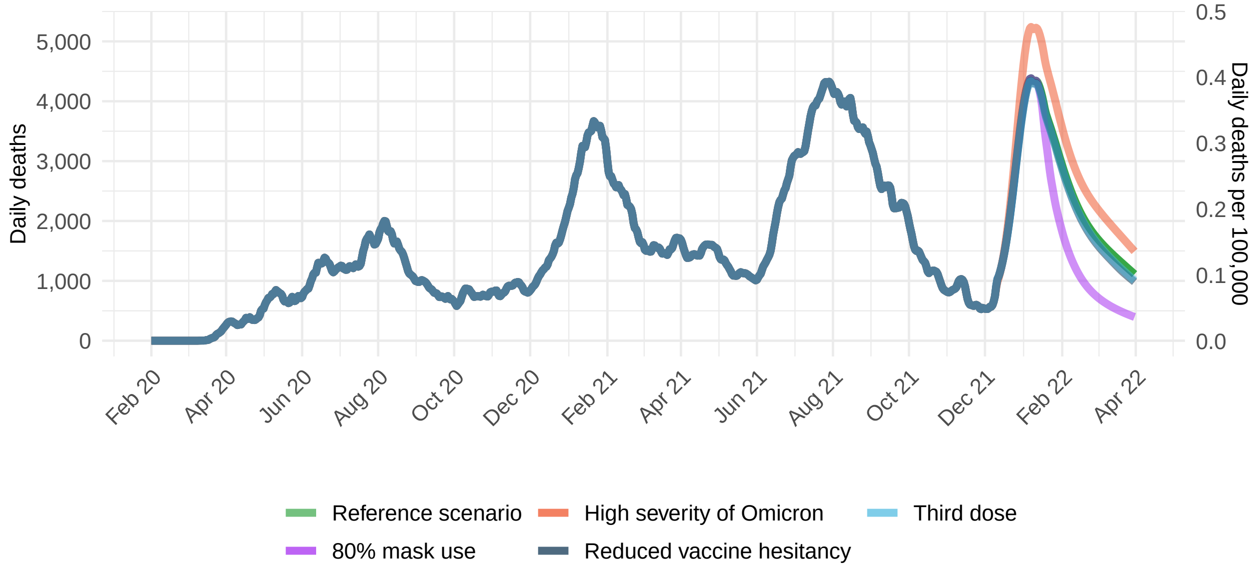
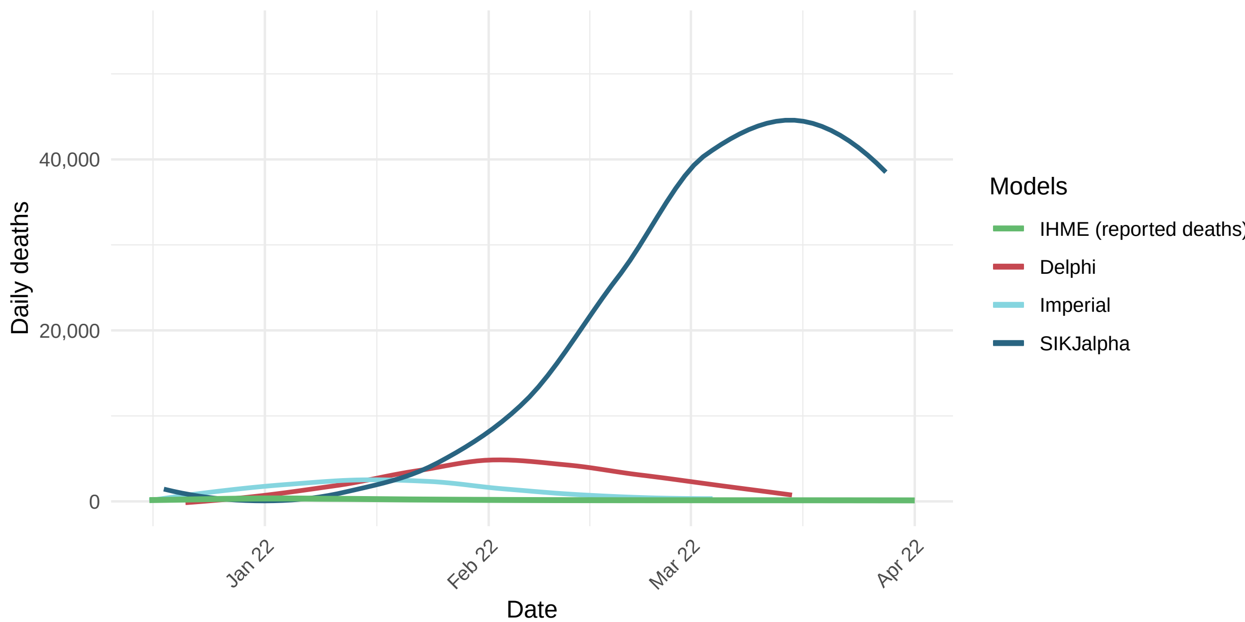


Figure 22.1. Comparison of reference model projections with other COVID modeling groups. For this comparison, we are including projections of daily COVID-19 deaths from other modeling groups when available, last model update in brackets: Delphi from the Massachusetts Institute of Technology (Delphi) [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.



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.