COVID-19 Results Briefing

Pakistan

January 8, 2022

This document contains summary information on the latest projections from the IHME model on COVID-19 in Pakistan. The model was run on January 7, 2022, with data through January 3, 2022.

Current situation

Two weeks’ more data on Omicron since our last release confirm that Omicron has a much higher fraction of asymptomatic infections, a lower fraction of diagnosed cases requiring hospitalization, and a dramatically lower death rate among those who have been hospitalized compared to Delta. The extraordinarily rapid transmission and extremely high community prevalence of infection have also been well documented. Our models suggest that more than 50% of the global population will be infected with Omicron in the next 6 weeks. The infection-detection rate (IDR) is declining, although shortages of testing may lead to more rapid decreases in the IDR than we currently model.

The speed of the epidemic is so fast that policy interventions will have little impact. In previous waves, the control strategy has been to control infection and thus reduce hospitalization and death. Given there is little prospect of controlling infection, strategies need to focus on reducing harm in the vulnerable and minimizing disruption. The number of people who will be admitted with COVID-19 to hospital is expected to increase substantially, but a substantial fraction of this increase is due to incidental COVID-19. But hospitals are clearly under stress due to health care workers who have tested positive and need to quarantine. Given the massive numbers of infections in the community, testing and quarantining asymptomatic individuals may not be helpful. There appears to be no prospect for controlling transmission and considerable prospect for disruption of schools and essential services due to screening. Countries may need to consider revisions to their testing and quarantine strategies.

Considerable uncertainty remains about the future course of the Omicron wave. First, the infection-detection rate may decline even more than we have estimated if testing capacity is overwhelmed. This would reduce the reported case rates below the number forecasted per day. Second, hospital admission screening will substantially impact the reported COVID-19 admissions. If some hospitals run out of testing capacity and do not screen all admissions, then the incidental COVID-19 admission rate may also decline. Third, a critical factor in understanding the trajectory of Omicron is the fraction of infections that are asymptomatic. Based on data from South Africa and the UK, we currently estimate this to be 80%–90%. Increases or decreases in this fraction asymptomatic have an important impact on the trajectory and severity of the Omicron wave.

For individuals at risk of bad outcomes, particularly the unvaccinated and never infected, the strategies to reduce risk remain: vaccination, including a third dose where appropriate, high-quality mask use, and avoiding crowded indoor settings.
Cases are increasing in Pakistan, with no significant change in deaths. Approximately 29,700 cumulative reported deaths are projected for Pakistan on May 1, which is an additional 700 deaths from January 3.

- Daily infections in the last week increased to 263,300 per day on average compared to 120,500 the week before (Figure 1.1). Daily hospital census in the last week (through January 3) decreased to 1,900 per day on average compared to 2,000 the week before.

- Daily reported cases in the last week increased to 480 per day on average compared to 330 the week before (Figure 2.1).

- Reported deaths due to COVID-19 in the last week remained constant at 4 per day on average compared to 4 the week before (Figure 3.1).

- Total deaths due to COVID-19 in the last week decreased to 63 per day on average compared to 65 the week before (Figure 3.1). This makes COVID-19 the number 13 cause of death in Pakistan this week (Table 1). Estimated total daily deaths due to COVID-19 in the past week were 15.8 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 locations had daily total COVID-19 death rates greater than 4 per million (Figure 4.2).

- We estimate that 72% of people in Pakistan have been infected at least once as of January 3 (Figure 6.1). Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in five provinces and territories (Figure 7.1).

- The infection-detection rate in Pakistan was close to 1% on January 3 (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 provinces and territories, that the Beta variant is circulating in 0 provinces and territories, that the Delta variant is circulating in 7 provinces and territories, that the Gamma variant is circulating in 0 provinces and territories, and that the Omicron variant is circulating in 7 provinces and territories.

**Trends in drivers of transmission**

- Mobility last week was 47% higher than the pre-COVID-19 baseline (Figure 11.1). Mobility was lower than 30% of baseline in no locations.

- As of January 3, in the COVID-19 Trends and Impact Survey, 40% of people self-report that they always wore a mask when leaving their home, the same as last week (Figure 13.1).

- There were 20 diagnostic tests per 100,000 people on January 3 (Figure 15.1).
As of January 3, 0 provinces and territories have reached 70% or more of the population who have received at least one vaccine dose and 0 provinces and territories have reached 70% or more of the population who are fully vaccinated (Figure 17.1). 43% of people in Pakistan have received at least one vaccine dose and 32% are fully vaccinated.

In Pakistan, 79.7% 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 2.1 percentage points from last week. The proportion of the population who are open to receiving a COVID-19 vaccine ranges from 42% in Azad Jammu & Kashmir to 95% in Islamabad Capital Territory (Figure 19.1).

In our current reference scenario, we expect that 116.5 million people will be vaccinated with at least one dose by May 1 (Figure 20.1). We expect that 47% of the population will be fully vaccinated by May 1.

Projections

Infections

- Daily estimated infections in the reference scenario, which represents what we think is most likely to happen, will rise to 3,501,580 by February 2, 2022 (Figure 21.1).
- Daily estimated infections in the high severity of Omicron scenario will rise to 3,500,400 by February 2, 2022 (Figure 21.1).
- Daily estimated infections in the 80% mask coverage scenario will rise to 2,087,180 by February 7, 2022 (Figure 21.1).
- Daily estimated infections in the third dose scenario will rise to 3,349,130 by February 2, 2022 (Figure 21.1).
- Daily estimated infections in the reduced vaccine hesitancy scenario will rise to 3,356,060 by February 2, 2022 (Figure 21.1).

Cases

- Daily cases in the reference scenario will rise to 10,520 by February 14, 2022 (Figure 21.2).
- Daily cases in the high severity of Omicron scenario will rise to 10,520 by February 14, 2022 (Figure 21.2).
- Daily cases in the 80% mask coverage scenario will rise to 6,520 by February 18, 2022 (Figure 21.2).
- Daily cases in the third dose scenario will rise to 10,070 by February 14, 2022 (Figure 21.2).
- Daily cases in the reduced vaccine hesitancy scenario will rise to 10,090 by February 14, 2022 (Figure 21.2).
Hospitalizations

- Daily hospital census in the reference scenario will rise to 52,930 by February 23, 2022 (Figure 21.3).
- Daily hospital census in the high severity of Omicron scenario will rise to 104,840 by February 23, 2022 (Figure 21.3).
- Daily hospital census in the 80% mask coverage scenario will rise to 32,050 by February 27, 2022 (Figure 21.3).
- Daily hospital census in the third dose scenario will rise to 47,540 by February 22, 2022 (Figure 21.3).
- Daily hospital census in the reduced vaccine hesitancy scenario will rise to 47,730 by February 22, 2022 (Figure 21.3).

Deaths

- In our reference scenario, our model projects 30,000 cumulative reported deaths due to COVID-19 on May 1. This represents 740 additional deaths from January 3 to May 1. Daily reported COVID-19 deaths in the reference scenario will rise to 10 by February 27, 2022 (Figure 21.4).
- Under our reference scenario, our model projects 465,000 cumulative total deaths due to COVID-19 on May 1. This represents 12,000 additional deaths from January 3 to May 1 (Figure 24.2).
- In our high severity of Omicron scenario, our model projects 30,000 cumulative reported deaths due to COVID-19 on May 1. This represents 1,000 additional deaths from January 3 to May 1. Daily reported COVID-19 deaths in the high severity of Omicron scenario will rise to 30 by February 28, 2022 (Figure 21.4).
- In our 80% mask coverage scenario, our model projects 29,000 cumulative reported deaths due to COVID-19 on May 1. This represents 550 additional deaths from January 3 to May 1. Daily reported COVID-19 deaths in the 80% mask coverage scenario will rise to 10 by March 2, 2022 (Figure 21.4).
- In our third dose scenario, our model projects 30,000 cumulative reported deaths due to COVID-19 on May 1. This represents 620 additional deaths from January 3 to May 1. Daily reported COVID-19 deaths in the third dose scenario will rise to 10 by February 27, 2022 (Figure 21.4).
- In our reduced vaccine hesitancy scenario, our model projects 30,000 cumulative reported deaths due to COVID-19 on May 1. This represents 620 additional deaths from January 3 to May 1. Daily reported COVID-19 deaths in the reduced vaccine hesitancy scenario will rise to 10 by February 27, 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 January through May 1, seven provinces and territories will have high or extreme stress on hospital beds (Figure 23.1). At some point from January through May 1, seven provinces and territories will have high or extreme stress on intensive care unit (ICU) capacity (Figure 24.1).
Model updates

In this week’s update, we have made changes to key Omicron parameters based on data from South Africa, the United Kingdom, and the US. First, based on an analysis of the UK Office of National Statistics prevalence of infection surveys, we have revised the range of asymptomatic infection from 90% to 80%–90%. Second, the degree of transmissibility of Omicron compared to ancestral variants was increased from 1.5–2.5 to 2–3. This adjustment was based on matching the scale-up curves for Omicron from the analysis of the GISAID database. Third, the infection-hospitalization rate for Omicron relative to Delta has been increased from a mean of 0.07 to a mean of 0.125 (range 0.0625–0.1875) based on data from the UK, US, and South Africa. Fourth, the infection-hospitalization rate has been decreased from a mean of 0.02 to 0.01875 (range 0.009375–0.028125) based on published studies of the hospital-fatality rate, the case-hospitalization rate, and the fraction asymptomatic. Fifth, based on the timing of Omicron surges, we have adjusted the date of Omicron arrival for a number of countries to match the timing of increases in reported cases, taking into account the lag from introduction to the exponential rise in reported cases. Sixth, in the high-severity scenario, we have used IFR and IHR values that are double the ranges used in the reference scenario.
Figure 1.1. Daily COVID-19 hospital census and estimated infections

![Graph showing daily COVID-19 hospital census and estimated infections from January 2020 to January 2022.]

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

![Graph showing reported daily COVID-19 cases, moving average from March 2020 to January 2022.]

covid19.healthdata.org Institute for Health Metrics and Evaluation
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.

<table>
<thead>
<tr>
<th>Cause name</th>
<th>Weekly deaths</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal disorders</td>
<td>4,804</td>
<td>1</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>3,527</td>
<td>2</td>
</tr>
<tr>
<td>Stroke</td>
<td>2,028</td>
<td>3</td>
</tr>
<tr>
<td>Diarrheal diseases</td>
<td>1,481</td>
<td>4</td>
</tr>
<tr>
<td>Lower respiratory infections</td>
<td>1,311</td>
<td>5</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>1,207</td>
<td>6</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>1,205</td>
<td>7</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>917</td>
<td>8</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>854</td>
<td>9</td>
</tr>
<tr>
<td>Cirrhosis and other chronic liver diseases</td>
<td>848</td>
<td>10</td>
</tr>
<tr>
<td>COVID-19</td>
<td>444</td>
<td>13</td>
</tr>
</tbody>
</table>

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 January 3, 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 January 3, 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 January 3, 2022

Figure 7.1. Mean effective R on December 23, 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 January 3, 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 Omicron variant
Figure 10.1. Infection-fatality rate on January 3, 2022. This is estimated as the ratio of COVID-19 deaths to estimated daily COVID-19 infections.

< 0.2%  
0.2% to 0.39%  
0.4% to 0.59%  
0.6% to 0.79%  
0.8% to 0.99%  
> 1%
### 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 | Individual curfew | 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 curbside only | Restaurants / bars closed | Gyms, pools, other leisure closed | Non-essential retail closed | Non-essential workplaces closed | Stay home order | Stay home fine | Mask mandate | Mask mandate fine |
|------------------|------------------------|--------------------------|-----------------------|-------------------------------------------|------------------------------------------|----------------------------------------|-------------------|----------------------|-------------------|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|-------------------|----------------|-----------------|-----------------|----------------|----------------|----------------|
| Azad Jammu & Kashmir |                        |                          |                       |                                           |                                          |                                        |                   |                      |                   |                                       |                                        |                                        |                                        |                                        |                   |               |                 |                 |
| Balochistan       |                        |                          |                       |                                           |                                          |                                        |                   |                      |                   |                                       |                                        |                                        |                                        |                                        |                   |               |                 |                 |
| Gilgit-Baltistan  |                        |                          |                       |                                           |                                          |                                        |                   |                      |                   |                                       |                                        |                                        |                                        |                                        |                   |               |                 |                 |
| Islamabad Capital Territory |            |                          |                       |                                           |                                          |                                        |                   |                      |                   |                                       |                                        |                                        |                                        |                                        |                   |               |                 |                 |
| Khyber Pakhtunkhwa |                        |                          |                       |                                           |                                          |                                        |                   |                      |                   |                                       |                                        |                                        |                                        |                                        |                   |               |                 |                 |
| Punjab            |                        |                          |                       |                                           |                                          |                                        |                   |                      |                   |                                       |                                        |                                        |                                        |                                        |                   |               |                 |                 |
| Sindh             |                        |                          |                       |                                           |                                          |                                        |                   |                      |                   |                                       |                                        |                                        |                                        |                                        |                   |               |                 |                 |

- **Mandate in place**
- **Mandate in place (imposed this week)**
- **Mandate in place (updated from previous reporting)**
- **No mandate**
- **No mandate (lifted this week)**
- **No mandate (updated from previous reporting)**

Source: covid19.healthdata.org, Institute for Health Metrics and Evaluation
**Figure 11.1.** Trend in mobility as measured through smartphone app use, compared to January 2020 baseline

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Pakistan
Figure 12.1. Mobility level as measured through smartphone app use, compared to January 2020 baseline (percent) on January 3, 2022
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 January 3, 2022
**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 January 3, 2022
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.

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Ancestral</th>
<th>Alpha</th>
<th>Beta</th>
<th>Gamma</th>
<th>Delta</th>
<th>Omicron</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Severe disease</td>
<td>Infection</td>
<td>Severe disease</td>
<td>Infection</td>
<td>Severe disease</td>
<td>Infection</td>
</tr>
<tr>
<td>AstraZeneca</td>
<td>94%</td>
<td>63%</td>
<td>94%</td>
<td>63%</td>
<td>94%</td>
<td>69%</td>
</tr>
<tr>
<td>CanSino</td>
<td>66%</td>
<td>62%</td>
<td>66%</td>
<td>62%</td>
<td>64%</td>
<td>61%</td>
</tr>
<tr>
<td>CoronaVac</td>
<td>50%</td>
<td>47%</td>
<td>50%</td>
<td>47%</td>
<td>49%</td>
<td>46%</td>
</tr>
<tr>
<td>Covaxin</td>
<td>78%</td>
<td>73%</td>
<td>78%</td>
<td>73%</td>
<td>76%</td>
<td>72%</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>86%</td>
<td>72%</td>
<td>86%</td>
<td>72%</td>
<td>76%</td>
<td>64%</td>
</tr>
<tr>
<td>Moderna</td>
<td>97%</td>
<td>92%</td>
<td>97%</td>
<td>92%</td>
<td>97%</td>
<td>91%</td>
</tr>
<tr>
<td>Novavax</td>
<td>89%</td>
<td>83%</td>
<td>89%</td>
<td>83%</td>
<td>86%</td>
<td>82%</td>
</tr>
<tr>
<td>Pfizer/BioNTech</td>
<td>95%</td>
<td>86%</td>
<td>95%</td>
<td>86%</td>
<td>95%</td>
<td>84%</td>
</tr>
<tr>
<td>Sinopharm</td>
<td>73%</td>
<td>68%</td>
<td>73%</td>
<td>68%</td>
<td>71%</td>
<td>67%</td>
</tr>
<tr>
<td>Sputnik-V</td>
<td>92%</td>
<td>86%</td>
<td>92%</td>
<td>86%</td>
<td>89%</td>
<td>85%</td>
</tr>
<tr>
<td>Other vaccines</td>
<td>75%</td>
<td>70%</td>
<td>75%</td>
<td>70%</td>
<td>73%</td>
<td>69%</td>
</tr>
<tr>
<td>Other vaccines (mRNA)</td>
<td>91%</td>
<td>86%</td>
<td>91%</td>
<td>86%</td>
<td>88%</td>
<td>85%</td>
</tr>
</tbody>
</table>
Percent of the population having received at least one dose (17.1) and fully vaccinated against SARS-CoV-2 (17.2) by January 3, 2022

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 May 01, 2022 for five scenarios

Figure 21.2. Daily COVID-19 reported cases until May 01, 2022 for five scenarios
Figure 21.3. Daily COVID-19 hospital census until May 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

- Reference scenario
- High severity of Omicron
- Third dose
- 80% mask use
- Reduced vaccine hesitancy
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) [January 7, 2022], Imperial College London (Imperial) [December 13, 2021], the SI-KJalpha model from the University of Southern California (SIKJalpha) [January 4, 2022]. 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*. 

![Intensive care unit beds](image-url)
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.