COVID-19 Results Briefing

Pakistan

July 30, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 in Pakistan. The model was run on July 27, 2021, with data through July 25, 2021.

Current situation

Reported cases and deaths are rising in Pakistan. The rapid spread of the Delta variant, combined with low masking, high mobility, and low vaccination levels has led to this rapid surge. We estimate that effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in six provinces and territories, indicating a rise in cases in these locations in the coming weeks. Masks are an effective means to reduce transmission as the vaccination campaign is rolled out. If universal mask coverage (95%) were attained in the next week, our model projects about 1,800 fewer cumulative reported deaths compared to the reference scenario on November 1.

The main strategies to manage the epidemic in this phase remain the same: 1) addressing hesitancy and increasing vaccination levels; 2) re-imposition of mask mandates; 3) reporting of cases, hospitalizations, and deaths by vaccination status and time since vaccination to help assess vaccine effectiveness and how it changes over time; and 4) long-term planning of resources for the likely heavy demand for hospitalization due to COVID-19 and flu in the winter.

- Daily reported cases in the last week (through July 25) increased to about 2,500 per day on average compared to about 2,300 the week before (Figure 1).

- Reported deaths due to COVID-19 in the last week increased to about 34 per day on average compared to about 31 the week before (Figure 2).

- Excess deaths due to COVID-19 in the last week increased to about 140 per day on average compared to about 130 the week before (Figure 2). This makes COVID-19 the number 8 cause of death in Pakistan this week (Table 1). Estimated excess daily deaths due to COVID-19 were 4.1 times larger than the reported number of deaths.

- No locations had daily reported COVID-19 death rates greater than 4 per million (Figure 3).

- No locations had daily excess death rates greater than 4 per million (Figure 3).

- We estimated that 77% of people in Pakistan have been infected as of July 26 (Figure 5).

- Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in six provinces and territories (Figure 6).

- The infection-detection rate in Pakistan was close to 1% on July 26 (Figure 7).
Based on the GISAID and various national databases, combined with our variant spread model, we estimate the current prevalence of variants of concern (Figure 8). We estimate that B.1.617 is circulating in six provinces and territories.

**Trends in drivers of transmission**

- Mobility last week was 33% higher than the pre-COVID-19 baseline (Figure 10). Mobility was near baseline (within 10%) in Azad Jammu & Kashmir, Balochistan, Gilgit-Baltistan, Islamabad Capital Territory, Khyber Pakhtunkhwa, Punjab, and Sindh. Mobility was not lower than 30% of baseline in any locations.

- As of July 26, in the COVID-19 Trends and Impact Survey, 49% of people self-report that they always wore a mask when leaving their home compared to 48% last week (Figure 12).

- There were 19 diagnostic tests per 100,000 people on July 26 (Figure 14).

- In Pakistan 63.6% of people say they would accept or would probably accept a vaccine for COVID-19. This is down by 1.9 percentage points from last week. The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 56% in Khyber Pakhtunkhwa to 86% in Islamabad Capital Territory (Figure 18).

- In our current reference scenario, we expect that about 28 million people will be vaccinated by November 1 (Figure 19).

- In our current reference scenario, we expect that by November 1, 83% of people will be immune to non-escape variants and 69% of people will be immune to escape variants (Figure 20).

**Projections**

- In our *reference scenario*, which represents what we think is most likely to happen, our model projects about 28,000 cumulative reported deaths due to COVID-19 on November 1. This represents about 5,000 additional deaths from July 26 to November 1. Daily reported deaths will rise to about 70 by September 6, 2021 (Figure 21).

- Under our *reference scenario*, our model projects about 115,000 cumulative excess deaths due to COVID-19 on November 1. This represents about 20,000 additional deaths from July 26 to November 1. Daily excess deaths due to COVID-19 will rise to about 260 by August 31, 2021 (Figure 21).

- If *universal mask coverage* (95%) were attained in the next week, our model projects about 1,800 fewer cumulative reported deaths compared to the reference scenario on November 1.

- If *universal mask coverage* (95%) were attained in the next week, our model projects about 7,100 fewer cumulative excess deaths due to COVID-19 compared to the reference scenario on November 1.
• Under our **worse scenario**, our model projects about 28,000 cumulative reported deaths on November 1, an additional about 280 deaths compared to our reference scenario. Daily reported deaths in the worse scenario will rise to about 70 by September 5, 2021 (Figure 21).

• Under our **worse scenario**, our model projects about 116,000 cumulative excess deaths due to COVID-19 on November 1, an additional about 3,900 deaths compared to our reference scenario. Daily excess deaths due to COVID-19 in the worse scenario will rise to about 270 by September 5, 2021 (Figure 21).

• Daily infections in the reference scenario will rise to about 320,030 by August 7, 2021 (Figure 22). Daily infections in the worse scenario will rise to about 337,510 by August 12, 2021 (Figure 22).

• By November 1, we project that about 1,400 lives will be saved by the projected vaccine rollout. This does not include lives saved through vaccination that has already been delivered.

• Figure 23 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.

• At some point from July through November 1, seven provinces and territories will have high or extreme stress on hospital beds (Figure 24). At some point from July through November 1, seven provinces and territories will have high or extreme stress on intensive care unit (ICU) capacity (Figure 25).
Model updates

Our projections of SARS-CoV-2 infections and COVID-19 deaths in the worse scenario were updated to account for the possibility that population mobility may continue to increase, irrespective of vaccine coverage or infection levels. Specifically, a new mobility scenario was formulated in which all locations exhibit an 8-week linear increase in mobility to the regional maximum mobility level observed between the period 1/1/2020 and the last day of data. Furthermore, the new projections of mobility for the worse scenario assume that population mobility will remain elevated until COVID-19 mortality reaches a minimum of 15 deaths per million, at which point a location may re-impose all social distancing mandates for a period of six weeks, causing mobility to rapidly decline.
Figure 1. Reported daily COVID-19 cases, moving average

Table 1. Ranking of excess 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>COVID-19</td>
<td>986</td>
<td>8</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>917</td>
<td>9</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>854</td>
<td>10</td>
</tr>
</tbody>
</table>
**Figure 2.** Smoothed trend estimate of reported daily COVID-19 deaths (blue) and excess daily deaths due to COVID-19 (orange)
Figure 3. Daily COVID-19 death rate per 1 million on July 26, 2021

A. Daily reported COVID-19 death rate per 1 million

B. Daily excess COVID-19 death rate per 1 million
Figure 4. Cumulative COVID-19 deaths per 100,000 on July 26, 2021

A. Reported cumulative COVID-19 deaths per 100,000

B. Excess cumulative COVID-19 deaths per 100,000
Figure 5. Estimated percent of the population infected with COVID-19 on July 26, 2021

Figure 6. Mean effective R on July 15, 2021. 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. Effective R less than 1 means that transmission should decline, all other things being held the same.
Figure 7. Percent of 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.
Figure 8. Estimated percent of circulating SARS-CoV-2 for primary variant families on July 26, 2021

A. Estimated percent B.1.1.7 variant

B. Estimated percent B.1.351 variant
C. Estimated percent B.1.617 variant

D. Estimated percent P.1 variant
Figure 9. Infection-fatality ratio on July 26, 2021
Critical drivers

Table 2. Current mandate implementation
**Figure 10.** Trend in mobility as measured through smartphone app use compared to January 2020 baseline

**Figure 11.** Mobility level as measured through smartphone app use compared to January 2020 baseline (percent) on July 26, 2021
**Figure 12.** Trend in the proportion of the population reporting always wearing a mask when leaving home

**Figure 13.** Proportion of the population reporting always wearing a mask when leaving home on July 26, 2021
Figure 14. Trend in COVID-19 diagnostic tests per 100,000 people

Figure 15. COVID-19 diagnostic tests per 100,000 people on July 26, 2021
Figure 16. Increase in the risk of death due to pneumonia on February 1 compared to August 1
Table 3. Estimates of vaccine efficacy for specific vaccines used in the model at preventing disease and infection. The SEIR model uses variant-specific estimates of vaccine efficacy at preventing symptomatic disease and at preventing infection. We use data from clinical trials directly, where available, and make estimates otherwise. More information can be found on our [website](https://covid19.healthdata.org).

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Efficacy at preventing disease: D614G &amp; B.1.1.7</th>
<th>Efficacy at preventing infection: D614G &amp; B.1.1.7</th>
<th>Efficacy at preventing disease: B.1.351, B.1.617, &amp; P.1</th>
<th>Efficacy at preventing infection: B.1.351, B.1.617, &amp; P.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>AstraZeneca</td>
<td>74%</td>
<td>52%</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>CoronaVac</td>
<td>50%</td>
<td>44%</td>
<td>40%</td>
<td>35%</td>
</tr>
<tr>
<td>Covaxin</td>
<td>78%</td>
<td>69%</td>
<td>62%</td>
<td>55%</td>
</tr>
<tr>
<td>Janssen</td>
<td>72%</td>
<td>72%</td>
<td>64%</td>
<td>56%</td>
</tr>
<tr>
<td>Moderna</td>
<td>94%</td>
<td>89%</td>
<td>83%</td>
<td>79%</td>
</tr>
<tr>
<td>Novavax</td>
<td>89%</td>
<td>79%</td>
<td>73%</td>
<td>64%</td>
</tr>
<tr>
<td>Pfizer/BioNTech</td>
<td>91%</td>
<td>86%</td>
<td>81%</td>
<td>77%</td>
</tr>
<tr>
<td>Sinopharm</td>
<td>73%</td>
<td>65%</td>
<td>47%</td>
<td>41%</td>
</tr>
<tr>
<td>Sputnik-V</td>
<td>92%</td>
<td>81%</td>
<td>73%</td>
<td>65%</td>
</tr>
<tr>
<td>Tianjin</td>
<td>66%</td>
<td>58%</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>CanSino</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other vaccines</td>
<td>75%</td>
<td>66%</td>
<td>60%</td>
<td>53%</td>
</tr>
<tr>
<td>Other vaccines</td>
<td>91%</td>
<td>86%</td>
<td>81%</td>
<td>77%</td>
</tr>
<tr>
<td>(mRNA)</td>
<td></td>
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</table>
**Figure 17.** Trend in the estimated proportion of the adult (18+) population that have been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

![Graph showing trend in vaccination proportion](image)

**Figure 18.** This figure shows the estimated proportion of the adult (18+) population that has been vaccinated or would probably or definitely receive the COVID-19 vaccine if available

![Map showing vaccination coverage by country](image)
Figure 19. Number of people who receive any vaccine and those who are effectively vaccinated and protected against disease, accounting for efficacy, loss to follow up for two-dose vaccines, partial immunity after one dose, and immunity after two doses.

Figure 20. Percentage of people who are immune to non-escape variants and the percentage of people who are immune to escape variants.
Projections and scenarios

We produce three scenarios when projecting COVID-19. The reference scenario is our forecast of what we think is most likely to happen:

- Vaccines are distributed at the expected pace.
- Governments adapt their response by re-imposing social distancing mandates for 6 weeks whenever daily deaths reach 8 per million, unless a location has already spent at least 7 of the last 14 days with daily deaths above this rate and not yet re-imposed social distancing mandates. In this case, the scenario assumes that mandates are re-imposed when daily deaths reach 15 per million.
- Variants B.1.1.7 (first identified in the UK), B.1.351 (first identified in South Africa), and P1 (first identified in Brazil) continue to spread from locations with (a) more than 5 sequenced variants, and (b) reports of community transmission, to adjacent locations following the speed of variant scale-up observed in the regions of the United Kingdom.

The worse scenario modifies the reference scenario assumptions in two ways:

- First, it assumes that variants B.1.351 or P.1 begin to spread within three weeks in adjacent locations that do not already have B.1.351 or P.1 community transmission.
- Second, it assumes that all those vaccinated increase their mobility toward pre-COVID-19 levels.

The universal masks scenario makes all the same assumptions as the reference scenario but also assumes 95% of the population wear masks in public in every location.
Figure 21. Daily COVID-19 deaths until November 01, 2021 for three scenarios

A. Reported daily COVID-19 death per 100,000

B. Excess daily COVID-19 deaths per 100,000
Figure 22. Daily COVID-19 infections until November 01, 2021 for three scenarios.
Figure 23. 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: Delphi from the Massachusetts Institute of Technology (Delphi), Imperial College London (Imperial), The Los Alamos National Laboratory (LANL), and the SI-KJalpha model from the University of Southern California (SIKJalpha). Daily deaths from other modeling groups are smoothed to remove inconsistencies with rounding. Regional values are aggregates from available locations in that region.
**Figure 24.** 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*.

![Hospital Bed Usage Chart](chart.png)

- **Stress level**
  - **Low**
  - **Moderate**
  - **High**
  - **Extreme**

- **Province/City**
  - Azad Jammu & Kashmir
  - Balochistan
  - Gilgit-Baltistan
  - Islamabad Capital Territory
  - Khyber Pakhtunkhwa
  - Punjab
  - Sindh

- **Dates**
  - Mar 20 to Nov 21

[covid19.healthdata.org](https://covid19.healthdata.org)
Figure 25. 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.