COVID-19 Results Briefing

China

March 19, 2022

This document contains summary information on the latest projections from the IHME model on COVID-19 in China. The model was run on March 19, 2022, with data through March 14, 2022.

The situation in China is very challenging. The country has so far been successful in containing the spread of COVID-19. Therefore, the percentage of people previously infected with the virus is very low. There are reports of low vaccination rates among the older population due to disbelief in modern medicine. The vaccines used in China have a lower effectiveness compared to the mRNA vaccines. We believe that stopping the spread of Omicron would be very difficult as this mutation is highly infectious. Our projections show a rapid surge in COVID-19 cases, hospitalizations, and deaths in the coming months with a projected peak of infections in the third week of May. Preparing hospitals for a surge in admissions and intensive care use should be a priority. Preventive efforts should continue to reduce the spread of the virus using high-quality masks and increasing vaccination coverage, especially among the older and vulnerable population. Efforts should focus on increasing the production of antivirals to save lives and reduce the pressure on hospitals.

Current situation

• Daily infections in the last week decreased to 12,000 per day on average compared to 23,000 the week before (Figure 1.1). Daily hospital census in the last week (through March 14) decreased to 4,900 per day on average compared to 8,700 the week before.

• Daily reported cases in the last week decreased to 20,000 per day on average compared to 39,000 the week before (Figure 2.1).

• Reported deaths due to COVID-19 in the last week increased to 300 per day on average compared to 200 the week before (Figure 3.1).

• Total deaths due to COVID-19 in the last week increased to 300 per day on average compared to 200 the week before (Figure 3.1). This makes COVID-19 the number 19 cause of death in China this week (Table 1).

• The daily rate of reported deaths due to COVID-19 is greater than 4 per million in one location (Figure 4.1).

• The daily rate of total deaths due to COVID-19 is greater than 4 per million in one location (Figure 4.2).

• We estimate that 0% of people in China have been infected at least once as of March 14 (Figure 6.1). Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in one location (Figure 7.1).

• The infection-detection rate in China was close to 42% on March 14 (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 no locations, that the Beta variant is circulating in no locations, that the Delta variant is circulating in one location, that the Gamma variant is circulating in no locations, and that the Omicron variant is circulating in two 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 location.
- As of March 14, in the COVID-19 Trends and Impact Survey, 59% of people self-report that they always wore a mask when leaving their home compared to 58% last week (Figure 13.1).
- There were 2,348 diagnostic tests per 100,000 people on March 14 (Figure 15.1).
- As of March 14, three locations have reached 70% or more of the population who have received at least one vaccine dose, and two locations have reached 70% or more of the population who are fully vaccinated (Figure 17.1). 82% of people in China have received at least one vaccine dose, and 77% are fully vaccinated.
- In China, 93.9% 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 the same as last week (Figure 19.1).
- In our current reference scenario, we expect that 1.2 billion people will be vaccinated with at least one dose by July 1 (Figure 20.1). We expect that 77% of the population will be fully vaccinated by July 1.

**Projections and scenarios**

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

- Vaccines are distributed at the expected pace. Brand- and variant-specific vaccine efficacy is updated using the latest available information from peer-reviewed publications and other reports.
- Future mask use is the mean of mask use over the last seven 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 six months after their second dose.
The 80% mask use scenario makes all the same assumptions as the reference scenario but assumes all locations reach 80% mask use within seven days. If a location currently has higher than 80% use, mask use remains at the current level.

The 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 six months.

Projections

Infections

- Daily estimated infections in the reference scenario will rise to 10,436,570 by May 23, 2022 (Figure 22.1).
- Daily estimated infections in the 80% mask use scenario will rise to 6,800,030 by June 2, 2022 (Figure 22.1).
- Daily estimated infections in the third dose scenario will rise to 8,233,370 by May 29, 2022 (Figure 22.1).

Cases

- Daily estimated cases in the reference scenario will rise to 10,296,380 by May 31, 2022 (Figure 22.2).
- Daily estimated cases in the 80% mask use scenario will rise to 6,991,700 by June 10, 2022 (Figure 22.2).
- Daily estimated cases in the third dose scenario will rise to 8,180,310 by June 6, 2022 (Figure 22.2).

Hospitalizations

- Daily hospital census in the reference scenario will rise to 332,890 by June 9, 2022 (Figure 22.3).
- Daily hospital census in the 80% mask use scenario will rise to 218,270 by June 20, 2022 (Figure 22.3).
- Daily hospital census in the third dose scenario will rise to 266,540 by June 16, 2022 (Figure 22.3).

Deaths

- In our reference scenario, our model projects 615,000 cumulative reported deaths due to COVID-19 on July 1. This represents 607,000 additional deaths from March 14 to July 1. Daily reported COVID-19 deaths in the reference scenario will rise to 17,580 by June 20, 2022 (Figure 22.4).
- Under our reference scenario, our model projects 615,000 cumulative total deaths due to COVID-19 on July 1. This represents 607,000 additional deaths from March 14 to July 1 (Figure 22.5).
• In our **80% mask use scenario**, our model projects 350,000 cumulative reported deaths due to COVID-19 on July 1. This represents 341,000 additional deaths from March 14 to July 1. Daily reported COVID-19 deaths in the **80% mask use scenario** will rise to 11,250 by July 1, 2022 (Figure 22.4).

• In our **third dose scenario**, our model projects 455,000 cumulative reported deaths due to COVID-19 on July 1. This represents 446,000 additional deaths from March 14 to July 1. Daily reported COVID-19 deaths in the **third dose scenario** will rise to 13,980 by June 27, 2022 (Figure 22.4).

• Figure 23.1 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.

• At some point from March through July 1, no locations will have high or extreme stress on hospital beds (Figure 24.1). At some point from March through July 1, one location will have high or extreme stress on intensive care unit (ICU) capacity (Figure 25.1).
Model updates

We had previously developed a model in which deaths and the infection-fatality ratio, hospital admissions and the infection-hospitalization ratio, and cases and the infection-detection ratio were all passed into a single run of our ODE system to simultaneously fit past transmission intensity for a given location over time. We have seen improved stability when instead we first derive transmission intensity based on each of the three abovementioned pairs of daily reported epi statistics and estimated ratios in separate SEIR models and then average them.
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

<table>
<thead>
<tr>
<th>Cause name</th>
<th>Weekly deaths</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>42,100</td>
<td>1</td>
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<tr>
<td>Ischemic heart disease</td>
<td>36,039</td>
<td>2</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>19,951</td>
<td>3</td>
</tr>
<tr>
<td>Tracheal, bronchus, and lung cancer</td>
<td>14,561</td>
<td>4</td>
</tr>
<tr>
<td>Stomach cancer</td>
<td>8,107</td>
<td>5</td>
</tr>
<tr>
<td>Alzheimer’s disease and other dementias</td>
<td>6,168</td>
<td>6</td>
</tr>
<tr>
<td>Hypertensive heart disease</td>
<td>6,156</td>
<td>7</td>
</tr>
<tr>
<td>Colon and rectum cancer</td>
<td>5,034</td>
<td>8</td>
</tr>
<tr>
<td>Esophageal cancer</td>
<td>4,948</td>
<td>9</td>
</tr>
<tr>
<td>Road injuries</td>
<td>4,808</td>
<td>10</td>
</tr>
<tr>
<td>COVID-19</td>
<td>2,112</td>
<td>19</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 March 14, 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 March 14, 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 March 14, 2022

Figure 7.1: Mean effective R on March 3, 2022. Effective R less than 1 means that transmission should decline, all other things being held the same. The estimate of effective R is based on the combined analysis of deaths, case reporting, and hospitalizations where available. Current reported cases reflect infections 11-13 days prior, so estimates of effective R can only be made for the recent past.
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 March 14, 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

China
Figure 10.1: Infection-fatality rate on March 14, 2022. 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 March 14, 2022

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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 March 14, 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 March 14, 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>Severe disease</th>
<th>Infection</th>
<th>Severe disease</th>
<th>Infection</th>
<th>Severe disease</th>
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<td>AstraZeneca</td>
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<td>63%</td>
<td>94%</td>
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<td>94%</td>
<td>69%</td>
<td>94%</td>
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<td>94%</td>
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<td>94%</td>
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<td>62%</td>
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<td>61%</td>
<td>64%</td>
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<td>64%</td>
<td>61%</td>
<td>48%</td>
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<tr>
<td>CoronaVac</td>
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<td>47%</td>
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<td>47%</td>
<td>49%</td>
<td>46%</td>
<td>49%</td>
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<td>49%</td>
<td>46%</td>
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<td>Covaxin</td>
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<td>73%</td>
<td>78%</td>
<td>73%</td>
<td>76%</td>
<td>72%</td>
<td>76%</td>
<td>72%</td>
<td>76%</td>
<td>72%</td>
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<td>Johnson &amp; Johnson</td>
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<td>72%</td>
<td>86%</td>
<td>72%</td>
<td>76%</td>
<td>64%</td>
<td>76%</td>
<td>64%</td>
<td>76%</td>
<td>64%</td>
<td>57%</td>
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<td>91%</td>
<td>73%</td>
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<td>82%</td>
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<td>43%</td>
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<td>Pfizer/BioNTech</td>
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<td>86%</td>
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<td>68%</td>
<td>71%</td>
<td>67%</td>
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<td>67%</td>
<td>53%</td>
<td>35%</td>
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<td>Sputnik-V</td>
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<td>86%</td>
<td>89%</td>
<td>85%</td>
<td>89%</td>
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<td>67%</td>
<td>44%</td>
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<tr>
<td>Other vaccines</td>
<td>75%</td>
<td>70%</td>
<td>75%</td>
<td>70%</td>
<td>73%</td>
<td>69%</td>
<td>73%</td>
<td>69%</td>
<td>73%</td>
<td>69%</td>
<td>55%</td>
<td>36%</td>
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<td>Other vaccines (mRNA)</td>
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<td>86%</td>
<td>91%</td>
<td>86%</td>
<td>88%</td>
<td>85%</td>
<td>88%</td>
<td>85%</td>
<td>88%</td>
<td>85%</td>
<td>67%</td>
<td>45%</td>
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Percent of the population having received at least one dose (17.1) and fully vaccinated against SARS-CoV-2 (17.2) by March 14, 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

![Graph showing vaccination rates](image)

Figure 21.1: Percent of people who are immune to Delta or Omicron. Immunity is based on protection due to prior vaccination and infection(s). Moreover, variant-specific immunity is also based on variant-variant specific protection.

![Graph showing immunity against variants](image)
Projections and scenarios

Figure 22.1: Daily COVID-19 infections until July 01, 2022 for three scenarios

Figure 22.2: Daily COVID-19 reported cases until July 01, 2022 for three scenarios
Figure 22.3: Daily COVID-19 hospital census until July 01, 2022 for three scenarios
Figure 22.4: Reported daily COVID-19 deaths per 100,000

The graph shows the reported daily COVID-19 deaths per 100,000 population over time from February 20 to August 22. The data is categorized into different scenarios:

- **Reference**: Baseline scenario without any interventions.
- **Third dose**: Scenario with the administration of a third dose of the vaccine.
- **80% mask use**: Scenario with increased mask use to 80%.

The graph indicates a significant increase in daily deaths in late December 2021, particularly with the implementation of a third dose scenario, highlighting the impact of vaccination on reducing fatalities.
Figure 22.5: Total daily COVID-19 deaths per 100,000

- Reference
- Third dose
- 80% mask use
Figure 23.1: 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) [March 20, 2022], Imperial College London (Imperial) [January 20, 2022], the SI-KJalpha model from the University of Southern California (SIKJalpha) [March 20, 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 24.1: 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 25.1: 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.