COVID-19 Results Briefing

Global

March 6, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 globally. The model was run on March 6, 2021 with data through March 1, 2021.

Steady declines in global cases since early January have reversed. The reversal is driven in a larger part by slowdowns in the US, increases in Central and Eastern Europe, and larger increases in Brazil. The biggest factor driving the increases are the spread of B.1.1.7 in Europe and the US and the spread of P.1 in Brazil and Peru. The spread of P.1 in South America is particularly concerning as evidence is accumulating that there is substantially reduced protection against P.1 and B.1.351 from infection with ancestral variants or B.1.1.7. Given the large epidemics that have occurred already in South America, a large effectively susceptible population in this region can fuel a large increase in infection and death. This region also has very slow vaccine scale-up. Fortunately, the spread of B.1.351 and the associated increase in cases and deaths in Southern Africa appears to have peaked; the reason for the peak, however, remains unclear. The gap between our reference scenario – where we expect 926,000 deaths from now to July 1 – and the worse scenario (with more rapid declines in mask use, increases in mobility, spread of new variants, and lower cross-variant immunity) is very large: 381,000 more deaths. If mask use declines faster or mobility rebounds more quickly as vaccination scales or public fatigue increases, transmission can easily be higher than in our worse scenario. Introduction this week in our model of reduced cross-variant immunity implies the potential for substantial transmission in the Northern Hemisphere next winter, but has little impact by July 1 due to low prevalence of B.1.351 and P.1 in these regions. The impact on South America, however, is profound. The need for securing and delivering vaccines with efficacy against P.1 in South America is very high.

Current situation

• Daily reported cases in the last week increased to 365,600 per day on average compared to 348,900 the week before (Figure 1). This increase is driven by increases in South America, a slowdown in the US, and an increase in Europe.

• Daily deaths in the last week decreased to 9,900 per day on average compared to 10,800 the week before (Figure 2). This makes COVID-19 the number 3 cause of death globally this week (Table 1). Given the lag in cases and deaths and the increased infection-fatality ratio associated with new variants, we expect the decline in deaths to slow and then reverse in the next two weeks.

• The daily death rate is greater than 4 per million in 26 countries (Figure 3).

• We estimated that 11% of people globally have been infected as of March 1 (Figure 4). Some locations in Latin America including in Brazil and Mexico have estimated cumulative infection rates over 65%.
• The global infection-detection rate remains under 25% (Figure 5).

• Based on reported sequencing data, Figure 6 summarizes estimates of variant prevalence. B.1.1.7 is becoming the dominant variant in much of Europe and the Middle East. B.1.351 is the dominant variant in Southern Africa. P.1 is becoming the dominant variant in Peru, Colombia, Venezuela, and most northern states of Brazil.

• The infection-fatality ratio estimated based on seroprevalence data and reported COVID-19 deaths is much lower in sub-Saharan Africa and South Asia than in the US and most of Europe (Figure 7).

Trends in drivers of transmission

• Mobility has increased since early January, reaching 18% lower than the pre-COVID-19 baseline (Figure 8). Mobility was near baseline (within 10%) in 35 countries. Mobility was lower than 30% of baseline in 51 countries.

• Mask use remains constant with 63% of adults reporting that they always wore a mask when leaving their home (Figure 10). Mask use was extremely low in Norway, Finland, Denmark, West Africa, Central Africa, and East Africa.

• There were 100 diagnostic tests per 100,000 people on March 1 (Figure 12).

• The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 37% in Haiti to 93% in Denmark (Figure 15).

• In our current reference scenario, we expect that 2.8 billion will be vaccinated by July 1 (Figure 16).

Projections

• In our reference scenario, which represents what we think is most likely to happen, our model projects 3,893,000 cumulative deaths on July 1. This represents 926,000 additional deaths from March 1 to July 1 (Figure 17). Daily deaths are expected to decline after early April reaching nearly 2,500 a day by July 1 (Figure 18).

• By July 1, we project that 324,200 lives will be saved by the projected vaccine rollout. This does not include lives saved due to vaccination that has already occurred.

• If universal mask coverage (95%) were attained in the next week, our model projects 219,000 fewer cumulative deaths compared to the reference scenario on July 1, (Figure 17).

• Under our worse scenario, our model projects 4,274,000 cumulative deaths on July 1, (Figure 17). This represents 381,000 more deaths than in the reference scenario. Daily deaths decline only slowly in the worse scenario from early April remaining over 7,500 on July 1.

• Daily infections have remarkably different trends across the three scenarios (Figure 19). In the reference scenario, they decline slowly to July 1 remaining over 1.5 million until mid-June. In the worse scenario, daily infections steadily increase, reaching over 3.5 million on July 1.
Figure 20 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.

At some point from March through July 1, 81 countries will have high or extreme stress on hospital beds (Figure 24). At some point from March through July 1, 87 countries will have high or extreme stress on ICU capacity (Figure 22).
Model updates

This week we have modified our SEIR model to allow for reduced cross-variant immunity. The placebo arm of the Novavax South African trial suggests that infection with ancestral variants provided no protection against B.1.351. Over the last three months, the epidemic in Amazonas, Brazil – where more than 70% of the population were previously infected – also suggests that the P.1 variant is likely infecting at high rates those individuals who were previously infected with ancestral variants. Based on these observations, we have modified the SEIR framework to allow for no or partial protection from infection with ancestral variants or B.1.1.7 against B.1.351 or P.1. In this more elaborated model, two critical assumptions substantially determine the impact of new variant scale-up: 1) protection against B.1.351 or P.1 from ancestral or B.1.1.7 infection, and 2) the increase in transmissibility of B.1.351 or P.1 compared to the increment seen in B.1.1.7. The elaborated SEIR model has the compartments shown below. The actual number of compartments is larger, since we track high-risk and low-risk individuals separately.

In our reference scenario, or what we think is most likely to occur, we sample from a uniform distribution ranging from 25% to 50% cross-variant immunity. In the worse scenario, we sample from a uniform distribution ranging from 0% to 50% cross-variant immunity. In the reference scenario, we also assume that the probability of transmission for B.1.351 and P.1 is 25%–75% that of the increase of B.1.1.7 over ancestral variants. This range has been selected to approximate the observed scale-up of the B.1.351 variant in South Africa under conditions of reduced cross-variant immunity. In the worse scenario, the probability of transmission for B.1.351 and P.1 is assumed to be 0–50% of the increase of B.1.1.7 over ancestral variants. The introduction of reduced cross-variant immunity has important impacts in the next four months in settings (such as Brazil) with high ancestral variant cumulative infection and the presence of B.1.351 or P.1. In other settings, with lower cumulative infection from ancestral variants and low prevalence of these escape variants, the impact in our forecasts over the next four months is less pronounced.
Current situation

Figure 1. Reported daily COVID-19 cases

Table 1. Ranking of 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>Ischemic heart disease</td>
<td>175,727</td>
<td>1</td>
</tr>
<tr>
<td>Stroke</td>
<td>126,014</td>
<td>2</td>
</tr>
<tr>
<td>COVID-19</td>
<td>69,244</td>
<td>3</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>63,089</td>
<td>4</td>
</tr>
<tr>
<td>Lower respiratory infections</td>
<td>47,946</td>
<td>5</td>
</tr>
<tr>
<td>Tracheal, bronchus, and lung cancer</td>
<td>39,282</td>
<td>6</td>
</tr>
<tr>
<td>Neonatal disorders</td>
<td>36,201</td>
<td>7</td>
</tr>
<tr>
<td>Alzheimer’s disease and other dementias</td>
<td>31,217</td>
<td>8</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>29,830</td>
<td>9</td>
</tr>
<tr>
<td>Diarrheal diseases</td>
<td>29,509</td>
<td>10</td>
</tr>
</tbody>
</table>
Figure 2. Reported daily COVID-19 deaths and smoothed trend estimate.
**Figure 3.** Daily COVID-19 death rate per 1 million on March 01, 2021

**Figure 4.** Estimated percent infected with COVID-19 on March 01, 2021
Figure 5. 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 to detection rate (IDR) can exceed 100% at particular points in time.
Figure 6. Percent of circulating SARS-CoV-2 for 3 primary variants on March 1, 2021.

A. Percent B.1.1.7 variant

B. Percent B.1.351 variant

C. Percent P1 variant
**Figure 7.** Infection fatality ratio on March 01, 2021. This is estimated as the ratio of COVID-19 deaths to infections based on the SEIR disease transmission model.
Critical drivers

**Figure 8.** Trend in mobility as measured through smartphone app use compared to January 2020 baseline

**Figure 9.** Mobility level as measured through smartphone app use compared to January 2020 baseline (percent)
Figure 10. Trend in the proportion of the population reporting always wearing a mask when leaving home

Figure 11. Proportion of the population reporting always wearing a mask when leaving home on March 01, 2021
Figure 12. Trend in COVID-19 diagnostic tests per 100,000 people

Figure 13. COVID-19 diagnostic tests per 100,000 people on March 01, 2021
Figure 14. Increase in the risk of death due to pneumonia on February 1 2020 compared to August 1 2020.
**Figure 15.** This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and yes, probably).

**Figure 16.** The 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.
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 UK.
- In one-quarter of those vaccinated, mobility increases toward pre-COVID-19 levels.

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

- First, it assumes that variants B.1.351 or P1 begin to spread within 3 weeks in adjacent locations that do not already have B.1.351 or P1 community transmission.
- Second, it assumes that all those vaccinated increase their mobility toward pre-COVID-19 levels.
- Third, it assumes that among those vaccinated, mask use starts to decline exponentially one month after completed vaccination.

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 17.** Cumulative COVID-19 deaths until July 01, 2021 for three scenarios.

**Figure 18.** Daily COVID-19 deaths until July 01, 2021 for three scenarios,
Figure 19. Daily COVID-19 infections until July 01, 2021 for three scenarios.
More information

Data sources:

Mask use data sources include PREMISE; Facebook Global symptom survey (This research is based on survey results from University of Maryland Social Data Science Center) and the Facebook United States symptom survey (in collaboration with Carnegie Mellon University); Kaiser Family Foundation; YouGov COVID-19 Behaviour Tracker survey.

Vaccine hesitancy data are from the COVID-19 Beliefs, Behaviors, and Norms Study, a survey conducted on Facebook by the Massachusetts Institute of Technology (https://covidsurvey.mit.edu/).

Data on vaccine candidates, stages of development, manufacturing capacity, and pre-purchasing agreements are primarily from Linksbridge and supplemented by Duke University.

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.