COVID-19 Results Briefing

Global

March 10, 2021

This document contains summary information on the latest projections from the IHME model on COVID-19 globally. The model was run on March 10, 2021, with data through March 8, 2021.

The declines in daily cases and deaths seen in January and February have now ended. The reversal is driven by three factors. First, the spread of P1 in Brazil, Peru, and some neighboring areas is driving a rapid increase in cases and deaths due to reduced cross-variant immunity. Given that effectively the entire population in these areas may be susceptible or partially susceptible to infection, and the demonstrated past death rate in these populations with ancestral variants, this trend is the most concerning in the global picture. Spread of B.1.1.7, compounded by some increases in mobility and declines in mask use in Europe, appears to be driving transmission back up in most of the region. In the United States, extremely rapid increases in mobility have been reported over the last week, B.1.1.7 is spreading, and there are some state-specific declines in mask use. Transmission is increasing in 19 states, and US cases may begin to increase again depending on the behavioral response. The B.1.351 surge in most of sub-Saharan Africa appears to have peaked and is declining in most countries. In the Northern Hemisphere over the next four months, the rise of vaccination and declining seasonality should be enough to lead to declines in cases and deaths by early April. In South America, the spread of the escape variant P1, combined with increasing seasonality and slow vaccination programs, will likely lead to substantial infections, cases, and deaths. From a global perspective, two issues emerge. First, aiding South America to vaccinate faster with vaccines that are likely effective against P1 could save many lives. Second, encouraging continued mask use and cautious behavior through messaging and social distancing mandates is critical in the Northern Hemisphere to manage the spread of B.1.1.7 in the next months. Looking past July and to later in the year, the most important issue will be managing the spread of the escape variants.

Current situation

- Average daily reported cases stayed constant over the last week at 379,000 (Figure 1).
- Average daily deaths in the last week reached 9,900, essentially unchanged from last week (Figure 2). This makes COVID-19 the number 3 cause of death globally this week (Table 1).
- The daily death rate is greater than 4 per million in 32 countries (Figure 3). The locations with high death rates are in Latin America, some US states, and Europe. Botswana also has a death rate over this threshold.
- We estimated that 11% of people globally have been infected as of March 8 (Figure 4).
Effective R, computed using cases, hospitalizations, and deaths, is greater than 1 in many countries of Europe, multiple states in the United States, and many countries of South America (Figure 5).

Variant B.1.1.7 is widely circulating in Europe, parts of the Middle East, Chile, and Argentina. B.1.351 is the dominant variant in most of southern Africa and some countries in West Africa; P1 is the dominant variant the northern half of South America (Figure 7).

Trends in drivers of transmission

Mobility last week was 17% lower than the pre-COVID-19 baseline, reflecting a general trend up since early January (Figure 9). Mobility was near baseline (within 10%) in 44 countries. Mobility was lower than 30% of baseline in 41 countries.

As of March 8, we estimated that 62% of people always wore a mask when leaving their home (Figure 11). Mask use was lower than 50% in 46 countries.

There were 101 diagnostic tests per 100,000 people on March 8 (Figure 13).

The fraction of the population who are open to receiving a COVID-19 vaccine ranges from 38% in Cameroon to 93% in Denmark (Figure 16).

In our current reference scenario, we expect that 2.8 billion will be vaccinated by July 1 (Figure 17). Currently, approximately 5% of adults are vaccinated, and this is expected to reach nearly 40% by July 1.

Projections

In our reference scenario, which represents what we think is most likely to happen, our model projects 3,870,000 cumulative deaths on July 1, 2021. This represents 832,000 additional deaths from March 8 to July 1 (Figure 18). Daily deaths will increase until early April and then decline to near 2,500 by July 1 (Figure 19).

If universal mask coverage (95%) were attained in the next week, our model projects 182,000 fewer cumulative deaths compared to the reference scenario on July 1, 2021 (Figure 18).

Under our worse scenario, our model projects 4,104,000 cumulative deaths on July 1, 2021 (Figure 18). This represents 234,000 more deaths than in the reference scenario. Daily deaths are over 7,000 in the worse scenario on July 1.

By July 1, we project that 264,200 lives will be saved by the projected vaccine rollout. This does not include lives saved through vaccination that has already occurred.

Daily infections are expected to decline in the reference scenario by the end of March. In the worse scenario, due to more rapid increases in mobility, declines in mask use, and faster variant spread, daily infections begin increasing in early April and reach over 3.5 million on July 1 (Figure 20).

Figure 21 compares our reference scenario forecasts to other publicly archived models. Forecasts are widely divergent.
At some point from March through July 1, 80 countries will have high or extreme stress on hospital beds (Figure 24). At some point from March through July 1, 93 countries will have high or extreme stress on ICU capacity (Figure 23).

Model updates

This week we continue to use the modification of our SEIR model to allow for reduced cross-variant immunity that we introduced last week. The figure below highlights the different compartments that allow us to track the ancestral variants, B.1.1.7, and the escape variants (B.1.351 and P1). Escape variants is a term that reflects that prior infection with ancestral and B.1.1.7 variants does not provide full immunity for these variants. It also captures the fact that available vaccines are less effective against these variants. The actual number of compartments is larger than shown, 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.1.17 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>68,955</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 08, 2021

Figure 4. Estimated percent infected with COVID-19 on March 08, 2021
Figure 5. Mean effective R on February 25, 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 6. 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 7. Percent of circulating SARS-CoV-2 for 3 primary variants on March 8, 2021.

A. Percent B.1.1.7 variant

B. Percent B.1.351 variant

C. Percent P1 variant
Figure 8. Infection fatality ratio on March 08, 2021. This is estimated as the ratio of COVID-19 deaths to infections based on the SEIR disease transmission model.
Critical drivers

Figure 9. Trend in mobility as measured through smartphone app use compared to January 2020 baseline

Figure 10. Mobility level as measured through smartphone app use compared to January 2020 baseline (percent)
Figure 11. Trend in the proportion of the population reporting always wearing a mask when leaving home.

Figure 12. Proportion of the population reporting always wearing a mask when leaving home on March 08, 2021.
Figure 13. Trend in COVID-19 diagnostic tests per 100,000 people

Figure 14. COVID-19 diagnostic tests per 100,000 people on March 08, 2021
Figure 15. Increase in the risk of death due to pneumonia on February 1, 2020 compared to August 1, 2020.

Table 3. 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 (http://www.healthdata.org/node/8584).
**Figure 16.** 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 17.** 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 18.** Cumulative COVID-19 deaths until July 01, 2021 for three scenarios.

**Figure 19.** Daily COVID-19 deaths until July 01, 2021 for three scenarios,
Figure 20. 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.