COVID-19 Results Briefing: Global

January 28, 2021

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

This week we include in our model a scenario of rapid spread of the B.1.351 variant first identified in South Africa and a worse scenario which includes rapid spread of B.1.351 along with more rapid return to pre-COVID-19 mobility levels in the vaccinated. We expect that the combination of extensive social distancing mandates in Europe and the scale-up of vaccination in many high-income countries will, in the reference scenario, lead to declining daily deaths by mid-February; this forecast takes into account the spread of variant B.1.1.7 in England, Portugal, Spain, Belgium, and Denmark.

However, rapid variant spread in the rest of the world, especially B.1.351, can extend the period of daily deaths over 6,000 to May 1. Some countries may see an increase in daily deaths in April with rapid variant spread. Rebound mobility in the vaccinated, combined with new variant spread, as captured in our worse scenario, could lead to daily deaths over 8,000 a day in April and increases in daily deaths in that month in many countries.

Total levels of immunity, if vaccines are only partially protective against infection as opposed to severe disease, may be just under 15% by May 1. In the worse scenario, we can expect that while many locations in the Northern Hemisphere would see relatively low transmission in the summer months, there will be a major spike in transmission in the Southern Hemisphere in July and August. A Northern Hemisphere third wave in the winter of 2021 would be possible. These analyses point to the critical need to moderate the rush to return to normal levels of mobility in vaccinated individuals. There is great value in universal mask use because it can mitigate increases in transmission that come about due to 1) rebounds in mobility, and 2) new variants; this value will become even larger as new variants spread. New variants and rebound mobility would potentially require continued use of social distancing mandates to manage transmission levels to avoid hospital overload in the months from April forward.

Current situation

- Daily reported cases in the last week decreased to 589,800 per day on average compared to 695,700 the week before (Figure 1).
- Daily deaths in the last week increased to 15,750 per day on average compared to 15,180 the week before (Figure 2). This makes COVID-19 the number 3 cause of death globally this week (Table 1).
- Effective R, computed jointly using cases and the infection detection rate, hospitalizations and the infection hospitalization rate, and deaths and the infection-fatality rate, is greater than 1 in southwestern Europe, several states of Mexico and countries of Central America, states in Brazil, and a number of countries in Western and Southern Africa (Figure 3).
We estimated that 8% of people globally have been infected as of January 25 (Figure 4).

Daily death rates are over 4 per million in most of the Northern Hemisphere, South Africa, and many countries in Latin America (Figure 5).

Trends in drivers of transmission

Mobility last week was nearly 25% lower than the pre-COVID-19 baseline (Figure 7). Mobility was near baseline (within 10%) in Wyoming. Regions with substantially depressed mobility include much of North America, Western Europe, Southern Africa, and Southern Latin America.

As of January 25, we estimated that 62% of people always wore a mask when leaving their home (Figure 8). Mask use was lower than 50% in many parts of the African continent, Northern Europe, and Australasia.

There were 99 diagnostic tests per 100,000 people on January 25 (Figure 9).

The fraction of the population who are open to receiving a COVID-19 vaccine ranges from below 60% in some parts of Africa and Central Asia to high levels, above 85%, in most of Latin America and South and Southeast Asia.

We expect that 1.7 billion will be vaccinated by May 1 (Figure 13). With faster scale-up, the number vaccinated could reach more than 2.1 billion people.

Projections

In our reference scenario, which represents what we think is most likely to happen, our model projects 3,441,000 cumulative deaths on May 1, 2021. This represents 933,000 additional deaths from January 25 to May 1 (Figure 13). Daily deaths will stay over 15,000 until mid-February and then decline (Figure 14).

Vaccinations are expected to save 153,000 lives compared to a no-vaccine scenario.

If universal mask coverage (95%) were attained in the next week, our model projects 157,000 fewer cumulative deaths compared to the reference scenario on May 1, 2021 (Figure 13).

In the rapid spread of variants scenario, daily deaths would remain at nearly 6,000 on May 1, 2021. Cumulative deaths on May 1, 2021, would be 3,512,000 (Figure 13).

Under our worst case scenario, our model projects 3,626,000 cumulative deaths on May 1, 2021 (Figure 13).

We estimate that 13.7% of people will be immune on May 1, 2021 (Figure 16).
Model updates

In order to capture the impact of variants and the potential impact of further spread of new variants, we have made changes to our scenarios. We now show results for four scenarios when projecting COVID-19.

The reference scenario is our forecast of what we think is most likely to happen and makes the following assumptions: 1) Vaccines will continue to be distributed at the expected pace. 2) Governments adapt their response by re-imposing social distancing mandates for six weeks whenever daily deaths reach eight per million, unless a location has already spent at least seven of the last 14 days with daily deaths above this rate and not yet re-imposed social distancing mandates, in which case mandates are re-imposed when daily deaths reach 15 per million. 3) Variant B.1.1.7 (first identified in the UK) continues to spread in locations where 100 or more isolates have been detected to date. 4) Mask use stays at current levels.

The rapid variant spread scenario shares assumptions with the reference scenario and in addition, we assume that variant B.1.351 (first identified in South Africa) spreads to everywhere in the world, starting February 1, 2021. Variant B.1.351 spreads at the observed rate that B.1.1.7 spread in London. The variant is assumed to increase the infection-fatality ratio by 29% and transmissibility by 35%. This scenario also assumes that those vaccinated are less effectively protected against variant B.1.351: Pfizer, Moderna, Janssen, and Novavax clinical effectiveness is reduced by 20%; all other vaccines’ clinical effectiveness is reduced by 50%.

The worst case scenario makes the same assumptions as the rapid variant spread scenario and also assumes that mobility moves toward pre-COVID-19 levels as vaccination rates increase.

The universal masks scenario makes all the same assumptions as the reference scenario and also assumes 95% mask usage adopted in public in every location.
In summary, here are the assumptions in each of the four scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Mobility</th>
<th>New variant spread</th>
<th>Vaccination</th>
<th>Mask use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference (most likely to happen)</td>
<td>Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 25% of those vaccinated, mobility returns toward pre-COVID-19 levels.</td>
<td>B.1.1.7 (UK) continues to spread in locations with &gt; 100 cases detected.</td>
<td>Expected pace</td>
<td>Stays at current levels</td>
</tr>
<tr>
<td><strong>Rapid variant increase</strong></td>
<td>Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 25% of those vaccinated, mobility returns toward pre-COVID-19 levels.</td>
<td>• B.1.1.7 (UK) continues to spread in locations with &gt; 100 cases detected.</td>
<td>• Expected pace</td>
<td>Stays at current levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• B.1.351 (S. Africa) spreads everywhere in the world starting Feb 1.</td>
<td>• Vaccines’ effectiveness lower against B.1.351</td>
<td></td>
</tr>
<tr>
<td><strong>Worst case</strong></td>
<td>Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 100% of those vaccinated, mobility returns toward pre-COVID-19 levels.</td>
<td>• B.1.1.7 (UK) continues to spread in locations with &gt; 100 cases detected.</td>
<td>Expected pace</td>
<td>Stays at current levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• B.1.351 (S. Africa) spreads everywhere in the world starting Feb 1.</td>
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<td></td>
</tr>
<tr>
<td><strong>Universal mask use</strong></td>
<td>Mobility in the unvaccinated follows the pattern seen last year associated with seasonality. In 25% of those vaccinated, mobility returns towards pre-COVID-19 levels.</td>
<td>B.1.1.7 (UK) continues to spread in locations with &gt;100 cases detected.</td>
<td>Expected pace</td>
<td>Increases to 95%</td>
</tr>
</tbody>
</table>

Note that scenarios assume the following about social distancing mandates. Governments adapt their response by re-imposing social distancing mandates for six weeks whenever daily deaths reach eight per million, unless a location has already spent at least seven of the last 14 days with daily deaths above this rate and not yet re-imposed social distancing mandates, in which case mandates are re-imposed when daily deaths reach 15 per million.
More details on each of the assumptions

- **How do the new variants scale up over time?**

In locations with more than 100 B.1.1.7 variants sequenced, we have included the further scale-up of the variant. Based on studies reported in England, we assume that B.1.1.7 is 35% more transmissible and the infection-fatality ratio is 29% higher than wild variants.

For B.1.351, we assume that the scale-up of the proportion of cases due to the new variant will follow the trajectory that has been well documented in London and other English locations for B.1.1.7. We assume that the variant is 35% more transmissible and the infection-fatality ratio is 29% higher. In the rapid variant scenario and the worst case scenario, we assume that B.1.351 will be introduced in all locations on February 1. With our assumptions of infectiousness, we find that all locations reach 80% of infections due to B.1.351 by May 19.

- **How effective are the vaccines against the new variants?**

This scenario assumes that those vaccinated are less effectively protected against variant B.1.351: Pfizer, Moderna, Janssen, and Novavax clinical effectiveness is reduced by 20%; all other vaccines’ clinical effectiveness is reduced by 50%.

- **How do we forecast increases in mobility in the worst case scenario?**

We have modified our mobility forecasts to reflect that as the coverage of vaccination increases, there will likely be fewer mandates in place. We reflect this in our model that forecasts mandates by building in an assumption that as vaccine coverage increases, the probability that mandates will stay in place decreases. Specifically, we do this by applying scalar that ranges from 1 when vaccine coverage a month ago was zero to 0.5 when vaccine coverage a month ago was 75%. This scalar is multiplied by the location-specific projections of the percent of mandates that are in place. As data emerge in places with high levels of vaccination, we will modify this assumption in future iterations of the model.
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>110,284</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 2a. Reported daily COVID-19 deaths and smoothed trend estimate.
**Figure 2b.** Estimated cumulative deaths by age group

**Figure 3.** Mean effective R on January 14, 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 4. Estimated percent infected with COVID-19 on January 25, 2021
Figure 5. Daily COVID-19 death rate per 1 million on January 25, 2021
Critical drivers

**Figure 6.** Total number of mandates
**Figure 7a.** Trend in mobility as measured through smartphone app use compared to January 2020 baseline

**Figure 7b.** Mobility level as measured through smartphone app use compared to January 2020 baseline (percent)
Figure 8a. Trend in the proportion of the population reporting always wearing a mask when leaving home.

Figure 8b. Proportion of the population reporting always wearing a mask when leaving home on January 25, 2021.
Figure 9a. Trend in COVID-19 diagnostic tests per 100,000 people

Figure 9b. COVID-19 diagnostic tests per 100,000 people on January 22, 2021
Figure 10. Increase in the risk of death due to pneumonia on February 1 compared to August 1
**Figure 11.** 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 unsure).

**Figure 12.** The number of people who receive any vaccine and those who are immune, 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 four 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 which case mandates are re-imposed when daily deaths reach 15 per million. Variant B.1.1.7 (first identified in the UK) continues to spread in locations where 100 or more isolates have been detected to date.

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The worst case scenario makes the same assumptions as the rapid variant spread scenario but also assumed that in those that are vaccinated mobility moves towards pre-COVID-19 levels.

The universal masks scenario makes all the same assumptions as the reference scenario but also assumes 95% mask usage adopted in public in every location. Figure 13. Cumulative COVID-19 deaths until May 01,
2021 for four scenarios.

**Figure 14.** Daily COVID-19 deaths until May 01, 2021 for four scenarios,
**Figure 15.** Daily COVID-19 infections until May 01, 2021 for four scenarios.

**Figure 16.** Month of assumed mandate re-implementation. We assume that 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 which case mandates are assumed to be re-imposed when daily deaths reach 15 per million.
Figure 17. Forecasted percent infected with COVID-19 on May 01, 2021

Figure 18. Daily COVID-19 deaths per million forecasted on May 01, 2021 in the reference scenario
Table 2. Ranking of COVID-19 among the leading causes of mortality in the full year 2020. Deaths from COVID-19 are projections of cumulative deaths on Jan 1, 2021 from the reference scenario. Deaths from other causes are from the Global Burden of Disease study 2019 (rounded to the nearest 100).

<table>
<thead>
<tr>
<th>Cause name</th>
<th>Annual deaths</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic heart disease</td>
<td>9,137,800</td>
<td>1</td>
</tr>
<tr>
<td>Stroke</td>
<td>6,552,700</td>
<td>2</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>3,280,600</td>
<td>3</td>
</tr>
<tr>
<td>Lower respiratory infections</td>
<td>2,493,200</td>
<td>4</td>
</tr>
<tr>
<td>COVID-19</td>
<td>2,151,032</td>
<td>5</td>
</tr>
<tr>
<td>Tracheal, bronchus, and lung cancer</td>
<td>2,042,600</td>
<td>6</td>
</tr>
<tr>
<td>Neonatal disorders</td>
<td>1,882,400</td>
<td>7</td>
</tr>
<tr>
<td>Alzheimer’s disease and other dementias</td>
<td>1,623,300</td>
<td>8</td>
</tr>
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<tr>
<td>Diarrheal diseases</td>
<td>1,534,400</td>
<td>10</td>
</tr>
</tbody>
</table>
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.