[2] COVID-19 infection and mortality tracking in the US and around the world

This section analyzes COVID infections and mortality reported to local, federal and intergovernmental agencies, and are heavily influenced by testing rates and differences in government reporting standards and capabilities. As we explain in Section 4, serology tests suggest that the true number of COVID infections may be 10x-20x higher than the number of reported infections. However, trends in reported infections are still important to monitor, since they influence government policy and the behavior of citizens and companies.

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Comments on infection data. In part 6, several countries show up with almost no COVID outbreak reported. In cases like New Zealand, Taiwan, Japan, Vietnam and South Korea, we interpret the lack of a material outbreak as possible based on the quality of data reporting and testing taking place. Other countries which report practically no material incidence of COVID include Nigeria, Kenya, Angola, DR Congo, Tanzania and Mozambique. According to various news reports1, there’s a shortage of reliable data in many of these countries, and the lack of funds to carry out broad scale testing. On the other hand, while infections can be obscured, it’s harder to obscure a sharp rise in mortality; even when accounting for some under-reporting of deaths, Africa mortality rates are still much lower than expected. The few antibody surveys conducted in Africa reveal COVID prevalence that is similar to other European countries; in other words, COVID is spreading in Africa as it is elsewhere. The most likely explanation for lower relative mortality is age: Africa’s median age is 18, compared to 35 in North America and 42 in Europe. Since those over age 65 experience 80% of COVID mortality, age distributions are the most likely reason for lower African COVID mortality rates.

Additional supplementary materials are available upon request: COVID mortality distributions and probabilities by age bracket and US state, COVID mortality per mm vs Case Fatality Rates by country and US state, and COVID infections by age group by US state.

On data sources. We generally use infection and mortality data from Johns Hopkins, with any exceptions noted in chart sources. While JHU data usually match sources such as covidtracking.com and Worldometers, this is not always the case. Any large differences usually work themselves out over time; even so, such differences are a warning against over-extrapolating any short term trends seen in the data. There are also patterns in some countries in which tests and infections drop over the weekend, only to rise the following week. Other anomalies: countries and US states sometimes make large one-time additions or subtractions to infections or deaths data to reflect over- or underestimations made over the course of the entire pandemic. JHU and other data providers do not amortize such adjustments over time and simply reflect them on the day they are made; we do the same.

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**What’s new: US hotspots, Northeast US, Europe, testing intensity of infection spike**

- US hotspot positive testing rates above 20%
- “Big Sky” US states are experiencing infection levels that are around 6x higher than adjacent Canadian provinces
- The Northeastern US is now experiencing a material rise in infections as well after a very quiet summer
- The increase in infections in Western Europe surpasses Spring levels; infections are starting to roll over, particularly in France, Belgium and Switzerland, and if so, mortality should follow
- Increased testing explains much of the infection spike in the US and Spain, but much less of the infection spike in the rest of Europe

**Hotspots: ID IL IA KS MN MT NE ND SD WI WY**

<table>
<thead>
<tr>
<th>Positive tests/total tests</th>
<th>Total daily tests (000's)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**What a difference a border makes**

<table>
<thead>
<tr>
<th># of days after total reported cases reaches 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>- &quot;Big Sky&quot; US states (ID, MT, ND, SD, WI, WY)</td>
</tr>
<tr>
<td>- Western Canada (Sask, Alberta, Manitoba)</td>
</tr>
</tbody>
</table>

**Northeast**

US new daily infections per mm people, 7 day avg

- CT
- NJ
- MA
- NY

**Europe daily infections vs mortality**

<table>
<thead>
<tr>
<th># of days after total reported cases reaches 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Infections per mm (LHS)</td>
</tr>
<tr>
<td>- Hosp (na)</td>
</tr>
<tr>
<td>- Deaths per mm (RHS)</td>
</tr>
</tbody>
</table>

**US vs Europe infections**

New daily infections per mm people, 7 day avg

- US
- Europe

**% of infection spike since Labor Day explained by increased testing**

- Spain
- US
- France
- Germany
- Netherlands
- Iceland
- Italy
- Switzerland
- Belgium
- United Kingdom

**Source:** COVID Tracking Project, JPMAM. 11/15/2020. 7 day avgs.

**Source:** Johns Hopkins University, IMF, JPMAM. November 15, 2020

**Source:** JHU, JPMAM. November 15, 2020

**Source:** Johns Hopkins University, IMF, JPMAM. November 15, 2020

**Source:** JHU, OWID, JPMAM. 11/15/2020.
What’s new: Scandinavia, Eastern Europe, India

- Infections in many Latin American countries are rolling over now from very high levels
- Sweden model failing again vs Scandinavian neighbors
- Eastern Europe seeing substantial outbreak for the first time; Czech Republic finally rolling over while most other country infections still rising
- So far, infections relatively constrained on a per capita basis in India, Nepal and Bangladesh compared to other parts of the world (< 100 per mm per day), but infection accuracy unclear
- With the exception of Japan, Infections remain subdued in Developed Asia (< 10 per mm per day)
- Even in Germany, second wave is 2x the first one

[Charts for Latin America, Scandinavia, Eastern Europe, India, and Western Europe showing new daily infections per mm people, 7 day avg]
Summary of global and US infection/mortality trends

**World daily infections vs mortality**

![Graph showing world daily infections vs mortality](image1)

Source: JHU, JPMAM. 11/15/2020. 7 day avg.

**US daily infections vs mortality**

![Graph showing US daily infections vs mortality](image2)

Source: JHU, COVID Tracking, JPMAM. 11/15/2020. 7 day avg.

**Dev World ex-US daily infections vs mortality**

![Graph showing Dev World ex-US daily infections vs mortality](image3)

Source: JHU, JPMAM. 11/15/2020. 7 day avg.

**S America daily infections vs mortality**

![Graph showing S America daily infections vs mortality](image4)

Source: JHU, JPMAM. 11/15/2020. 7 day avg.

**US vs Europe infections**

New daily infections per mm people, 7 day avg

![Graph showing US vs Europe infections](image5)

Source: Johns Hopkins University, IMF, JPMAM. November 15, 2020

**US vs Europe mortality**

Daily deaths per mm people, 7 day avg

![Graph showing US vs Europe mortality](image6)

Source: Johns Hopkins University, IMF, JPMAM. November 15, 2020
COVID at a glance: infections and mortality per mm, and the falling age of infected persons

Lower mortality rates in the developed world

Lower mortality rates in the developed world (when compared to the spring of 2020) appear to reflect the lower age of more recently infected persons, less overcrowded hospitals, and more informed standards of patient care (less unnecessary ventilation when oxygenation will suffice, and the use of steroids and blood thinners). The charts below show shifting COVID patient age levels for the US and Switzerland. In Section 3, see pages 8-9 for a discussion of the empirically measured benefits of steroids like dexamethasone and of anti-coagulants and other blood thinners.

Median age of individuals with positive SARS-CoV-2 PCR test results, Years

Source: CDC. October 2020.

Switzerland first wave vs second wave

Distribution of COVID infections by age group

Infections and mortality snapshots: current vs peak levels of infection and mortality

The two charts below show peak and current levels of infection (top chart) and mortality (bottom chart) for the 50 largest countries in the world based on GDP. These countries represent 94% of global GDP.

**Infection levels for the largest 50 countries based on GDP, peak vs current**

Sorted by trailing 7 day average infection rate per mm people

**Mortality levels for the largest 50 countries based on GDP, peak vs current**

Sorted by trailing 7 day average mortality rate per mm people

Source: Johns Hopkins University, IMF, JPMAM. Countries shown represent 94% of World GDP. November 15, 2020.
The three charts below show peak and current levels of infection (first chart), mortality (second chart) and the positive testing rate (third chart) for the 50 US states and DC.

**Infection levels for US states: peak vs current**
Sorted by trailing 7 day average infection rate per mm people

**Mortality levels for US states: peak vs current**
Sorted by trailing 7 day average mortality rate per mm people

**Positive testing rate for US states**
Sorted by trailing 14 day average positive testing rate

Source: Johns Hopkins University, IMF, JPMAM. November 15, 2020.

US hotspot infection, hospitalization and mortality tracking

The charts below track infection, hospitalization, testing, mortality and doctor visit data for the US in aggregate and for US infection hotspots. See section 5 for a state-by-state chartpack which covers the full range of infection, mortality, hospitalization, testing and hospital utilization data.

2 We dynamically define hotspot states in three ways: the largest one-month increase in new daily infections per mm people, the highest levels of infection and the highest rates of positive PCR testing. If a state shows up as top 7 on any of these 3 metrics, they are included as a hotspot.
Hotspots: ID IL IA KS MN MT NE ND SD WI WY
New daily infections per mm
Percentage

Source: COVID Tracking, CMU, JPMAM. 11/15/2020. 7 day avgs.

Infections by state category
US new daily infections per mm people, 7 day avg

Source: Johns Hopkins University, IMF, JPMAM. November 15, 2020

Hospitalizations by state category
US current hospitalizations per mm people, 7 day avg

Source: COVID Tracking Project, IMF, JPMAM. November 15, 2020

Mortality by state category
US daily deaths per mm people, 7 day avg

Source: Johns Hopkins University, IMF, JPMAM. November 15, 2020

Testing by state category
US daily tests per mm people, 7 day avg

Source: Johns Hopkins University, IMF, JPMAM. November 15, 2020
Why aren’t US infections declining more rapidly?

The US does not have internal border controls; as a result, focusing too much on infections at the state level ignores the ease with which US citizens cross state lines. As shown below, former Hotspot states have now transmitted the infection to new Hotspot states.

Without border controls, Hotspots keep shifting

![Map showing US states with color-coded hotspots]

Source: JHU, JPMAM. November 9, 2020.
Country level infection, hospitalization and mortality trends

This section contains infection, hospitalization and mortality trends for the 68 countries that are among the Top 50 Countries by GDP, or among the Top 50 Countries by Population. The country charts appear in descending order of GDP, and are all scaled relative to Europe for comparability purposes. Note that high frequency hospitalization data is only available for a subset of the countries below.

US daily infections vs mortality

Source: JHU, COVID Tracking, JPMAM. 11/15/2020. 7 day avg.

China daily infections vs mortality

Source: JHU, JPMAM. 11/15/2020. 7 day avg.

Japan daily infections vs mortality

Source: JHU, JPMAM. 11/15/2020. 7 day avg.

Germany daily infections vs mortality

Source: JHU, JPMAM. 11/15/2020. 7 day avg.

India daily infections vs mortality

Source: JHU, JPMAM. 11/15/2020. 7 day avg.

United Kingdom daily infections vs mortality

Source: JHU, ECDC, JPMAM. 11/15/2020. 7 day avg.

France daily infections vs mortality

Source: JHU, ECDC, JPMAM. 11/15/2020. 7 day avg.

Italy daily infections vs mortality

Source: JHU, ECDC, JPMAM. 11/15/2020. 7 day avg.

Brazil daily infections vs mortality

Source: JHU, JPMAM. 11/15/2020. 7 day avg.
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