
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. Serology tests suggest that the true number of COVID infections may be much 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. 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. Other countries which report low incidence of COVID include Nigeria, Kenya, Angola, DR Congo, Tanzania and Mozambique. As per various news reports1, there’s a shortage of reliable data in many of these countries, and the lack of funds to carry out broad 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.

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.

Summary of infection and mortality trends by region

Delta infections are rolling over in the developed world. Pass-through to hospitalization and mortality has been lower than during prior COVID waves due to the effectiveness of vector and mRNA vaccines, and due to the lower age of many newly infected unvaccinated persons. In the Emerging countries for which we have more confidence in reported data, mortality is tracking infections due to lower rates of vaccination. Fourth chart shows how US states currently represent most of the Global Hotspots shown below.
**25 highest infection rates vs Dev World ex-US**

Daily infections, # per mm; US states, top 50 countries by GDP

Source: Johns Hopkins University, IMF, JPMAM. October 24, 2021.

**25 highest mortality rates vs Dev World ex-US**

Daily deaths, # per mm; US states, top 50 countries by GDP

Source: Johns Hopkins University, IMF, JPMAM. October 24, 2021.

**US / Canada / Europe**

Daily infections, # per mm, smoothing = 7 days


**Vaccination, mortality and infection trends by region**

Mortality per million people, 14 day avg; percentage = unique people vaccinated as % of population

Source: Johns Hopkins University, IMF, JPMAM. October 24, 2021.
What’s new: In the US, COVID risks among the unvaccinated

- US infections, mortality and hospitalizations are starting to roll over
- Overall hospitalization is higher for some states than during the pre-vaccination winter 2020/2021 period

**US**

Source: JHU, IMF, HHS, JPMAM. Oct 24, 2021. 7 day smoothing.

**Hotspots: AK ID MT ND OK WV WY**

Source: JHU, IMF, HHS, JPMAM. Oct 24, 2021. 7 day smoothing.

**Current hospitalization levels vs winter 2020/2021 average**

15 largest ratios

What’s new: Europe

- UK Delta variant wave less severe (mortality and hospitalization) since 94% of people over 50 are vaccinated
- Delta variant showing up in Continental Western Europe as well; hospitalizations and mortality showing a very small rise, reflective of high levels of vaccination

United Kingdom

![Graph showing daily infections, current hospitalizations, and daily deaths in the United Kingdom](image)

Source: JHU, IMF, OWID, JPMAM. Oct 24, 2021. 7 day smoothing.

W Europe

Current hospitalizations, # per mm, smoothing = 7 days

![Graph showing current hospitalizations in Western Europe](image)


W Europe

Daily infections, # per mm, smoothing = 7 days

![Graph showing daily infections in Western Europe](image)


W Europe

Daily deaths, # per mm, smoothing = 14 days

![Graph showing daily deaths in Western Europe](image)


Scandinavia

Daily infections, # per mm, smoothing = 7 days

![Graph showing daily infections in Scandinavia](image)


W Europe

Daily infections, # per mm, smoothing = 7 days

![Graph showing daily infections in Western Europe](image)

What’s new: South America, Central America, Caribbean

- Case counts and mortality have been declining sharply from very high levels. Note that Gamma and Lambda variants have been more prevalent than Delta variant

South America

Daily infections, # per mm, smoothing = 7 days


South America

Daily deaths, # per mm, smoothing = 14 days


Caribbean

Daily infections, # per mm, smoothing = 7 days


Central America

Daily infections, # per mm, smoothing = 7 days

What’s new: Asia and India

- Infections remain low in Developed Asia outside Singapore
- Malaysia infections and deaths rolling over after spiking in September

**Developed Asia**

Daily infections, # per mm, smoothing = 7 days

**EM Asia**

Daily infections, # per mm, smoothing = 7 days

**Other Asia**

Daily infections, # per mm, smoothing = 7 days

**India region**

Daily infections, # per mm, smoothing = 7 days

**India region**

Daily deaths, # per mm, smoothing = 14 days

**EM Asia**

Daily deaths, # per mm, smoothing = 14 days

**Other Asia**

Daily deaths, # per mm, smoothing = 14 days

**India region**

Daily deaths, # per mm, smoothing = 14 days
What’s new: MidEast, Israel, Africa

- Israel infections and deaths are rolling over. Israel saw high levels of infection during the Delta wave despite a 70% vaccination rate. See Section 1 on evidence of fading immunity in Israel.

- Africa infections are rolling over. While reported infections in Africa are lower than in India/LatAm, there are questions about reliability of African data and many of its healthcare systems are less equipped to handle the increase in sick patients.

### MidEast

Daily infections, # per mm, smoothing = 7 days


### Israel

Daily infections, # per mm (LHS)

Current hospitalizations # per mm (LHS)

Daily deaths # per mm (RHS)

Source: JHU, IMF, OWID, JPMAM. Oct 24, 2021. 7 day smoothing.

### Northern Africa

Daily infections, # per mm, smoothing = 7 days


### Southern Africa

Daily infections, # per mm, smoothing = 7 days

What’s new: Russia and Eastern Europe

Russia region
Daily infections, # per mm, smoothing = 7 days

E Europe
Daily infections, # per mm, smoothing = 7 days

COVID at a glance: infections and mortality per mm in the developing world

Normally we show infection and mortality data in linear terms. But when comparing across the Emerging World, the dispersions are too great to properly grasp on a linear axis so we use a log scale instead. As a reminder, on a log scale each increment represents an increase of 10x vs the prior value. **To be clear, there are substantial uncertainties regarding the accuracy of COVID infections and deaths reported in some countries; this chart shows the data as reported by Johns Hopkins.**

**Infection and mortality trends in Africa, EM Asia, S America, C America, M East, E Europe**

Mortality per million people, 14 day average, log scale

Source: Johns Hopkins University, IMF, JPMAM. October 24, 2021.
**Infection, mortality and hospitalization snapshots**

The two charts below show current rates of infection and mortality compared to the rate 21 days ago 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

Sorted by trailing 7 day average infection rate per mm people

Source: Johns Hopkins University, IMF, JPMAM. Countries shown represent 94% of World GDP. October 24, 2021.

### Mortality levels for the largest 50 countries based on GDP

Sorted by trailing 14 day average mortality rate per mm people

Source: Johns Hopkins University, IMF, JPMAM. Countries shown represent 94% of World GDP. October 24, 2021.

### Case fatality rates for the largest 50 countries based on GDP

Sorted by case fatality rate (mortality divided by reported infections)

Source: Johns Hopkins University, IMF, JPMAM. Countries shown represent 94% of World GDP. October 24, 2021.
The charts below show current rates of infection, mortality and hospitalization compared to the rate 21 days ago for the 50 US states and DC.

Infection levels for US states
Sorted by trailing 7 day average infection rate per mm people

Mortality levels for US states
Sorted by trailing 14 day average mortality rate per mm people

Hospitalization levels for US states
Sorted by trailing 7 day average current hospitalizations per mm people

Source: Johns Hopkins University, IMF, JPMAM. October 24, 2021.

Global testing data

The charts below track infection, hospitalization, testing and mortality data for the US in aggregate as well as a comparison of testing levels across the largest 50 countries by GDP. See section 3 for a chartpack which covers the full range of infection, hospitalizations and mortality for countries and US states.

US

Source: JHU, IMF, HHS, JPMAM. Oct 24, 2021. 7 day smoothing.

US testing: 40 testing states

Daily tests, # per mm, smoothing = 7 days


Testing levels for the largest 50 countries based on GDP

Sorted by trailing 7 day average testing rate per mm people

Source: OWID, JHU, IMF, JPMAM. Countries shown represent 94% of World GDP. October 24, 2021.

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2 40 states report the total number of “testing encounters” or “testing specimens”; the rest show the number of people tested each day that have never been tested before or include untested probable cases. We only compute testing rates for the 40 states that provide encounter or specimen data.
How lethal is COVID, and for whom?

Let’s first compare it to the flu. A key issue to keep in mind: there’s a difference between **case fatality rates** (deaths as a % of reported cases) and **infection fatality rates** (deaths as a % of all infected people, whether symptomatic or not). The latter can only be derived through antibody testing and other sampling methods involving molecular assessments of infection. The IFR of the seasonal flu is reported to be well below 0.1% with other estimates ranging from 0.02% to 0.04%. In contrast, the IFR for COVID has been estimated at 0.23% by Stanford’s Metaresearch Innovation Center, and at 0.7%-0.9% by the CDC. Either way, COVID is significantly more lethal than the seasonal flu. Tracking “excess” abnormal death levels is another way to understand the incremental mortality impact of COVID (see second chart). In addition to higher mortality than the flu, COVID also appears to entail **more longer-lasting medical complications** (see web portal section 5).

### Flu vs COVID-19 infection fatality rates

<table>
<thead>
<tr>
<th>Source</th>
<th>Flu IFR (%)</th>
<th>COVID-19 IFR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Oxford</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>CDC</td>
<td>0.4%</td>
<td></td>
</tr>
<tr>
<td>Stanford Meta-Research</td>
<td>0.6%</td>
<td></td>
</tr>
<tr>
<td>Innovation Center (global)</td>
<td>0.8%</td>
<td></td>
</tr>
<tr>
<td>University of Wollongong (global)</td>
<td>1.2%</td>
<td></td>
</tr>
<tr>
<td>CDC US Seroprevalence Survey</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>Imperial College London (global)</td>
<td>1.0%</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** CDC, WHO, Stanford, Oxford, Imperial College London, University of Wollongong. 2020.

### Mortality by age in the US

The first section in the table below shows the distribution of US COVID deaths by age bracket. People over the age of 85 represent around 1/3 of all COVID fatalities to-date. However, the number of people over age 85 is much smaller than other age cohorts; as a result, fatality risks are much greater for people in this age group. The second section reflects this by showing deaths to date per mm people in each age bracket (you can divide one number by another to obtain relative mortality probabilities). The third section looks specifically at mortality risk across age brackets relative to older populations. For example, a person aged 55-64 is only around 14% as likely to die from COVID compared to someone over the age of 75, and only around 8% as likely to die as someone over the age of 85. Differences across states are generally minor.

#### DISTRIBUTION OF ACTUAL MORTALITY: Mortality to-date by age group, % of total mortality

<table>
<thead>
<tr>
<th>Age Group</th>
<th>&lt; 1 yr</th>
<th>1-4 yrs</th>
<th>5-14 yrs</th>
<th>15-24 yrs</th>
<th>25-34 yrs</th>
<th>35-44 yrs</th>
<th>45-54 yrs</th>
<th>55-64 yrs</th>
<th>65-74 yrs</th>
<th>75-84 yrs</th>
<th>&gt; 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>1.0%</td>
<td>2.5%</td>
<td>6.2%</td>
<td>13.9%</td>
<td>22.5%</td>
<td>26.3%</td>
<td>27.4%</td>
</tr>
</tbody>
</table>

#### MORTALITY RATES FOR EACH AGE BRACKET: COVID deaths to-date per mm population in each age group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>&lt; 1 yr</th>
<th>1-4 yrs</th>
<th>5-14 yrs</th>
<th>15-24 yrs</th>
<th>25-34 yrs</th>
<th>35-44 yrs</th>
<th>45-54 yrs</th>
<th>55-64 yrs</th>
<th>65-74 yrs</th>
<th>75-84 yrs</th>
<th>&gt; 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>33</td>
<td>4</td>
<td>4</td>
<td>38</td>
<td>153</td>
<td>425</td>
<td>1,079</td>
<td>2,335</td>
<td>5,101</td>
<td>11,748</td>
<td>29,524</td>
</tr>
</tbody>
</table>

#### RELATIVE MORTALITY RISK: risk of dying across age brackets

<table>
<thead>
<tr>
<th>Relative to 85+</th>
<th>&lt; 1 yr</th>
<th>1-4 yrs</th>
<th>5-14 yrs</th>
<th>15-24 yrs</th>
<th>25-34 yrs</th>
<th>35-44 yrs</th>
<th>45-54 yrs</th>
<th>55-64 yrs</th>
<th>65-74 yrs</th>
<th>75-84 yrs</th>
<th>&gt; 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative to 75+</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.5%</td>
<td>1.4%</td>
<td>3.7%</td>
<td>7.9%</td>
<td>17.3%</td>
<td>39.8%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Source:** CDC, JPMAM. October 9, 2021.
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