

Test positivity rate: How this one figure explains that the US isn't doing enough testing yet

31 July 2020, by Ronald D. Fricker, Jr.



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The U.S. has performed [more coronavirus tests](#) than any other country in the world. Yet, at the same time, the U.S. is notably underperforming in terms of suppressing COVID-19. Confirmed cases—as well as deaths—are surging in many parts of the country. Some people have argued that the increase in cases is solely due to increased testing.

[I am a statistician](#) who studies how mathematics and statistics can be used to track diseases. The claim that the increase in cases is only caused by increases in testing is just not true. But how do [public health officials](#) know this?

Testing, confirmed cases and total cases

COVID-19 testing has two purposes. The first is to confirm a diagnosis so that medical treatment can be appropriately rendered. The second is to do surveillance for tracking and disease suppression—including finding those who may be asymptomatic or only have mild symptoms—so that individuals and public health officials can take

actions to slow the spread of the virus.

At a White House briefing on July 13, the president said, "[When you test, you create cases.](#)"

The problem with this statement is that anyone who is infected with the coronavirus is, by definition, a case. Since taking a COVID-19 [test](#) does not cause a person to get coronavirus, just like taking a [pregnancy test](#) does not cause one to become pregnant, the president's claim is false. Testing does not create cases.

However, because many COVID-19 cases are asymptomatic, many people are infected and don't know it. What COVID-19 testing does do is identify unknown cases. And thus it does increase the number of cases that are known, or otherwise called the confirmed case count.

Finding unknown cases is good, not bad, because identifying those who are COVID-19-positive allows individuals and public health officials to take actions that slow the spread of the disease. When public health officials find cases, they can begin contact tracing. When a person finds out they are infected, they will know to quarantine.

Since the beginning of the pandemic, the U.S. has performed [more total tests and more tests per capita than any other country](#), though as of late July [the U.K., Russia and Qatar were performing more tests per capita per day](#). But counting the total number of tests or the tests per capita is not the right way to judge success of a testing program.

As it says on the [Johns Hopkins testing comparison page](#), a country's "testing program should be scaled to the size of their epidemic, not the size of the population." Sure, the U.S. might have a big testing program, but it has a massive epidemic. The

U.S. needs an equally massive testing program if health officials want to have an accurate picture of what's really going on.

Test positivity rate

So how do public health officials know if they are doing enough testing?

Better than simply counting total number of tests, the test positivity rate is a useful measure of whether enough tests are being done. The test positivity rate is simply the fraction of tests that come back positive. It is calculated by dividing the number of positive tests by the total number of tests. Generally, a lower test positivity rate is good.

A good way to think about test positivity is to think about fishing with a net. If you catch a fish almost every time you send the net down—high test positivity—that tells you there are probably a lot of fish around that you haven't caught—there are a lot of undetected cases. On the other hand, if you use a huge net—more testing—and only catch a fish every once in a while—low test positivity—you can be pretty sure that you've caught most of the fish in the area.

According to the World Health Organization, before a region can relax restrictions or begin reopening, the test positivity rate from a comprehensive testing program should be [at or below 5%](#) for at least 14 days.

There are two ways to lower a test positivity rate: either by decreasing the number of positive tests or by increasing the total number of tests. A comprehensive testing program does both. By conducting a large number of tests, most cases in the community are detected. Then, individual and government actions can be taken that contain the virus. This results in a declining number of positive tests.

Returning to the fishing metaphor, the goal of a comprehensive testing program is to use a huge net to overfish in the [coronavirus](#) lake until there are very few COVID-19 cases left. Using the test positivity rate as a measure of success helps ensure that a testing [program](#) is appropriately

scaled to the size of an epidemic.

As of July 27, the U.S. as a whole had a [test positivity rate of 10%](#). States where testing programs are robust and the virus is fairly well controlled have test positivity rates well below 5%, like [Massachusetts at 2.68%](#) and [New York at 1.09%](#). In places like Mississippi and Arizona that are experiencing large outbreaks, [test positivity rates are above 20%](#).

The right amount of testing

The increases in confirmed cases aren't occurring just because there is more testing. The high test positivity rates in some locations show that the virus is in fact spreading and growing so testing needs to grow with it. I believe that if the U.S. wants to beat back this virus, one of the first things that needs to happen is to increase testing. We need to deploy larger nets to catch more fish. Yes, we'll find more cases, but that's the point.

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