

Former CDC director Tom Frieden on 3 key questions about the novel coronavirus in Wuhan, China

By TOM FRIEDEN JANUARY 22, 2020



Pedestrians in Tokyo wear protective masks after Japan's government said that a man treated for pneumonia after returning from China has tested positive for a new coronavirus identified as a possible cause of an outbreak in Wuhan, China.

EUGENE HOSHIKO/AP

There may or may not always be [something new out of Africa](#), as the saying goes, but there's always something new out of the microbial world. Scientists find an average of one new pathogen every year. The decade is off to a quick start with a newly discovered virus that started sickening — and sometimes killing — people in [Wuhan, China](#). It [may have spread to Japan](#), and just caused the [first infection in the United States](#).

The new virus is a coronavirus. Some coronaviruses don't infect humans, others do but cause only minor illness. Some can cause severe illness in a high proportion of those infected by it, like the coronavirus responsible for severe acute respiratory syndrome (SARS), which sickened more than 8,000 people globally in 2003, killing nearly 800.

Here are three key questions to be answered about the new coronavirus, and some emerging answers to these questions.

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Despite the ubiquity of NCDs, solutions cannot be “one size fits all.” We must address the variability that exists in the burden of NCDs across nations and intervention strategies.

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First: How readily does this new coronavirus spread? In the dry language of epidemiology, the question is “What’s the R_0 ?” The higher the R_0 (pronounced r-zero), the more rapid and extensive the spread. (There’s a memorable explanation of R_0 in the movie “[Contagion](#).” Kate Winslet, playing a CDC epidemiologist, explains the concept to terrified local government leaders.) The answer, so far is, “We have no idea.”

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It’s clear that the virus spreads from person to person. Many of those affected, including the man diagnosed with it [in the U.S.](#), had no known contact with a [live animal market](#), which is where the virus is believed to

have first spread from animals to people.

The assertion that the infection emerged because of contact at a live animal market, while plausible, at this point is just a theory. Microbes can be highly contagious: One person with measles is [able to infect hundreds](#) of others if they are not immune. They can also be not very contagious, like rabies, which rarely spreads from one person to another. Sometimes organisms spread to just a few people, particularly close contacts such as family caregivers, and then stop.

But the World Health Organization [has now indicated](#) that there “may be sustained human to human” transmission, which means the virus could potentially spread widely, and for a long time.

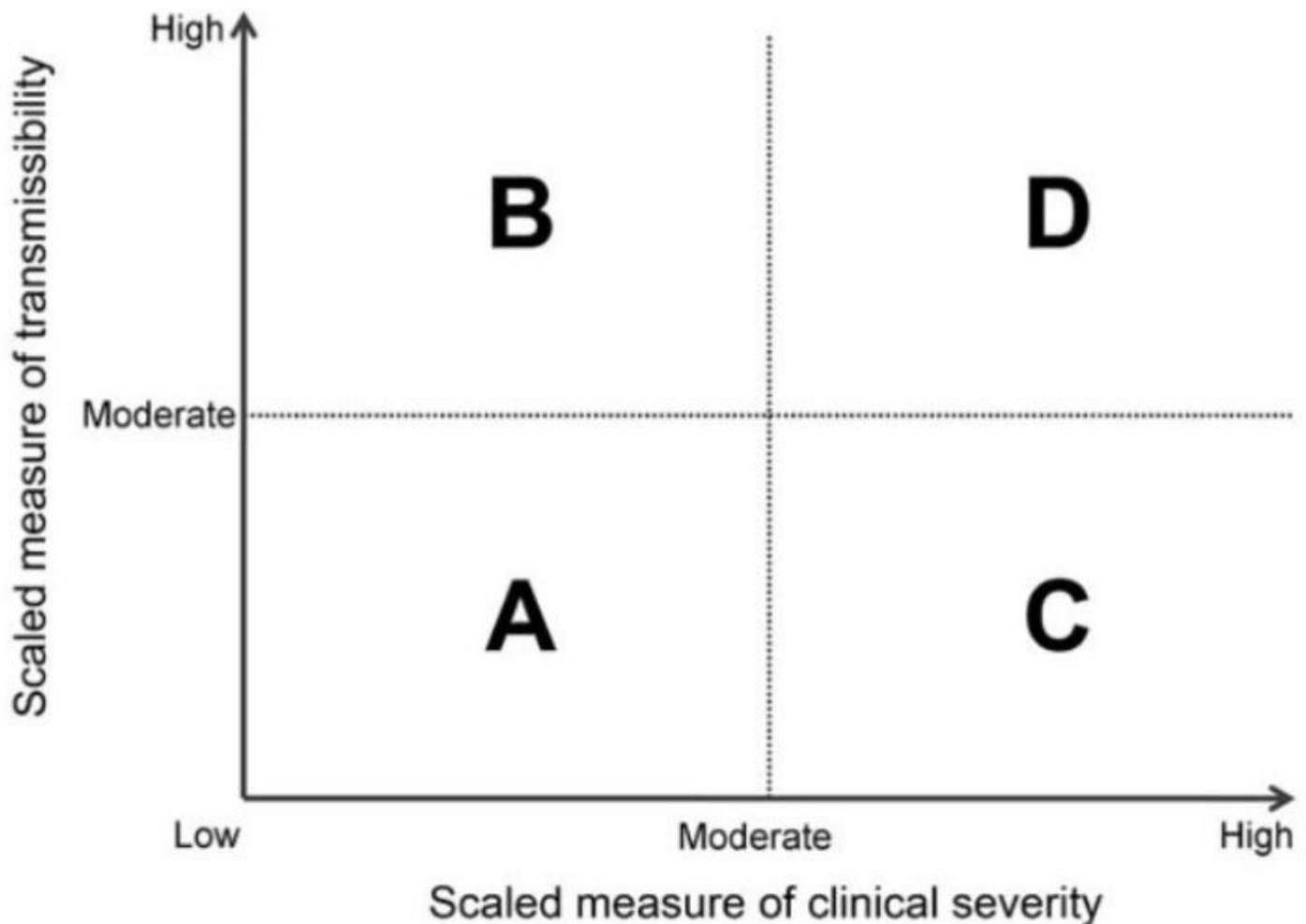
Second: How deadly is this newly identified coronavirus? This is called the case fatality rate, which is determined by the proportion of people with the infection who die from it. The answer so far is that it looks more serious than the common cold but less serious than SARS.

The World Health Organization on Tuesday [released its first situation report](#) on the novel coronavirus, with two disparate data points. One: Of concern is that 51 of 278 individuals known to be infected with the new coronavirus are reported to have been severely ill. Because there are undoubtedly many more infections than 278, we still don’t know the case fatality rate. Two: On the other hand, the report notes that at least five people had infection with no symptoms. That’s somewhat reassuring, but it’s not *very* reassuring.

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Here’s why. A pathogen’s harmfulness is determined by the combination of R_0 and the case fatality rate. The worst strains of influenza have a [relatively high \$R_0\$](#) (with nearly two people infected by every patient). The case fatality rate with flu can be low — [less than one death](#) per every 10,000 people infected. But since flu infects hundreds of millions of people a year around the world, if the case fatality rate increases, as it did in 1918-1919 to “only” 1% to 2%, the results can be catastrophic. That’s why epidemiologists — who can disagree about almost everything — are nearly unanimous in identifying pandemic influenza as the greatest microbial threat to humanity.

These two critical elements — how readily an infection spreads and how deadly it is — are captured in this graphic from an [article by CDC scientists](#). Quadrant A — not very infectious and not very severe — might be a virus that doesn’t spread easily and doesn’t often cause severe disease. At the other extreme, the 1918-1919 influenza pandemic was in quadrant D — both infectious and severe.



From: *Emerging Infectious Diseases*. 2013;19(1):85-91. doi:10.3201/eid1901.120124.

In short, it's vitally important that we quickly find out how infectious the new coronavirus is, because that will determine how serious the risk is.

Third: How can we limit the risk? We know even less about the answer to this question than we know about the first two. If it's confirmed that the virus spreads from live animal markets to people, this raises an important issue. These markets (also called wet markets) are an integral part of shopping in parts of Asia and elsewhere. But they are also an important route of spread of infections from animals to people, which is how Ebola, SARS, MERS, and new strains of influenza arise.

After a nasty strain of flu called H7N9 spread in China, Beijing closed its live bird markets, helping to end that outbreak and prevent others. Curtailing the practice of selling live animals for food won't be easy or quick, but it's something leaders need to consider in the long term. Right now, that won't make much difference, because the new coronavirus is spreading from person to person.

So, what's the bottom line?

The new virus is likely to continue spreading and be recognized more, and in more countries, in the coming days and weeks. We need to learn — and fast — about how it spreads and how often it causes severe illness so we can try to prevent its spread.

Related: [First death from Wuhan pneumonia outbreak reported as scientists release DNA sequence of virus](#)

Here are a few early strategies:

If you are elderly or have an health underlying condition, think twice before going to Wuhan (or any other area where the virus is spreading), until we learn more about it. And if you've been in Wuhan or in contact with anyone who has been since December and are sick, see a doctor right away. Health care workers need to be protected, because we're not yet sure how the virus spreads.

The simplest of infection-control strategies should get more of the limelight: Wash your hands often, especially after going to the bathroom and before eating or touching your face. Cover your mouth and nose with a tissue or your sleeve when you cough or sneeze. And don't go out if you're sick with fever and cough. Each of these behaviors reduces the R_0 of an infection, because the R_0 reflects a series of factors — human behavior, crowding, ventilation, and cleanliness, as well as the inherent qualities of the microbe.

And stay tuned. We'll learn more in the coming days and weeks. As I once heard the legendary Nobel laureate Joshua Lederberg say, we're outnumbered by microbes by billions to one — it's their numbers against our smarts.

Tom Frieden, M.D., is president and CEO of [Resolve to Save Lives](#), a global nonprofit initiative housed at Vital Strategies that works with countries to prevent 100 million deaths and make the world safer from epidemics. He is the former director of the Centers for Disease Control and Prevention and former commissioner of the New York City Health Department.

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