

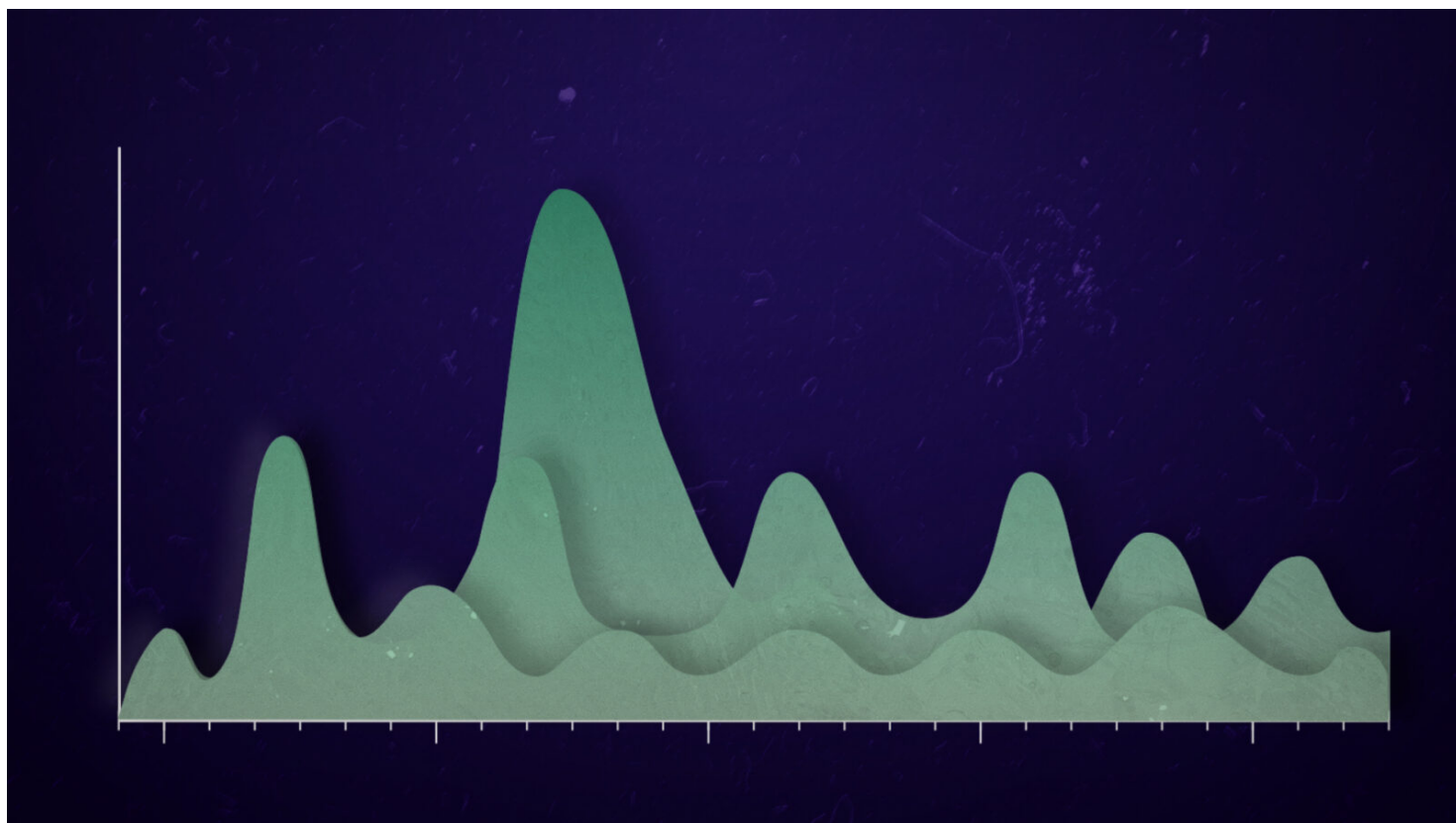
STAT

Three potential futures for Covid-19: recurring small outbreaks, a monster wave, or a persistent crisis

By [Sharon Begley](#) [@sxbegle](#)

May 1, 2020

[Reprints](#)



Hyacinth Empinado/STAT

As epidemiologists attempt to scope out what [Covid-19](#) has in store for the U.S. this summer and beyond, they see several potential futures, differing by how often and how severely the no-longer-new coronavirus continues to wallop humankind. But while these scenarios diverge on key details — how much transmission will decrease over the summer, for instance, and how many people have already been infected (and possibly acquired immunity) — they almost unanimously foresee a

world that, even when the current outbreak temporarily abates, looks and feels nothing like the world of just three months ago.

It is a world where, even in Western countries, wearing a face mask is no more unusual than carrying a cellphone. A world where even at small social gatherings a friend's occasional cough feels threatening, where workplaces have the feel of hot zones, and where taking public transit is not as much environmentally correct as personally dangerous.

“October 2020,” said emerging diseases expert Amesh Adalja of the Johns Hopkins University Center for Health Security, “won't look nothing like October 2019.”

And neither will October 2021, according to an [analysis](#) released on Thursday by epidemiologist Michael Osterholm of the University of Minnesota and his colleagues. They envision three possible futures, depicted as seascapes, their waves of different heights and widths approaching the unseen and unsuspecting beachcombers on a placid shore.

[Related:](#)

[**China has near-total control of the world's antibiotic supply. Is America at risk as a result?**](#)

In one future, a monster wave hit in early 2020 (the current outbreak of millions of cases and a [projected](#) hundreds of thousands of deaths globally by August 1). It is followed by alternating mini-waves of much smaller outbreaks every few months with only a few (but never zero) cases in between.

In the second scenario, the current monster wave is followed later this year by one twice as fierce and even longer-lasting, as the outbreak rebounds after a summer when a significant drop in the number of cases and deaths led officials and individuals to let down their guard, relax physical distancing more than was safe, and fail to heed (or even detect) the early warning signs that a new outbreak was gathering force. After this doubly disastrous second wave, the sea is almost calm,

marred only by an occasional wave of cases that number barely one-fifth of what the fall and spring of 2020 saw.

In the third possible future, the current wave creates a new normal, with Covid-19 outbreaks of nearly equal size and, in most cases, duration through the end of 2022. At that point, the best-case scenario is that an effective vaccine has arrived; if not, then the world experiences Covid-19 until at least half of the population has been infected, with or without becoming ill.

What all three scenarios agree on is this: There is virtually no chance Covid-19 will end when the world bids good riddance to a calamitous 2020. The reason is the same as why the disease has taken such a toll its first time through: No one had immunity to the new coronavirus.

“This pandemic is not going to settle down until there is sufficient population immunity,” slightly above 50%, epidemiologist Gabriel Leung of the University of Hong Kong told a New York Academy of Sciences briefing.

Since the world “is far from that level of immunity,” said Osterholm (he estimates that no more than 5% of the world population is immune to the new coronavirus as a result of surviving their infection), “this virus is going to keep finding people. It’s going to keep spreading through the population.” And that, he said, “means we’re in for a long haul.”

The uncertainty over what the long haul will look like — a staggering third scenario or a much less brutal first — reflects the host of unknowns surrounding an outbreak unparalleled in modern history. Scientists are still racing to understand everything from the basic biology of the virus (how much do warm temperatures and high humidity reduce transmission? how many people were infected, and if they have immunity, how long does it last?) to the impact of mitigation strategies (does closing K-12 schools help enough to justify the cost to children’s education?). The answers will affect which future comes to pass.

Perhaps the greatest unknown involves human and social values. To put it bluntly, how many deaths can a particular country, city, or community tolerate? “Reducing

infections to zero is not possible, and would come at too high a cost,” Leung said.

Different countries will decide what “too high” means; Sweden, for instance, has imposed only modest physical distancing steps, such as banning large gatherings, but its schools, restaurants, stores, and workplaces have remained open. It has fewer cases per 1 million people than Spain, Italy, the U.S., France, the U.K., and other countries that adopted stricter measures.

When STAT last asked experts [what might happen](#) if the new coronavirus were not contained, three months ago, Wuhan, China — the origin of the pandemic — had been on lockdown only a week. The world had just passed 10,000 cases. The U.S. had [one](#) (a man returning to Washington state after visiting family in Wuhan). Its first documented [case](#) of community transmission was still three weeks away. Yet there was a consensus that the outbreak would not be contained.

Instead, the experts told us, while the new coronavirus might settle down and simply cause colds like the other four human coronaviruses already in circulation, it was more likely to return year after year like seasonal flu, causing illnesses much more serious than sniffles.

Now, more than 1 million U.S. cases and 64,000 deaths later, here are three possible futures that leading epidemiologists think the Northern Hemisphere could see. In each, the small wave in early 2020 represents China’s Covid-19 outbreak, which peaked in late January and February but was mostly gone by March (the dip). The next, much larger crest represents the pandemic outside of China, especially in Europe and the U.S. Each scenario runs through 2022, when there’s a reasonable chance a vaccine will have arrived and there will have been enough of it produced to inoculate hundreds of millions of people.



Hyacinth Empinado/STAT; Source: Michael Osterholm/University of Minnesota

Scenario One: Small waves as far as the eye can see

In this future, the current peak in Covid-19 cases is followed over the next two years by crest and dip, crest and dip. The crests will be less than half the size of this spring's outbreak, with some of the highest numbers coinciding with flu season next fall and troughs this summer and next. There will likely be regional variation due to factors including random outbreaks, the bad luck of having super-spreaders, and too little testing and contact tracing to extinguish new outbreaks before they explode.

The crest-and-dip possibility reflects an emerging consensus that this coronavirus has some seasonality but will not be eliminated by hot, humid weather.

“The consensus among scientists is that climate is unlikely to substantially suppress Covid-19 on its own during the summer of 2020 because we will still have a population that is almost completely susceptible to the virus,” biologist Marta Shocket of the University of California, Los Angeles, told reporters. As a result, any seasonal reduction “won’t have as big of an effect.”

That's because of how the virus is transmitted. Heat and humidity can kill virus on surfaces, said Adalja, "but in the summer, there will still be plenty of people who can transmit it person-to-person," by sneezing, coughing, and [even speaking](#).

How many people? "It is our estimate that there is maybe a 20% reduction in transmissibility in the summer," said epidemiologist Marc Lipsitch of Harvard T.H. Chan School of Public Health, who helped develop the scenarios. "If it's similar to the other [four] human coronaviruses," which cause common colds, "that's not enough to stop it, just to slow it down," he told JAMA Live.

[Related:](#)

[For the first time, a blood test helped doctors find and treat multiple types of cancer in seemingly healthy people](#)

Osterholm's summertime mini-wave shows more than a 20% reduction in cases, however, reflecting what experts predict will be one of the pandemic's long-lasting legacies: Governors can open up bars and beaches all they want, but large indoor gatherings will still likely be off-limits, and many people will continue to practice voluntary social distancing.

"Even without mandates for social distancing, people will be doing it anyway," Adalja said. "It's been built into our lives." As a result, he said, "spectator sports and rock concerts probably won't be part of the equation. I suspect certain malls will close; they were already dying, so [people's reluctance to be close to others] is likely to be their death knell."

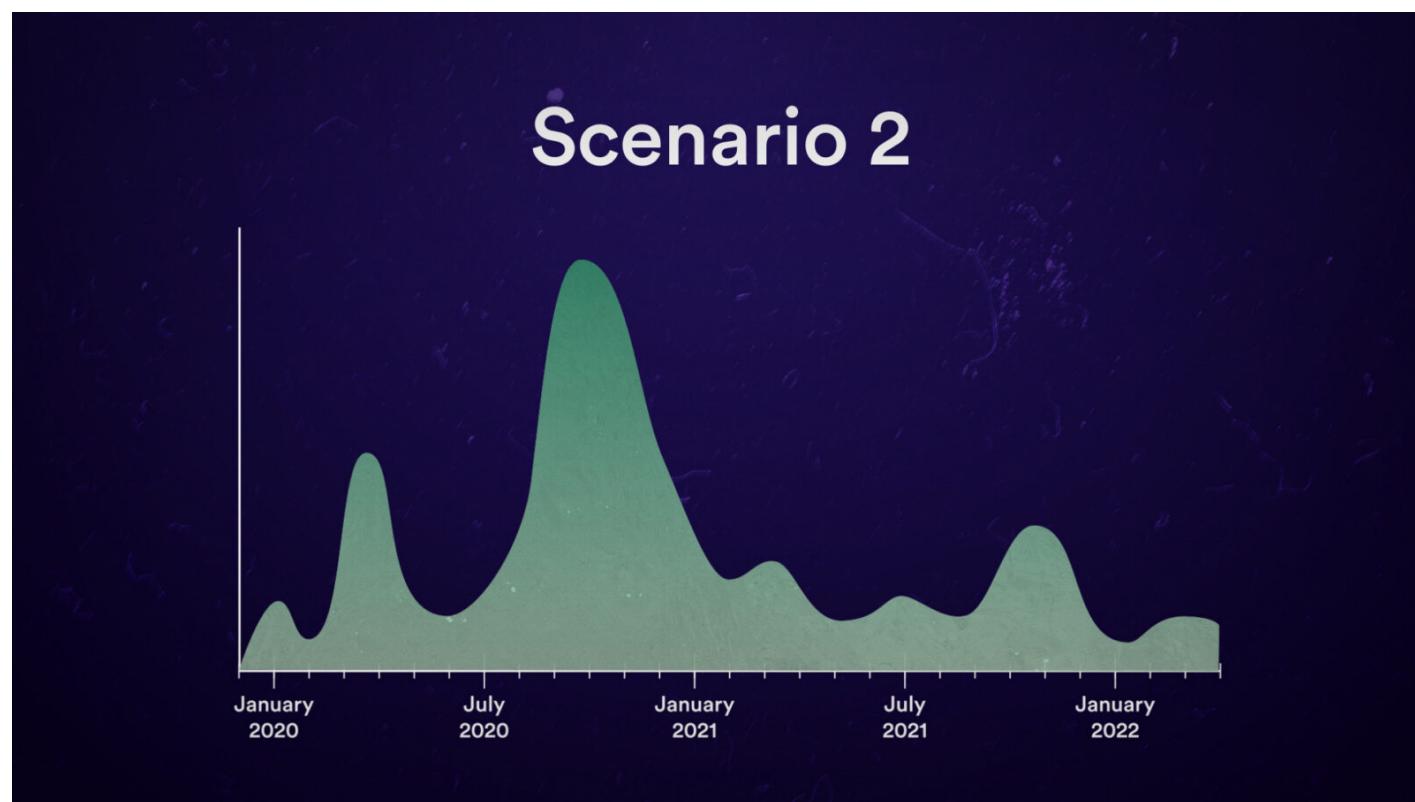
Measures that retailers, employers, and others are readying for when they re-open, from staggering work shifts to erecting partitions between cubicles to sending home any employee who runs even a slight fever, the new normal will lock in some of the physical distancing that has kept the worst forecasts for Covid-19's first wave from coming true. For many, donning a face mask before meeting friends at a park or going to the gym will become as natural as pocketing their cellphone. At restaurants, patrons will likely have their temperatures taken before being seated and servers will wear a mask and gloves, Gov. Gavin Newsom of California predicted last month.

And when local outbreaks occur anyway, those measures will become stricter, even if only through voluntary measures. Many workers, frightened by a local flare-up, will telecommute if they can. People will again shun public transit, even taxis and ride apps. They will postpone scheduled surgeries and doctor visits, especially as telemedicine takes hold.

“If you can speak to a doctor on the phone instead of getting in your car, driving through traffic, and traveling to the surgery ... well, who wouldn't want that?,” said futurist Patricia Lustig, CEO of the consulting firm LASA Insight.

And then the outbreak will dissipate again, thanks to such measures. Many people will take that as a signal that it is safe to let down their guard. Social distancing will be less strict. The next wave will hit ... over and over until so many people have been infected, or a vaccine succeeds, to produce herd immunity.

Said Osterholm, “I keep telling people, the outbreak will not end with this one wave.”



Hyacinth Empinado/STAT; Source: Michael Osterholm/University of Minnesota

Scenario Two: History redux

March 1918 brought the first, moderate wave of the Spanish flu. Cases fell over that summer, but six months later, in the fall, the epidemic exploded. That was followed by smaller peaks in early 1919. And then the pandemic ended. The influenza pandemics of 1957 and 1958, and 2009's swine flu, followed a similar pattern.

In this scenario, rather than reappearing throughout the year as the crests and troughs of the first scenario, Covid-19 would return with more ferocity in the late summer and fall and then dissipate, settling into a small but near-constant number of cases. "You would have what we call a case cliff," Osterholm said.

The precipitous, and lasting, fall-off would have two causes. First, so many people would be infected in the moderate first wave (now) and the gargantuan second wave (peaking around October) that the population might approach herd immunity. Second, the second wave, Osterholm said, "would absolutely take the health system down."

[Related:](#)

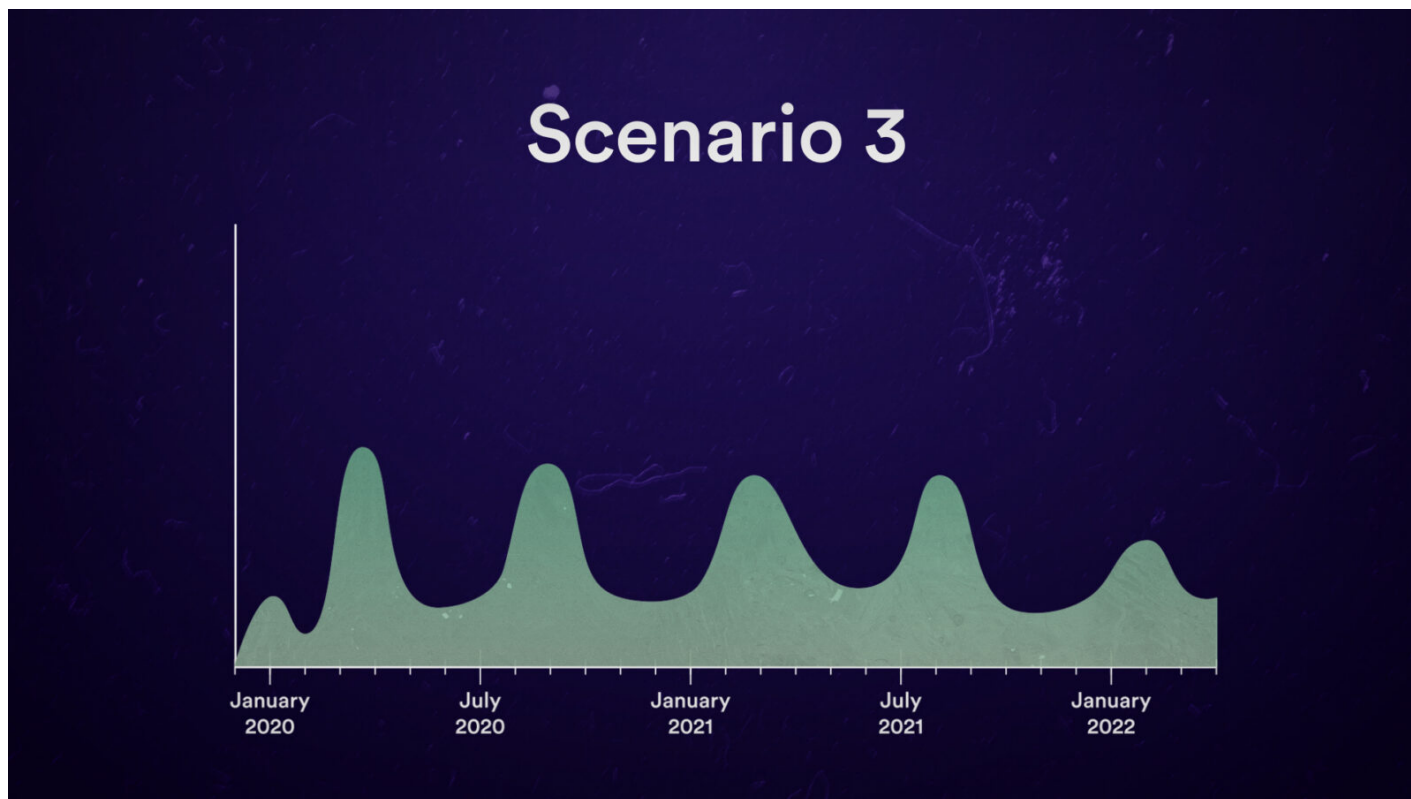
[How high will it go? As Covid-19 death toll in U.S. blows past 60,000, there are no easy answers](#)

Avoiding that was the whole point of efforts to "[flatten the curve](#)" in the U.S. beginning in March, and they largely succeeded. But even if hospitals and others use the summer lull to load up on personal protective equipment, ventilators, and other needs, and to otherwise prepare for a full-blown return of Covid-19 in the autumn and winter, it would likely not be enough.

"If we also had a bad flu season, it would be really difficult for hospitals to cope," Hopkins' Adalja said.

An imminent or actual crash of the health care system, similar to what northern Italy experienced in March, would force national, state, and local officials to impose mitigation measures even stricter than those of the last six weeks, which — as happened in China from late January to early March — would mostly snuff out Covid-19.

Because the new coronavirus would continue to circulate, like the four other human coronaviruses, there would still be low-level transmission. But cases would be so few they would hardly count as “outbreaks;” instead, Covid-19 would be with us at a fairly low level, perhaps thousands of cases at any one time.



Hyacinth Empinado/STAT; Source: Michael Osterholm/University of Minnesota

Scenario Three: The worst Groundhog Day

If everything breaks wrong, “we just keep having outbreaks in this city or that city and we keep trying to smother them,” Osterholm said, who calls this the “slow burn” scenario.

The waves keep coming because the size of the outbreaks that follow the current one are smaller than in the monster-wave second scenario. It therefore takes longer for population immunity to build up. Local outbreaks occur, worse in some places than others due to, among things, different capacity to conduct widespread, regular testing and contact-tracing.

No past influenza pandemic has ever followed this pattern. There are two reasons Covid-19 might, however.

One is biological: Coronaviruses, as shown by the four endemic ones, are frighteningly adept at continuing to circulate and never disappearing (the SARS coronavirus in the early 2000s was an exception).

The other is sociological: There are real questions about society's capacity to withstand another economic shutdown, let alone repeated ones. In the future, those policies, at least in some cities and states, may well be less stringent, and therefore less effective at controlling outbreaks, than those imposed this spring. That's why future outbreaks in this scenario keep coming, with durations and case loads comparable to the current one.

[Related:](#)

[**Social distancing is controlling Covid-19; now scientists need to figure out which measures are most effective**](#)

Do the endless waves mean that social distancing will have to be reimposed over and over, forcing the repeated closures of businesses that just reopened and the laying off of employees whose jobs keep being eliminated? Although it's hard to remember, the stay-at-home orders, business shutdowns, and other mitigation measures were all in service of flattening the curve: slowing the spread of Covid-19 enough to keep the number of patients needing hospitalization, intensive care, or a ventilator no greater than the health system's capacity. Flattening the curve did not mean zero cases and deaths, or even a few thousand.

If that remains the goal for future Covid-19 waves, then mitigation might not be as severe, as a growing number of epidemiologists recognize: Having seen how disastrously short of supplies and capacity they were, many hospitals will use the summer lull "to manage capacity better and make adjustments to be better able to absorb a surge of cases," Adalja said. "Hopefully, it won't be a calamity every time."

Ironically, that may increase somewhat people's tolerance for high numbers of illnesses, especially if the arrival of effective treatments means the return of Covid-19 is less lethal than it was initially.

Society must referee what Leung calls “a three-way tug of war” among a trio of competing needs: to keep cases and deaths low, to preserve jobs and economic activity, and to preserve people’s emotional well-being. “It’s a battle between what we need to do for public health and what we need to do for the economy and for social and emotional well-being,” he said. If the public health part of the tug-of-war weakens, then the waves will keep on coming through the end of 2022.

And which scenario is most likely? Osterholm isn’t sure. “This virus is on its own time schedule,” he said. “But we will have some tough months ahead.”

About the Author [Reprints](#)



[Sharon Begley](#)

Senior Writer, Science and Discovery

Sharon covers science and discovery.

sharon.begley@statnews.com

[@sxbegle](#)

© 2020 STAT