



# The growing scientific evidence for masks to fight Covid-19, explained

It's true the evidence for masks was weak before. That's changed.

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Over the past couple of months, the world has received more evidence that face masks really can play a crucial role in the fight against the Covid-19 pandemic.

It's a significant shift from earlier this year, when the evidence for mask-wearing was so weak that government authorities and public health experts [publicly cast doubts](#) on face coverings as a preventive measure against the coronavirus. Worried about the low supply of masks for health care workers, Surgeon General Jerome Adams, among others, [said](#) the public should "STOP BUYING MASKS!"

That changed when the Centers for Disease Control and Prevention finally [recommended](#) in April that the general public use masks, particularly in places where social distancing is hard to achieve. Government officials and experts [cited](#) a "precautionary principle," arguing that an unproven benefit was worth it since the potential harms and costs of mask-wearing are so low.

Since then, scientists have done much more research on whether masks work, with new studies coming out over the past few months.

The research increasingly favors both individual mask-wearing and policies requiring universal masking. It suggests that masks not only help stop the spread of the coronavirus — by preventing the spread of virus-containing droplets that people spit out when they talk, sing, laugh, cough, sneeze, and so on — but that policies requiring masks work to significantly slow community transmission.

"The evidence on masks is getting better and better," Ashish Jha, faculty director of the Harvard Global Health Institute, told me. "None of it is bomb-proof evidence. It's not a large randomized trial. But given that that's unlikely to come ... we're now at a point where it's really, very good evidence."

The research doesn't mean that masks allow for reckless behavior: Other precautions, from hand-washing to physical distancing, are still crucial in the fight against Covid-19. But it does show that masks, coupled with other precautions, help.

The growing research for masks also shows how important it is to be adaptable in a fast-moving disease outbreak. There's still [a lot about the coronavirus we just don't know](#), such as whether kids widely transmit the virus and what forms of social distancing are most effective. How well a society does against Covid-19 could come down to how quickly it reacts and adapts to new evidence as we get it.

"This is a landscape that's rapidly changing," Jade Pagkas-Bather, an infectious diseases expert and doctor at the University of Chicago, told me. "We didn't have the knowledge we have today that we had a few months ago. That's why things are confusing."

With masks, the evidence still isn't totally definitive — science can be a very slow-moving process. But it's increasingly pointing in one direction: During this pandemic, we all should wear a mask whenever we go out in public.

### **The latest research on masks, summarized**

Since the CDC's recommendation for the public to wear masks, several studies have come out indicating the recommendation was the right choice. Some research has gone further, indicating a mandate — not just a recommendation — for mask-wearing could be effective.

Here's a list of some of these studies, which deploy a wide range of methodologies across a variety of settings:

- A [review of the research](#) in *The Lancet* concluded that for the general public, “face masks are associated with protection, even in non-health-care settings, with either disposable surgical masks or reusable 12–16-layer cotton ones.” The review also backed the use of eye protection, physical distancing, and hand hygiene, among other measures, and cautioned that masks alone do not fully supplant the benefits of these other precautions.
- A [review of the research](#) in *International Journal of Nursing Studies* found that “community mask use by well people could be beneficial, particularly for COVID-19, where transmission may be pre-symptomatic.” It's unclear, though, how much of this benefit comes from masks protecting the wearer versus protecting those exposed to the wearer.
- A [study](#) in *Health Affairs* found state mandates to wear masks helped reduce the spread of the coronavirus. The researchers concluded that “as many as 230,000–450,000 cases may have been averted due to these mandates by May 22,” though they cautioned that this was merely an approximation and sensitive to methodological changes in how it's calculated.
- A [study](#) from the nonprofit research institute IZA found that Germany's local and regional mask mandates “reduced the cumulative number of registered Covid-19 cases between 2.3% and 13% over a period of 10 days after they became compulsory” and “the daily growth rate of reported infections by around 40%.”
- A [study](#) in *BMJ Global Health* found the use of masks in households in Beijing was associated with less spread of Covid-19. Specifically, households in which people used masks before the first person to get infected showed symptoms were “79% effective in reducing transmission.”
- A [study](#) from the CDC found that Navy service members on the USS Theodore Roosevelt, which experienced a large Covid-19 outbreak, were less likely to get infected if they reported using a mask. “Use of face coverings and other preventive measures could mitigate transmission,” the researchers concluded.

This list is not comprehensive. Many, many more studies — not just on masks, but on Covid-19 in general — are coming out on a weekly basis. The cited studies simply help give an idea of where the research is headed.

Overall, the studies indicate that masks reduce the transmission of the coronavirus and other respiratory diseases by the general public. They work in community settings, but appear to work in household settings, too. Cloth masks are effective for the general public, although surgical masks and respirators are likely better — but more research is needed on this front.

The research compounds some of the recent anecdotal evidence we've seen, too. The Black Lives Matter protests, where mask-wearing by protesters was widespread, [didn't seem to cause a significant spike in infections](#). In several Asian countries where mask use has long been widespread, like [South Korea](#) and [Japan](#), masks [seemed to play a role](#) in reducing transmission as well.

“It’s definitely hard to miss that relationship — that the countries with widespread mask-wearing seem to have it better under control,” Linsey Marr, an environmental engineer at Virginia Tech who studies airborne particles, told me. She added that she “wouldn’t be surprised” if masks turn out to be even more effective than some of the evidence already suggests.

### ***There are still gaps in the research, but experts say it’s strong enough***

The studies aren’t perfect. They’re on the cutting edge of a fast-moving issue, potentially making them more prone to errors and corrections over time. Many aren’t peer-reviewed, a process that could catch problems. The studies can be underpowered — meaning they might not have enough subjects for statistically significant findings — and they often can’t fully isolate the effect of masks versus other widely adopted actions against Covid-19. Some simply find correlations, but whether the associations are truly cause-and-effect is unclear.

The large reviews of the research in *The Lancet* and *International Journal of Nursing Studies* caution that more research on masks is needed, particularly to tease out the effect of masks in households versus community versus health care settings, and how effective cloth masks are compared to surgical masks compared to respirators.

The studies also emphasize that masks don’t fully replace the need for other precautions against Covid-19. So even with a mask, everyone should continue to wash their hands, keep 6 feet from others, and avoid large gatherings, particularly indoors. While masks appear to be a net good, researchers also caution that there needs to be further study on how they may enable reckless behaviors by making people feel invincible or less vulnerable.

There have also been some deeply flawed studies. One [study](#) in *Annals of Internal Medicine* with findings that went against masks was retracted, and [another](#) in *PNAS* that backed the use of masks [has come under fire](#) for allegedly shoddy methods.

The research also doesn’t yet provide conclusive evidence for *how* masks work. While much of the CDC’s messaging has focused on how wearing a mask prevents people from infecting others, the research suggests — and some experts believe — that masks do offer at least some protection from infection for the wearer.

Masks also may encourage positive behavioral changes. One researcher [found](#) wearing a mask appeared to get people to physically distance farther from him, which could further prevent the spread of the coronavirus.

But that’s something, along with just about everything else related to masks and Covid-19, that still needs to be studied further.

“There is some evidence,” George Wehby, a health policy expert at the University of Iowa who’s studied the effect of mask mandates, told me. “At the same time there’s definitely room for more understanding on both the lab-based studies ... but also more on the policy side.”

Still, he added, “There is more and more indication of effectiveness rather than lack of effectiveness.”

Raina MacIntyre, who heads the Biosecurity Research Program at the University of New South Wales in Sydney, Australia, and has conducted many studies on masks, told me that “using the precautionary principle is warranted.”

Even if the evidence isn't definitive, there's enough of it to suggest that it's better to be safe than sorry and recommend the use of masks. With Covid-19, we know the virus spreads through droplets that fly through the air — and, at least in some cases, likely linger for some time — before reaching another host. Masks block at least some of those droplets, creating a literal physical barrier from infection.

Further bolstering this is the very low cost of masks. Masks are fairly cheap, and can be made by simply cutting up a shirt. For the vast majority of people, there's no risk to wearing a mask, and it's at worst a bit uncomfortable. So even if the gains are small — though they in fact appear to be quite large — then using a mask would win out in a cost-benefit analysis.

The net benefit is even wider when comparing it to societal costs. “The cost of masking versus intensive care unit space, there's an astronomical gap between the costs of those two interventions,” Pagkas-Bather said.

It's important to remember the scope of the problem here, with half a year of the Covid-19 pandemic already killing more Americans than multiple years of the opioid epidemic, gun violence, or car crashes. A mere 5 percent reduction in deaths would have saved at least 7,000 people in the US alone over the past seven months — and many more to come.

#### ***We're still learning a lot about the coronavirus and how to respond to it***

The situation with masks and the evidence for them shows how quickly things can change in the midst of a fast-moving disease outbreak. In just a few months, the US has gone from no government recommendations and wide expert skepticism of masks to embracing them.

Experts caution that this kind of situation is going to happen again and again with Covid-19. There's simply going to be a lot of uncertainty with the coronavirus for some time, even after we've — hopefully — vanquished it with a vaccine. This is a virus that's new to humans, causing a pandemic of the likes that modern society hasn't seen. We're still learning, for example, just how airborne the coronavirus is, if children widely spread it, what kinds of medical treatments work against it, and whether immunity is long-lasting.

Given how new this all is, experts say the public and its leaders need to be ready to act on changing evidence, and officials shouldn't be criticized too harshly for adapting on the fly. “It's never too late to say the right thing,” Wehby said.

So while it's unfortunate that the CDC and surgeon general worked against public mask use at first, and they arguably moved too slowly, it's also good that they rigorously reviewed the research and embraced change once they felt there was enough evidence to do so. It's the kind of model that everyone should be encouraged to follow.

There's still a more philosophical debate about what the government can and should tell people to do. But experts say it's important to acknowledge the trade-offs — in terms of not just deaths, but the broader effects of the pandemic on normal life and the economy.

“People say, ‘It's a free country. I can do what I want.’ I get that. Americans are very individualistic,” Marr said. “But right now, with the economy shut down, if we wear masks, that would give us the freedom to reopen the economy more while not overwhelming hospitals.”

Given that, most experts I spoke to were bullish on masks — arguing that different levels of government should not only educate and persuade people to wear masks, but even flat-out mandate masks in public spaces. The research, at least, increasingly backs such steps.

“It’s a good way to curb transmission,” Pagkas-Bather said. “Especially if we’re going to open up economies, open up public spaces, and encourage people to live as closely to how they did pre-pandemic — which is what it seems like the nation is moving toward.”