

- Virus

COVID: When and where is the infection risk high?

We've all heard it: You're more likely to catch COVID indoors than outdoors. But once you're inside, there are different factors that determine the risk level. And you shouldn't throw caution to the wind outside either.

Deutsche Welle (English edition) · 24 Nov 2021 · 35

There are some COVID rules we have all learned by now — or so we think. The easy ones are wash your hands and keep your distance wherever possible. Then there's the "indoors: bad, outdoors: good" dichotomy when it comes to the risk of catching the coronavirus from those around us. But, in reality, things aren't quite as straightforward. So let's have a closer look: Where is the risk of infection particularly high?



Infection risk depends on a number of factors

One main transmission pathway is the spread of coronavirus particles through aerosols and droplets. These are small airborne particles that an infected person emits through breathing, talking or coughing, for example.

First things first: The risk of virus transmission is indeed higher in an indoor setting. A Japanese study from Spring 2020 that examined 110 cases of COVID-19 and their transmission pathways found that "the odds that a primary case transmitted COVID-19 in a closed environment was 18.7 times greater compared to an open-air environment."

But there are different factors that can affect how the virus spreads in indoor settings. The Max Planck Institute for Chemistry

has a calculator that lets you adjust a number of parameters to determine the COVID risk level if one person in the room is infected. Factors that play a role include how loud the infected person is speaking, how much they participate in the conversation, how well the room is aired and several more. The calculations are based on a study about aerosol transmission and infection risk published in the International Journal of Environmental Research and Public Health.

Whatever you do, don't sing

Among the scenarios with the highest infection rate is a choir rehearsal. That's because the louder an infected person vocalizes, the higher the concentration of droplets they produce, according to the study the Max Planck Institute bases its calculator on. Loud singing also expels droplets over a longer distance than just breathing or speaking at a lower volume. As the authors of the study put it, "singing is a particularly strong aerosol source."

Avoiding that risk shouldn't be too hard. But what about a classroom situation? Many countries want to avoid a new round of school closures, but to make that possible and still keep the infection risk low, there are several factors to consider.

With one infected person in the room, more people are likely to fall ill in a classroom full of children than in an office full of adults. The reason: The number of people who are fully vaccinated is lower among children. Other risk factors include poor ventilation — opening the windows once every hour long enough to ensure fresh air is circulated might not be an option with temperatures outside dropping to uncomfortable levels in the northern hemisphere. And many schools don't have expensive air filtration systems.

Magic masks

Whether it's a classroom, an office or any other indoor setting, there is one measure that brings the risk of catching the coronavirus down significantly: wearing masks. An FFP2 mask (equivalent to other international standards known as N95, KN95 and P2 masks) can reduce the risk of infection by a factor of 20, and the more advanced FFP3 masks can reduce the risk by a factor of 100 for the people who wear them, Ulrich Pöschl, director of the Multiphase Chemistry Department at the Max Planck Institute for Chemistry in the German city of Mainz, told DW.

"In indoor settings, I would recommend masks whenever people mix with [others] from outside their household," Pöschl said. "I think masks should be worn by all."

That doesn't negate the other factors, of course. Keeping your distance, trying to provide a high level of ventilation and not singing are still important to keep the infection risk down, even when everyone is masked.

Being outside is not a free-for-all

Now back to our question from the beginning: How high is the risk of infection when you're outside? Lower than when you're indoors, sure. (It increases when it's an outdoor choir practice!) But that doesn't mean that you should throw all caution to the wind.

"Also in outdoor environments it is useful to wear masks when you're close to other people," Pöschl stressed. "Within 1 to 2 meters (3.3–6.6 feet), you also have the risk of droplet infections. These larger droplets that we all exhale can still hit other people, also in outside environments. And a single one of these droplets, about one millimeter in size, can lead to an infection with a very high probability if it comes from an infected person."

So, if you're planning on going to a Christmas market this holiday season, don't leave your mask at home just because the market is outside. Mask wearing doesn't only decrease the risk of catching the coronavirus in indoor settings. As Pöschl said: "It's just even more urgent to use a mask indoors."