

Can Coronavirus Spread through Defective Bathroom Sewage Pipes?

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February 21, 2020

In a nutshell...

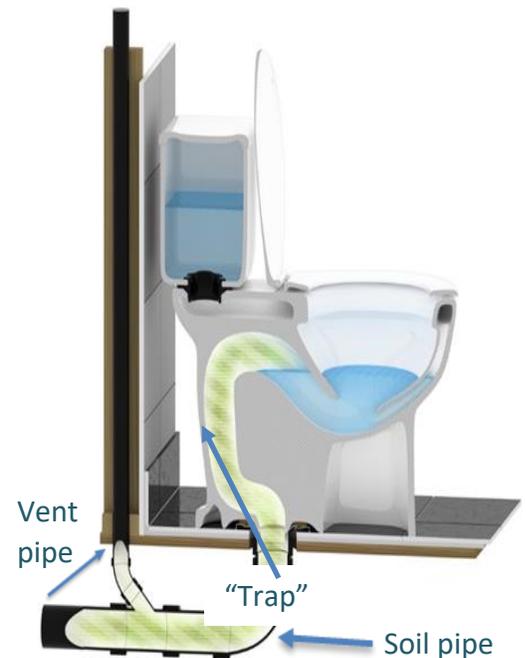
New concerns have arisen about the potential spread of the coronavirus COVID-19 through improperly connected bathroom sewage pipes in an apartment building in Hong Kong. This article discusses how this new type of transmission could take place, which if confirmed, emphasizes the importance of maintaining properly installed residential drain plumbing to help avoid infection.

On February 11, 2020, the World Health Organization (WHO) announced the official name for the disease that is causing the 2019 coronavirus epidemic, COVID-19.¹ On the same day, a 307-unit high-rise tower in Hong Kong [was partially evacuated](#) as a precaution due to concerns that the virus could have spread through the sewage pipes of the building's bathroom plumbing system. The public health implications of this form of transmission of the COVID-19 virus, if confirmed, could be substantial.

Details of the Linked Coronavirus Cases

According to the article,² two residents living on different floors of a high-rise apartment tower called Hong Mei House had been infected with coronavirus according to Hong Kong health officials. The first to be infected was a 75-year-old man. About 10 days later, a 62-year-old woman in the same building became infected. That woman's son and daughter-in-law who share the apartment were later diagnosed with COVID-19.

In the tower, the first two persons with coronavirus lived 10 floors apart, but were located in the same vertical block of apartments. For this reason, health authorities conducted an initial investigation and evacuated all residents living directly above and below each other in block seven across all 30 floors because their toilet and vent pipes were all connected (see figure).



Cut-away view of a toilet showing the "trap" and horizontal soil and vertical vent pipes (labeled); officials are investigating whether a detached or altered vent pipe vent could have contributed to the spread of the COVID-19 virus in an apartment building in Hong Kong.

¹ According to the U.S. Centers for Disease Control and Prevention ([CDC](#)), the COVID-19 virus spreads from person-to-person among close contacts and occurs mainly via respiratory droplets produced when an infected person coughs or sneezes. These droplets can land in the mouths or noses of nearby people or possibly be inhaled directly into the lungs. It might be possible for a person to get the virus by touching a contaminated surface or object and then touching their own mouth, nose, or eyes.

² "How can the coronavirus spread through bathroom pipes? Experts are investigating in Hong Kong" Available: <https://www.cnn.com/2020/02/12/asia/hong-kong-coronavirus-pipes-intl-hnk/index.html>.

Scary Reminder of the 2003 SARS Outbreak

The possibility of the coronavirus being transmitted through building sewage pipes immediately drew comparisons to the 2003 SARS (severe acute respiratory syndrome) coronavirus outbreak, where this was discovered to be a major source of transmission. At the [Amoy Gardens housing estate](#), also in Hong Kong, more than 300 infections and 42 deaths occurred after poorly-designed plumbing allowed the SARS virus to spread throughout the building complex. As a result, following a 24-hour medical lock-down, the residents were moved to confinement camps for 10 days as doctors, clinicians, sewage experts and engineers investigated.

How Could Bathroom Sewage Pipes Spread Coronavirus?

The COVID-19 virus could have spread through the Hong Mei House through close human contact or the shared use of elevator buttons. But because the two first patients lived above and below one another in the tower, and because an initial inspection found that a vent pipe had been disconnected from the bathroom's waste (soil) pipe, the building was partially evacuated. Although a full investigation is ongoing, based on the initial investigation, health officials declared the Hong Mei House's sewage pipe system to be safe.

Preliminary studies of the COVID-19 virus have suggested it is [present in fecal matter](#), though it is still unclear whether the coronavirus could be transmitted and infect others by some type of fecal-oral route (via exposure from hands to nasal passages and eyes not through ingestion). As can be seen in the figure, toilets (as well as sinks and floor drains) have a "U-" or "P-shaped" pipe that prevents sewer gases from entering the home and that allows wastewater and odors to escape. To work properly, the sharply curved pipe, also known as a "trap," needs to hold water in its bend. These connect to a soil pipe, which washes the waste down and away from the toilet, sink, or drain. The soil pipe also needs to be connected to a vent pipe to remove sewer gases and odors—usually through roof vents. The vent pipe also ensures that wastewater keeps flowing freely. One local microbiologist suggested at a press conference that the improperly sealed vent pipe "could have resulted in a virus transmission, by carrying infected feces into the building's ventilation system and blowing it into people's bathrooms",³ **but this theory has not been confirmed.**

During the 2003 SARS crisis, at Amoy Gardens the U-shaped pipe traps connecting to the floor drains were empty of water, allowing droplets containing viruses to come down the pipes from other apartments to collect in the U-bend. Without the water to form a liquid plug, nothing stopped the virus droplets from entering the bathrooms. Notably, Hong Kong officials have maintained that the Hong Mei House situation is different because the design of the pipes ensures water is always in the bends. Another **unconfirmed possibility** is that infected material from the first patient's apartment could have traveled down the pipes and entered the room via the broken vent in the second patient's bathroom.

While the investigation into the building continues, Hong Kong's Center for Health Protection has advised the public to maintain bathroom sewage pipes by regularly pouring water into drain outlets and to put the toilet lid down before flushing "to avoid spreading germs."

COVID-19 Resources

The WQ&HC has been following the COVID-19 epidemic with previous articles, [Coronavirus: What Is It and How Can We Prevent its Spread?](#) and [Will Wearing a Face Mask Prevent Coronavirus?](#) More articles are sure to come as this global public health crises evolves. In the meantime, check out Johns Hopkins University's [Center for Systems Science and Engineering](#) for up-to-date numbers of reported cases and deaths from COVID-19 or CDC's [Situation Summary](#).

Coronavirus Infection Prevention

It is important to emphasize that the epidemiology of coronavirus is still evolving in terms of our understanding of its transmissibility and pathogenicity. During this uncertain time, it is imperative that everyone use common sense and

³ *Ibid.*

good infection prevention practices, such as [frequent hand washing](#) with soap and water (or use an alcohol-based gel as an alternative), coughing into tissues or sleeves, avoiding ill persons when possible, and reporting symptoms such as fever and respiratory illness to your health care provider. You should also regularly clean and disinfect frequently touched surfaces (such as door knobs, tap handles, and kitchen surfaces).⁴ The [WHO recommends](#) using a solution made of 1 part chlorine bleach to 99 parts water (e.g., add one teaspoon of regular bleach to two cups of water).

If it is shown that coronavirus can travel through sewage pipes and infect others, the importance of maintaining properly installed residential drain plumbing becomes critical. An indication of a faulty drain trap is the distinctive odor of sewer fumes near floor drains and sinks, and/or a “gurgling” sound from a floor or sink drain. Water should always be visible in the toilet after flushing. High-rise buildings are at greater risk because of the common drain system “stack” between floors. Additional information on the outbreak will guide personal health practices, which may need to change and adapt.

Lastly, we would like to remind the U.S. public that risk of the coronavirus remains low; however, the risk of contracting the flu is very high (but it’s not too late to get vaccinated) and that the above infection control measures are also important to limit its spread—particularly to vulnerable populations such as the elderly.

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⁴ In the absence of data on the COVID-19 virus, a soon to be published [review](#) of the effectiveness of surface disinfection techniques for several known coronaviruses (e.g., SARS) concluded that (1) the virus can remain active on surfaces such as metal for up to 9 days, (2) disinfection with a solution of 0.1% sodium hypochlorite (chlorine bleach) or with 62–71% ethanol significantly reduces coronavirus infectivity on surfaces within 1 minute, and (3) a similar level of effectiveness using chlorine bleach or ethanol against the COVID-2019 virus is expected.