

LIFE IN TIMES OF COVID-19

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Should vegetables be washed with soap before using them? Can COVID-19 spread from newspapers, coins, bank notes, ATM cards, or air conditioning? Do Indians have innate immunity against SARS-CoV-2? How do we use herd immunity to our advantage?

Why should we be concerned about contracting COVID-19?

Since the SARS-CoV-2 virus, which causes COVID-19, is a brand-new virus, none of us have specific immunity against this virus. When a new virus is introduced into a community, everyone has the same chance of getting infected. When there are no control measures in place, a large number of people may get infected in a short period of time. If the number of people infected with the virus begins to increase exponentially, the number of patients with serious illness at a given point of time will begin to exceed the capacity of hospitals to treat them. This can result in many deaths. We have seen this happen in Wuhan (China), Lombardy (Italy), and Indore (Madhya Pradesh, India). Since the number of people needing hospitalization exceeded the number

of beds, ventilators, and treating doctors available in hospitals, many lives that could have been saved were unfortunately lost. This means that even if it is not very virulent (or deadly), the virus can wreak havoc if the speed at which it spreads is not controlled.

How quickly does the SARS-CoV-2 virus spread in a human population?

Epidemiologists use a parameter called **basic reproduction number**, denoted as R_0 (pronounced as R naught), to determine the initial speed with which a virus spreads in a susceptible population when no preventive measures are in place. This number is defined as the average number of people that can get infected from a single infected individual. The R_0 for SARS-CoV-2 is estimated to be around 2.5 to 3. This means that an infected person would,

on average, transmit the virus to about three people in a vulnerable community. Although this virus does not produce serious disease in a majority of people, it is still a highly contagious one.

Three factors determine the value of R_0 :

- The infectivity of the virus (or the ability of the virus to infect a healthy individual),
- The duration of infectivity of the virus (or how long the virus can remain infective), and,
- The number of uninfected people who are in contact with the virus at a given time.

The first two factors are virus-dependent and, therefore, non-modifiable. In other words, we don't have control over these factors until we find a medicine or vaccine against the virus. But the third factor is dependent on us, and can be controlled. Reducing the number of susceptible people who are in contact with an infected person at a given point in time can help stop the virus spreading at a breakneck speed.

What do the terms 'breaking the chain' and 'flattening the curve' refer to?

If left uncontrolled, any new viral infection would spread exponentially in a community as no one would be immune to it. In a few months, a 'substantial proportion' of the population would have been infected. At this stage, there would be very few people who have not developed immunity against the virus through prior infection (the exhaustion of susceptible persons). This would cause the number of new infections to drop with the same speed with which it had started. This drop would happen without any intervention (such as medication or vaccination).

The substantial proportion of a population that needs to be infected to reach this point varies with each viral infection. For example, H1N1 (Swine flu) in 2009 infected 40% of people before it subsided in the first wave.

Diseases like measles infect a greater proportion of people (over 80%) before they die down. It is estimated that about 40-60% of people would need to be infected before the current COVID-19 epidemic reaches this stage. Until this number is reached, the epidemic, if left unchecked, can result in the deaths of thousands of people.

When people keep a safe distance from each other, it decreases the chances of the virus spreading from one person to another. This measure, referred to as 'breaking the chain', reduces the speed of transmission (denoted as R_t) of the epidemic. R_t is defined as the 'effective reproduction number' at any given time. With the implementation of preventive measures, and as more people develop immunity against the virus, R_t becomes lesser than R_0 .

Remember, this process does not cause the virus to go extinct. However, as its speed of the transmission is greatly reduced, the virus will take many more months to infect the proportion of people needed for it to spontaneously stop. This reduced rate is called 'flattening the curve'. Since this process reduces the number of people infected at any given point in time, it decreases the load on hospitals during the time the infection is spreading in a particular community.

What are the most important ways in which SARS-CoV-2 infection is transmitted?

Respiratory infections can be transmitted through droplets of different sizes. Droplet particles that are $> 5-10 \mu\text{m}$ in diameter are referred to as respiratory droplets, while those that are $< 5 \mu\text{m}$ in diameter are referred to as droplet nuclei. Due to their heaviness, droplets quickly settle down, but droplet nuclei can remain in the air for long periods of time. These nuclei are prone to airborne transmission over distances $> 1 \text{ m}$. According to current evidence, SARS-CoV-2 virus is primarily transmitted between people through

respiratory droplets and direct contact. However, a possibility for airborne transmission exists in clinical care settings when procedures or support treatments that generate aerosols are performed. In non-clinical settings, the possibility of aerosol generation generally does not exist, and hence airborne transmission is unlikely.

Can air conditioning spread the infection?

Sensing the plausibility of air borne transmission, various Heating Ventilation and Air Conditioning (HVAC) federations and societies in different countries, including India, have come up with guidelines on HVAC operations during the COVID-19 pandemic. For residential air conditioners, recirculation of cool air must be accompanied by outdoor air intake through slightly opened windows. This guideline is applicable if someone at home is infected and they are in isolation in a room fitted with an A/C. For public spaces with centralized air-conditioning, A/Cs fitted with the provision of fresh air intake should be operated. If the centralized air conditioning system does not have an inbuilt fresh air intake provision, opening operable windows is recommended. However, these operational guidelines of HVAC are effective only when combined with more reliable prevention measures such as physical distancing, frequent hand washing, wearing masks, and sanitization of the flooring in offices and public places.

Can we catch COVID-19 from the non-respiratory body fluids of an infected person?

Although virus particles have been detected in the blood, stool, and semen of infected people, it is not yet known whether non-respiratory body fluids from an infected person including vomit, urine, breast milk, or semen can contain viable, infectious SARS-CoV-2.

How do we handle the dead body of a person who has died of COVID-19?

As the dead body does not have any physiological function, such as coughing and sneezing, the chance of getting infected from droplets is absent. Only the lungs of dead COVID-19 patients, if handled during an autopsy, can be infectious. The clothes of the dead body might also harbor the virus. In this regard, refer to the Ministry of Health and Family Welfare, Government of India, guidelines.

Yesterday, when I was buying vegetables from a nearby shop, someone unknowingly came very close to me. Should I worry?

No. Although people catch the virus from their contacts, casual contact of this kind is unlikely to spread the disease. Epidemiological research shows that disease transmission occurs in people who have reported sustained close contact for longer periods of time in closed or crowded places. In fact, a study from the United Kingdom found that casual talking in an open or semi-open space did not lead to disease transmission.

Should vegetables be washed with soap before using them?

It is always advisable to wash vegetables in running water. But washing them in soap water is not advisable as this may produce other unwanted side effects. It is important to keep in mind that while there is a theoretical possibility of the virus spreading through vegetables, there is no epidemiological evidence for it. For example, Koyambedu market, the largest wholesale market for vegetables, fruits, and flowers in Chennai, was recently identified as a hotspot for COVID-19 spread. Thousands of people associated with the market, such as vendors and load men from faraway

places (some from Kerala), got infected. But contact tracing did not reveal a single case that had spread through the vegetables sold in the market.

Can COVID-19 spread from newspapers, coins, bank notes, or ATM cards?

So far there is no epidemiological evidence for this kind of transmission. Therefore, one need not be too alarmed. However, it is always sensible to take precautions like washing hands with soap as frequently as possible.

What is the risk of getting COVID-19 from packages delivered through the postal system?

Studies have established the presence of SARS-CoV-2 virus on cardboard for 24 hours under experimental settings in controlled environments. In practice, however, there is no evidence of the infection being transmitted through contaminated packages.

We don't have much space in our house. How can we ensure the physical distance needed to keep our elderly parents from catching the virus?

This has to be worked out at the level of each family. The more distance young people maintain from the elderly, the lesser the chance that the latter contract the virus. Even simple measures can help. For example, allocate a chair exclusively for the elderly father or grandparent, and request everyone else in the family to refrain from using that. During summers, one can sleep outside the house, etc.

Indians have a lot of innate immunity. Will this protect us from COVID-19?

The low number of cases in the initial

stages of the epidemic in India led to a number of claims that Indians may have some innate immunity against COVID-19. This was called the **Indian paradox** – since Indians are already afflicted with many infectious diseases, we may have some immunity against COVID-19. But, now, these claims have been proven wrong. If anything, the fact that India has so many infectious diseases is a reflection of the poor state of public health in India!

Why is India reporting one of the lowest COVID-19 mortality rates?

Differences in number of cases and deaths could be caused by several factors. They could be related to different phases of the epidemic in different countries, or differences in demography, local environment and people's behaviour in each country. They could also be influenced by how different governments implement control and mitigation strategies and, most importantly, how each country defines and counts cases and deaths. Therefore, one cannot (and should not) blindly compare the number of cases and deaths in different countries in the middle of a pandemic.

How do we use herd immunity to our advantage?

All infectious disease epidemics can come to a spontaneous stop when a substantial proportion of the population has either been infected with the pathogen, or is vaccinated against it. In both cases, people with antibodies against the pathogen attain immunity against infection. For viral infections, immunity acquired through natural infection is, in general, stronger (even lasting lifelong) than vaccine-induced immunity. Once a particular community attains this threshold stage, it is said to have acquired herd immunity. At present, there are no vaccines available against COVID-19. Hence, to acquire the herd immunity needed for the epidemic to die down

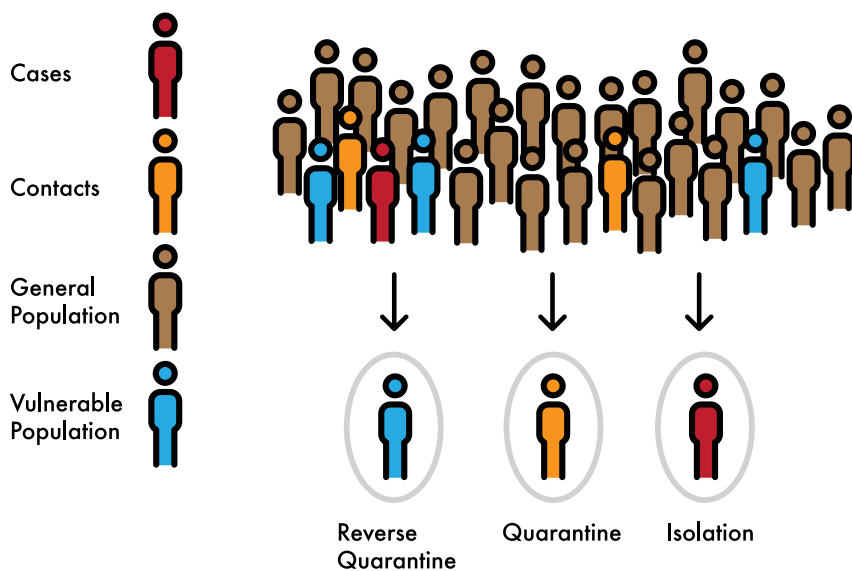


Fig. 1. What is a reverse quarantine? Isolation and quarantine of infected people and their contacts are used to minimize their ability to transmit infection to healthy people. In contrast, reverse quarantines are used to protect the elderly and other vulnerable people from catching the infection from others.

Credits: Adapted from an image by A.V.Raveendrana & Rajeev Jayadevan in 'Reverse quarantine and COVID-19', *Diabetes & Metabolic Syndrome: Clinical Research & Reviews* (2020), 14 (5): 1323-1325. URL: <https://doi.org/10.1016/j.dsx.2020.07.029>.

in the first wave, about 40–60% of the people (depending on the population density of the area) will need to get infected. Even with proper physical

distancing in place, this will eventually happen, albeit slowly. Therefore, herd immunity is a natural process, not a strategy to overcome epidemics.

However, this natural process can work to our advantage if we protect our elderly and other vulnerable people from catching the virus through reverse quarantines (see Fig. 1). The rest of the population can resume work with proper physical distancing measures in offices and public spaces. Through this strategy, young and healthy individuals will continue to get infected, but gradually. Remember, the chance of experiencing severe disease increases with age. Most young people (<60 years of age) who get infected are likely to be asymptomatic or experience mild disease. Measures to slow down spread of infection will help ensure that the few young people who develop severe disease can be saved by proper medical attention. Over time, this young population (about 85% of people in India are below 60 years of age) will contribute to building herd immunity, while the vulnerable remain protected. Thus, if we follow this strategy, we will be able to overcome the epidemic with fewer deaths. It is obvious that this will be a long process. But, in the absence of a vaccine or medicine, it is the best way forward.

Key takeaways

- Mitigation measures reduce number of deaths by ensuring that the number of patients with serious illness at a given point of time does not exceed the capacity of hospitals to treat them.
- Physical distancing reduces the chances of the virus spreading from one person to another (breaking the chain) and the speed of transmission of the epidemic (called 'flattening the curve').
- It is not yet known if non-respiratory body fluids from an infected person including vomit, urine, breast milk, or semen can contain viable, infectious SARS-CoV-2.
- The lungs and clothes of dead bodies of infected people can be infectious or harbour the virus.
- There is no epidemiological evidence to show that the virus spreads through vegetables, newspapers, coins, bank notes, ATM cards, or postal packages. But it is sensible to take precautions like washing vegetables with water, and hands with soap as frequently as possible.
- Initial claims that Indians may have some innate immunity against COVID-19 have been proven wrong.
- The natural process of herd immunity can be used to our advantage if we reverse quarantine the elderly and other vulnerable people, while the rest of the population resumes work and follows proper mitigation measures in offices and public spaces.



Notes:

1. These questions and responses were first published in an open-access booklet called **Understanding the Pandemic COVID-19**, authored by Dr. G. Thangavel, Dr. Jayaprakash Muliylil & Anoop Jaiswal, that has been translated into several Indian languages.
2. Source of the image used in the background of the article title: https://en.wikipedia.org/wiki/File:Safe_Newspaper_Vendor_-_coronavirus.jpg. Credits: Vaikunda Raja, Wikimedia Commons. License: CC-BY-SA.

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