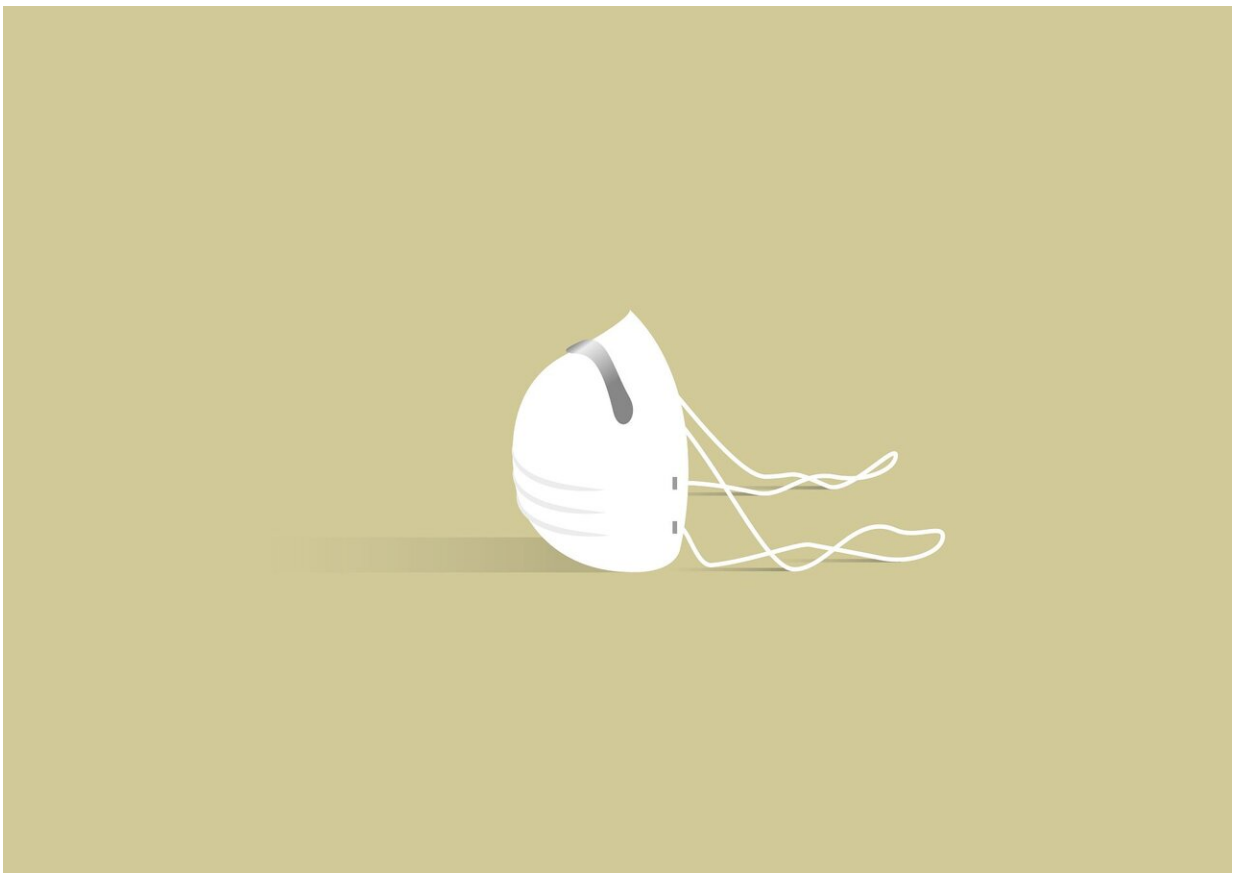


South Africa can get COVID-19 under control if it blocks the routes that enable transmission

June 18 2020, by Alex Van Den Heever, Imraan Valodia, Lucy Allais, Martin Veller, Shabir Madhi and Willem Daniel Francois Venter



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As the lockdown is relaxed, South Africa's focus should now be on how best to suppress the spread of the SARS-CoV-2 virus using other strategies. Policy should be informed by understanding the spread of the virus both in terms of the main mechanism of transmission (respiratory particles) as well as in terms of the connections that result in spread between communities. Crucially, not all spreaders are equal, and understanding this is important for policy.

South Africa introduced a lockdown early. It couldn't afford, or adequately implement, a lockdown for long enough and effectively enough to contain the virus. Unfortunately, the country has also not been able to implement testing and tracing at a level needed to suppress the spread.

Nevertheless, the strategy did buy some time to prepare hospitals and the healthcare system. But if the country can't contain the spread through lockdown or testing and tracing, this certainly does not mean that it should give up. Importantly, whether or not there is a lockdown, as long as people are conducting some economic activity, working in healthcare and other essential areas, and using transport to do so, there are routes of spread.

This means that, independent of lockdowns, the government needs to pay attention to limiting spread in these routes.

In this article we examine a way to think about successfully suppressing the epidemic with the tools that South Africa has available, by examining the main areas of transmission risk.

Features of SARS-CoV-2 transmission

Respiratory viruses spread rapidly as transmission occurs largely through the air. The reproduction rate (or R_0) represents the average number of

people an infected person will infect over a period of time. Importantly, the R_0 figure is a crude average which in fact reflects a wide distribution of spreaders of the virus.

It turns out that much of the average is made up of a few super-spreading events and a majority of weak spreaders. Super-spreading can be tied to one-off events, such as a religious gathering, or a recurring high-risk setting—such as a call centre with many workers in an enclosed open plan setting. In the case of influenza, schools and universities are associated with super-spreading due to the frequent grouping of people into enclosed classrooms and canteens.

The importance of super-spreading events can be seen in the finding, in a [still to be peer-reviewed article](#), that roughly 80% of COVID-19 infections are attributable to 20% of infected people. More interesting is a finding that roughly 70% of people with COVID-19 did not infect anyone else.

Understanding the importance of super-spreaders informs the potential effectiveness of physical distancing interventions—even in the absence of testing and tracing.

Social spaces that connect households

Given the way it spreads, the risk of exposure depends on:

- How physically close people are to each other (less than two metres is not advised);
- How long they are close to each other (more than ten minutes is not advised); and
- The containment of the environment they are in (indoors is much higher risk than outdoors and ventilation such as opening windows makes indoors much safer).

In terms of transmission between groups it is worth differentiating between three levels of connection.

- First there is the household level. Infected people within a household will tend to infect other family members living in close proximity.
- Second, there are the social spaces that connect households within a community. A community refers to multiple households in close proximity to each other—such as in a district or town. Local shops, stores, [local schools](#) and restaurants create opportunities for transmission to occur between households within a community.
- Third, there are the spaces that connect communities. These include places of employment, forms of bulk transport, major shopping centres, places of education, places of worship, theatres, healthcare providers, funeral gatherings, sports events, and any area where people from multiple communities are in close proximity.

The infectious disease spread between households and communities depends on two factors: first, the way in which the disease is transmitted between people; and second, the dynamics that connect people to each other. More distance naturally translates into no, or slower, transmission.

The distance is narrowed by social spaces that connect households and communities. Social spaces between households are responsible for transmission within a community. Social spaces between communities transmit an infectious disease between distant communities.

In theory, a strong generalised lockdown successfully implemented early enough could close both social spaces, restricting the further spread of the epidemic to that within the households. If these household members did not have contact with others, the disease would become extinct.

Where a generalised lockdown successfully closed the third-level social space, but left the second open, the spread would be affected by the number of communities with at least one household infected. In this scenario, the outbreak spreads through the connections between households within a community. However, the outbreaks would be quite localised. Communities with no infected households prior to the lockdown would not experience any outbreak.

Containment without preventive testing and tracing

Community-based testing and tracing can contain community-level outbreaks of COVID-19 relatively quickly—but only if the infection levels are relatively low and testing and tracing capabilities are highly responsive. This option has been taken off the table, given South Africa's level of spread combined with insufficient rapid testing.

This means that the country's strategy should focus on intensive management of the two levels of social space that connect households.

First, this means closing or heavily controlling the social spaces that provide opportunities for super-spreading and that are not essential for the economy and society. These include all large gatherings, such as funerals and church gatherings, particularly where these gatherings occur indoors in spaces with poor air circulation.

Second, it means the following general requirements for all spaces that are essential for the maintenance of the economy and society:

- Masks to be worn by everyone.
- Require physical distancing wherever possible. Staff who can work from home should be required to do so.
- Introduce outside air into closed settings. Whenever people from different households are in a vehicle, open windows if possible.

- Upgrade filters in air conditioning systems and only use air conditioning systems which extract rather than re-circulate air. Air flow from air conditioning systems and fans may also need to be modified.
- Regularly clean high-contact surfaces.
- Require that employers provide good quality protective equipment for staff in regular contact with clients.
- Provide for on-site symptom screening for staff. Self-screening should also be enabled before coming to work. This should include a requirement to stay at home if any person in the household has symptoms and clear messaging about which [symptoms](#) these are.
- Access to hand-washing facilities must be made available.
- Where cases are detected at any social space, testing and contact-tracing can ensue (where resources allow), with the possibility of a temporary short-term closure where required to understand the outbreak.

This strategy requires clear, accurate public information messaging, co-operation from employers and employees, and buy-in from society.

Conclusion

These measures are unlikely to eliminate spread, but will contain opportunities for super-spreading and transmissions between communities and households.

South Africa has clearly struggled to manage the social spaces within and between high-density communities using a lockdown approach. Redirecting efforts to managing the high-risk social spaces between communities and households may go a long way towards lowering the maximum infection peaks and reducing the risk to society.

If infection levels decline sufficiently, current capabilities for testing and tracing could be sufficient for their strategic redirection toward prevention—particularly if all testing capabilities in government, universities and the private sector were mobilised as part of a single strategy.

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Provided by The Conversation

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