

# Defeating SARS-CoV-2

John Friedrich, 05/2020

As most people, I've been doing some thinking these days about how to defeat the SARS-CoV-2 pandemic. In this article I use a thought experiment to discuss two basic approaches: Lockdown and Mass Testing and Targeted Isolation (MTTI). We will imagine extreme scenarios to try to make things as clear as possible. Even though the options I discuss are not attainable in real settings, I hope the discussion will be useful to deepen our understanding of possible advantages and drawbacks resulting from each alternative. As a disclaimer, I'm not a public health expert; but I firmly believe the conclusions reached in this theoretical exercise derive from relatively simple assumptions and reasoning.

## 1. Lockdown

Let's talk about Lockdown and why it could work. Let's run a highly idealized mental experiment on an imaginary country called Stopia. Imagine a certain percentage of the population is infected with the virus, say 1%. Assume infected people either get better or pass away one month after contracting the virus. We, as Stopia rulers, command every citizen to stay home for a whole month and our citizens fully comply. After one month of the perfect lockdown, what is the result? Well, every citizen that had COVID 19 on lockdown day either got better or died. Families with no cases on lockdown day would not be infected. There would be new cases after the beginning of the process though, as infected citizens spread the virus to family members living under the same roof. Maybe another month of lockdown would be necessary, considering the new cases among family members. At the end of the process we would have beat SARS-CoV-2. In terms of the health outcome, additional lives would be lost from infections that took place after the beginning of the lockdown. The economic cost: a staggering one month (or more) of zero or close to zero economic activity.

## 2. Mass Testing and Targeted Isolation (TTI)

We are now the rulers of Sciencia, a country that has lots of tests for the virus. Once again, 1% of the population has SARS-CoV-2. Assume we have a perfect test for detecting the virus. We decree that on testing day we are going to test the whole population of Sciencia. We separate the infected and isolate them for a full month. After that period, we have beat SARS-CoV-2. Nobody should be infected anymore and the recovered population would go back to normal activities. Not a single new infection would have happened from testing day onwards. In the meantime, as infected people remained in isolation, life would go on as usual for the non infected. They would be able to attend concerts, fly on planes, go to school, etc. With just 1% of the population away from work, the economic GDP decline should be very small, perhaps negligible. Maybe many of the people with less severe symptoms could even work remotely from WiFi equipped isolation facilities. The economic cost: tests for 100% of the population and isolation facilities for 1% of the citizens for a full month.

The theoretical advantages of the MTTI should be pretty obvious, both in terms of lives saved, economic cost and disruption to daily activities. It is the Middle Ages approach (Lockdown) versus the Age of Science one (MTTI). Even though a rigorous Lockdown has the theoretical potential to beat the pandemic, there is a better theoretical alternative, if we develop plenty of testing capacity. Of course real life is very different from highly idealized examples and estimating how far the best possible real Lockdown or MTTI are from the theoretical optimum is hard to do. I

would guess the ideal Lockdown is harder to implement than ideal MTTI but I'm not sure. The good news is that we don't have to have all the answers to make progress. If you think carefully about what South Korea is doing by testing abundantly and isolating people who test positive in government run facilities, you will realize that it seems to be using the main elements of Mass Testing and Targeted Isolation. In real settings there are other tools like masks, banning large gatherings, contact tracing, batch testing, etc, many of which South Korea is also using. By the way, Asian countries seem to have figured out that rolling out mass testings using almost any test (tomography, thermometer, etc), as unreliable as it might be, is better than not testing at all.

A quick observation on the implementation of MTTI: isolation of infected people doesn't necessarily have to be in government run facilities, as long as it is effective – tech companies might come to help with location tracking apps, making sure infected people never leave home or designated hotels. Batch testing holds a lot of promise in reducing test costs. A lot of creative thinking would be needed to make MTTI work effectively in a realistic setting.

Probably some form of Lockdown can't be avoided at the beginning of a new pandemic, while countries are still developing testing capacity and organizing resources to fight the virus. Most countries might be forced to use a combination of Lockdown and MTTI to reduce R0 and effectively contain the virus at some point. But I believe one thing is clear from the exercise: we should be gearing as much as possible towards Mass Testing and Targeted Isolation. That should be the goal of every policy maker. To spend billions on testing for all and isolation facilities for the infected looks incredibly cheap compared to losing trillions by shutting the economy down.

PS. Coincidentally, just one day after I finished writing the first draft of this article the NY Times reported that China is testing the whole population of Wuhan, about 11 million people. Exactly the kind of proposal this piece is defending.

<https://www.nytimes.com/2020/05/26/world/asia/coronavirus-wuhan-tests.html>

For more on the approach South Korea has taken, see:

<https://www.nytimes.com/2020/03/23/world/asia/coronavirus-south-korea-flatten-curve.html>

Nobel Laureate economist Paul Romer has been defending increased testing for quite some time now. See ( @paulmromer ):

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Disclaimer: the author is not a public health expert. He is not a member of any political party and not a shareholder of any pharmaceutical company.