Read an exclusive excerpt from Joshua Gans' new book, The Pandemic Information Gap

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This is the sixth post in a six-week series: **Rapid or Rushed?** exploring rapid response publishing in covid times.

As part of the series, there will be a virtual roundtable on Friday 6th November, 1.30pm featuring Professor Joshua Gans (Economics in the Age of COVID-19, MIT Press) and Richard Horton (The COVID-19 Catastrophe, Polity Press and Editor of The Lancet) in conversation with Victoria Pittman (Bristol University Press) and Qudsiya Ahmed (Cambridge University Press, India)

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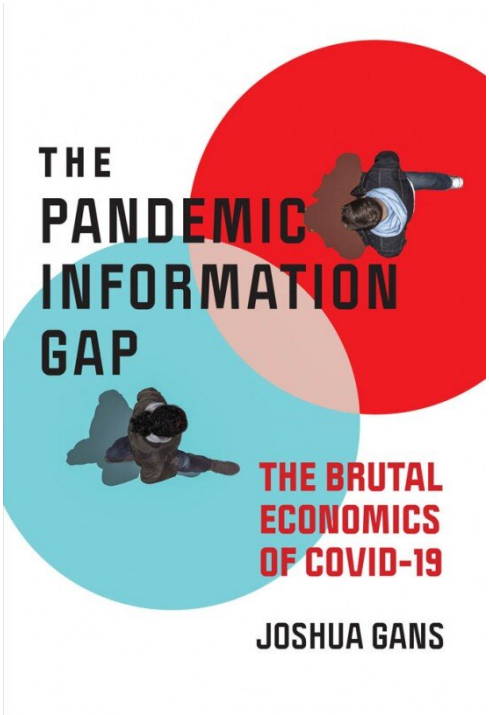
The Pandemic Needs an Information Solution



When trying to solve a problem, it's important to frame the problem correctly. The covid-19 pandemic is certainly a problem. But what kind of problem?

The standard answer is that it's a public health problem and that encouraging (and sometimes enforcing) behaviors such as social distancing, mask-wearing, and ensuring proper ventilation can slow viral transmission. Notice, however, that all of these solutions involve a cost, by requiring individuals and organizations to make big changes.

Why must we take such drastic steps? Because we don't know who is infectious and might spread the virus to us. So, given the risks, we treat everyone as potentially infectious. But at any given time, perhaps 1 in 4,000 or so people (in most places) are actually infectious.

If we knew who that person was or who is more at risk, we wouldn't choose a one-size-fits-all approach. We would isolate those people and the rest of us could go about our business. This is all a way of saying that the pandemic can be understood as an information problem: How do we improve our prediction of whether someone is infectious or not?

There are many ways to do this. We can engage in careful contract tracing to find out how people were infected and reconstruct the paths of viral transmission. We can examine genetic identification from the virus in infected people to try and figure out what makes some of them more infectious than others. And we can monitor wastewater for viral remnants to give a more accurate picture of its spread. But rapid and more frequent antigen testing is perhaps the most attractive path to narrowing the pandemic information gap.

Testing has been a big concern during the pandemic. Many countries were unprepared and couldn't even test symptomatic people in their own populations. Countries that were prepared, like South Korea and Taiwan, deployed large numbers of tests quickly and avoided lockdowns and other policies that residents elsewhere have endured for months. But once the virus has spread, testing can be hard to scale. Most countries require tests that are implemented by health professionals and analyzed in labs making it costly to test all but the most at-risk people.

The gold standard for testing is the PCR test. Until recently these were the only tests approved by regulators and alternatives were only available for experimental use (say, on college campuses). This test looks for RNA remnants of the coronavirus and can detect very small amounts in people. If you want to know whether someone is infected with the virus, a PCR test is your best option.

But PCR tests are expensive (costing $60 to $150 a person), and lab processing delays how quickly results can be obtained (between 1 and 7 days in the US depending on the state). Some PCR tests can give a faster result without requiring a lab, and cost about $30 each. But they are still inconvenient for operating at scale because they require a specialized machines and a trained person to operate them.

These drawbacks have led an increasing number of pandemic experts (such as Michael Mina of Harvard, Carl Bergstrom of the University of Washington and Eric Topel of Stanford) to advocate for antigen tests that cost just $1 to $5 per person and return results in five minutes. Instead of looking for RNA fragments, these tests search for indicators that the virus has infiltrated cells. However, manufacturers of rapid antigen tests have had difficulty obtaining regulatory approval for them. Regulators want to approve tests that can accurately tell whether someone is infected so doctors can rely on them to prescribe medical treatment.

But the information problem we face is different: We want to identify *infectious* (rather than infected) people so that those who can spread the virus can avoid others. And we want to do it as early as possible. The problem is that someone can be infectious before

they have symptoms, which is often what prompts people to get a PCR test.

Framing the problem as finding people when they are infectious could change the standard by which regulators judge a test. A person is infectious when they have a large viral load present. But the PCR test also identifies people as positive when they have a low viral load.

These tests are so good, in fact, that they can identify an infected person even when the virus in them is dead. As you may recall from crime shows, genetic material doesn't need to be alive in order for forensic experts to use it to identify someone. But a dead virus is not an infectious virus. This is well recognized and the reason why President Trump's doctor cleared him for social interactions even though he likely would still have a positive PCR test.

Rapid antigen tests may miss very low viral loads but do pick up higher loads. In fact, recent findings suggest that they pick up viral loads well below the likely threshold for infectiousness (even though the precise 'bright line' between being infectious or not remains unknown [link to Nature]).That means that rapid tests may be more accurate and reliable in identifying infectious people than PCR tests. At the same time, their low cost and ability to rapidly return results make it more feasible to scale up testing and find infectious people in a population.

There's another advantage that comes from thinking about pandemics as an information problem: you can derive value from solving the problem even at a local level. What businesses and organizations such as schools and colleges want to do is clear people so that they can safely interact in their spaces.

By setting up a rapid test process, these organizations could screen and clear non-infectious people for entry. Depending on the circumstances, they might grant clearance for a day or a week. What's more, they could change that period as conditions change.

This approach may mean that someone who is infectious gets through. But even if they did, the infection wouldn't spread far. With such frequent testing, health officials would detect it eventually, allowing them to contain and suppress any outbreak.

In this way, places can adopt rapid tests today as a clearance measure; a drastic improvement over symptom checks. We need not clear people every day. Depending on Covid-19 prevalence in the local population, once or twice a week may be sufficient. If we had a complementary information system that allowed people to securely keep track of their last screen, then people could be tested at one place and cleared for entry into another. This all requires more detailed operational guidelines to be developed but once it is done, we can expand this approach to the broader population. The point is that even if rapid tests are deployed at a few places, they can still assist in managing the pandemic. In that sense, each new expansion we can manage does good. We don't need a one size fits all approach to everything.

The critical, first step in all of this is to accurately identify the problem we face. It is an

information one whose priority sits alongside public health measures such as mask wearing. Once we acknowledge that, we can search for solutions to it.

Joshua Gans' Book The Pandemic Information Gap: The Brutal Economics of Covid-19 will be published by MIT Press in November 2020.

Note: This article gives the views of the author, and not the position of the LSE Impact Blog, nor of the London School of Economics. Please review our comments policy if you have any concerns on posting a comment below.