

# Sums, germs, and fear

QUENTIN GRAFTON, TOM KOMPAS

30 MARCH 2020

**The future is uncertain, but the outcomes of exponential growth are not.**

**Quentin Grafton and Tom Kompas use data on COVID-19 to explain what Australia might expect over the next couple of weeks, the costs and benefits of early and severe physical distancing, and why we should not panic but act.**

In 1997, a [bestselling book](#) written by Jared Diamond was published, purporting to explain how the West ‘won’ world dominance based on the good luck of geography, and because western countries were the first to industrialise. Fast forward to 2020, and to COVID-19. Geography still matters, but the West is no longer ‘winning’. Despite initial mistakes, it seems that [China](#) has been successful at containing the virus, and other countries such as South Korea and Singapore have, so far, been able to dramatically slow the rate of infection.

These nations have slowed or stopped the spread of the virus in different ways, but their approaches have all involved some combination of early distancing measures, careful tracking of contagious people and those with whom they may have had recent contact, extensive testing, and identifying people who are asymptomatic, but may be contagious.

Let’s compare this to some Western countries. Those now on the frontline of COVID-19 were slow to respond and are paying a very high cost for this early inaction. As of 30 March, Italy had 98,000 confirmed cases with 10,800 deaths from the virus. While [cross-country comparisons](#) on confirmed cases are problematic because of large differences in testing, the United States currently has over [137,000 confirmed](#) cases – the highest in the world, exceeding numbers in China. This number will get much larger very quickly if cases continue to double every few days.

The number of Americans who will die will soon be in the thousands, and possibly tens of thousands, if the United States does not do much more at a national level to ensure physical distancing. If its current growth rate continues, parts of the American health system, especially [intensive care units](#), will be overwhelmed.

Currently, the rate of infection – without sufficient measures – tracks very closely to exponential growth. This allows, with a basic disease spread model, an accurate prediction of the minimum, maximum, and most likely number of confirmed cases, at least for the next week or so. It is worth noting that an increased rate of testing for the virus will increase this number.

The data tells us that for countries in the earlier phase of this pandemic, such as Australia, the number of confirmed cases, which undoubtedly underestimates the rate of infection, is doubling every few days. In Australia, the infection rate began by doubling roughly every four days, and is now doubling every seven days.

Australia had about [2,000 confirmed cases on 24 March](#). Given rates of infection and changes in growth, our spread model forecast of infections made on 27 March for the 29 March ranged from 3,950 to 4,460.

The actual reported number on 29 March was 3,984, near the low end of that range. It is important to note that the daily growth rate has fallen from 27 per cent on 12 March to about 9.5 per cent on 29 March. Our forecast for 6pm on 1 April now ranges from 5,080 to 5,970 cases, with 5,220 most likely, and for 2 April the range is 5,510 to 6,835, with 5,715 most likely.

Until physical distancing has had an effect, exponential growth in infections is essentially certain. Current measures in Australia may be decreasing growth rates in infection, but it is too early to tell, and stricter measures will be needed to actually decrease the number of infected.

Overseas data can also be used to estimate a possible overall mortality rate. There is considerable uncertainty about this, but let's assume it is roughly one per cent, noting that mortality is much higher for vulnerable people. These numbers can be used to compare the predicted number of premature deaths if Australia implements sufficient physical distancing measures to an alternative without them.

This alternative is a worst-case scenario, given that physical distancing has already started in Australia and may already be reducing the growth in infections. Nevertheless, the Australian experiment of not implementing a true national lockdown is most likely a higher risk strategy.

Based on confirmed cases, Australia will have an infection rate on 1 April of about two persons per 10,000. With sufficient physical distancing, Australia could end up with an infection rate of one per cent. By comparison, if it fails to control the infection by not implementing physical distancing, Australia could end up with a much worse infection rate of 20 per cent.

So what is the difference in the number of deaths between an infection rate of one per cent versus 20 per cent? In all, Australia could face an additional 48,000 premature deaths without distancing. This is equivalent to about 30 per cent of annual deaths in Australia.

Although [recent evidence](#) suggests that young people may also be more vulnerable than previously thought, these premature deaths would be clustered in the old and those with co-morbidities, and also in remote Indigenous communities should the virus get there.

Economists use the [value of an economic life](#) for cost-benefit analysis of public projects. This measure represents society's willingness to pay to reduce the risk of an additional death. Using the [New South Wales Treasury's value of a statistical life](#) of \$4.2 million, the economic loss of 48,000 premature deaths is some \$200 billion or about 10 per cent of Australia's annual economic output.

This means acting early and hard before the infection rate gets too high, and lowering it as quickly as possible, makes good economic sense.

If the Spanish Influenza pandemic a century ago is anything to go by, going early and hard in terms of physical distancing should also [support a faster economic recovery](#).

The question Australians should ask of their leaders this: Is strict physical distancing a cost worth paying?

The economic benefit from insufficient physical distancing is that, at least initially, more Australians stay employed, there is more economic activity, more taxes are paid, and the expenditures of governments are less.

But not imposing a lockdown or equivalent measures comes at the cost of a higher infection rate, which also means more non-pandemic patients may die because there may be insufficient beds, medical equipment, or staff to look after them. A higher infection rate would also increase the mortality rate of pandemic patients as there may be an inadequate number of ventilators to treat them.

The economy will suffer even without sufficient physical distancing, but the effects would be delayed. Many people will get sick without sufficient physical distancing and many would be unable to work until they are recovered.

A much higher infection rate would also result in the isolation of Australia from the rest of the world. Why would any country – just as Australia did to China – want Australians coming to their country if it had high rates of infection, and why would anyone want to visit Australia?

While the future is uncertain, the outcomes of exponential growth are not. With much more testing and tracking of those with the virus, and with trialling the impact of going from a lockdown to lesser physical distancing in some communities, Australia would have an exit strategy out of a lockdown within a few weeks.

Moreover, anti-viral treatments are being tested and there is hope for a vaccine, likely to be available sometime in 2021. Reducing infection now buys time for these protections to become available.

Implementing a true lockdown, coupled with a government wage subsidy of 80 per cent of a worker's wage, similar to the [United Kingdom's](#), but to all casual, part-time and full-time workers who are unable to work because of physical distancing, would go a long way to keep people employed and attached to their employer.

A wage subsidy, coupled with the already announced additional \$550 a fortnight COVID-19 supplement to the [Jobseeker Payment](#), would provide most Australians with a basic income to survive and pay the bills during a lockdown.

Such an approach combines 'sharing the burden' with 'flattening the curve', a two-fold economic and public health approach that would save lives while minimising economic disruption, especially for younger and casual workers who are the most disadvantaged by severe physical distancing. It's the smarter and safer strategy, and Australia must do it.

*Our model for the spread of the infection is an adapted SEIR-M model. It is still under development, needs further validation and also peer-review. For now, we assume a homogeneously mixed population. We are also working on a spatially explicit model to account for more complex population contact.*

*Current model results are roughly in line with changes in basic growth rates and their projections by State. We will continue to provide forward projections that can then be compared with actual numbers. All data for COVID-19 is sourced from State and Commonwealth websites. A valuable discussion of this and more complicated infectious disease models is found on the [University of Melbourne Pursuit](#) website.*

*This article was co-published with [The Conversation](#).*

This piece was published at Policy Forum, Asia and the Pacific's platform for public policy analysis and opinion. Read the original version here: <https://www.policyforum.net/sums-germs-and-fear/>

# Is Australia's coronavirus strategy the Hammer or the Scythe?

QUENTIN GRAFTON, TOM KOMPAS

07 APRIL 2020

Harold Wilson, a former prime minister of the United Kingdom, once said that a week is a long time in politics. The same can be said of COVID-19. Although it is too early to be certain, from the available data, it very much looks as if physical distancing and better control of the borders is working in Australia.

The daily reported growth rate in infections has been falling dramatically recently and, as of Sunday April 5, is less than 3 per cent. There were periods during much of March where the daily growth rate was 24 per cent or more. This is something to be cautiously pleased about, even while the total number of infections is still increasing.

As Australia has moved towards but not yet implemented a national lockdown, people are speaking out about the high costs of government-imposed distancing. Their point is valid. Having the economy shut down for weeks or even months certainly imposes high costs. But is it worth it?

The answer to this question can be found by comparing three possible strategies. One of these, called "the Hammer", according to preliminary analyses, is the preferred strategy to fight COVID-19 in most cases. And yes, it does involve physical distancing, along with comprehensive testing, tracking, and quarantine of the sick.

An alternative strategy to physical distancing is what we call "the Scythe". The Scythe response to COVID-19 does not impose sufficient mandated physical distancing, with the intent to keep the economy running as smoothly as possible and get people back to work.

According to proponents of this strategy, this is achieved by letting the virus "take its natural course". This means COVID-19 ends up infecting a large proportion of the population. According to its proponents, the Scythe would eventually result in "herd immunity" and supposedly impose the lowest cost on the economy, since many people not affected by the virus could still work.

Putting aside the fact the Scythe could be described as involuntary euthanasia of potentially tens of thousands of mainly elderly people, it is premised on at least three false assumptions.

First, that the mortality rate is only a "bit worse" than an influenza epidemic. In fact, the mortality rate in a country with substantial COVID-19 testing, like South Korea, is about 1 per cent, or about 10 times greater than the common flu. COVID-19 also results in a much higher hospitalisation rate than the influenza we commonly have, with about 20 per cent of confirmed cases requiring hospital treatment. By comparison, the hospitalisation rate for the flu is about 1 per cent.

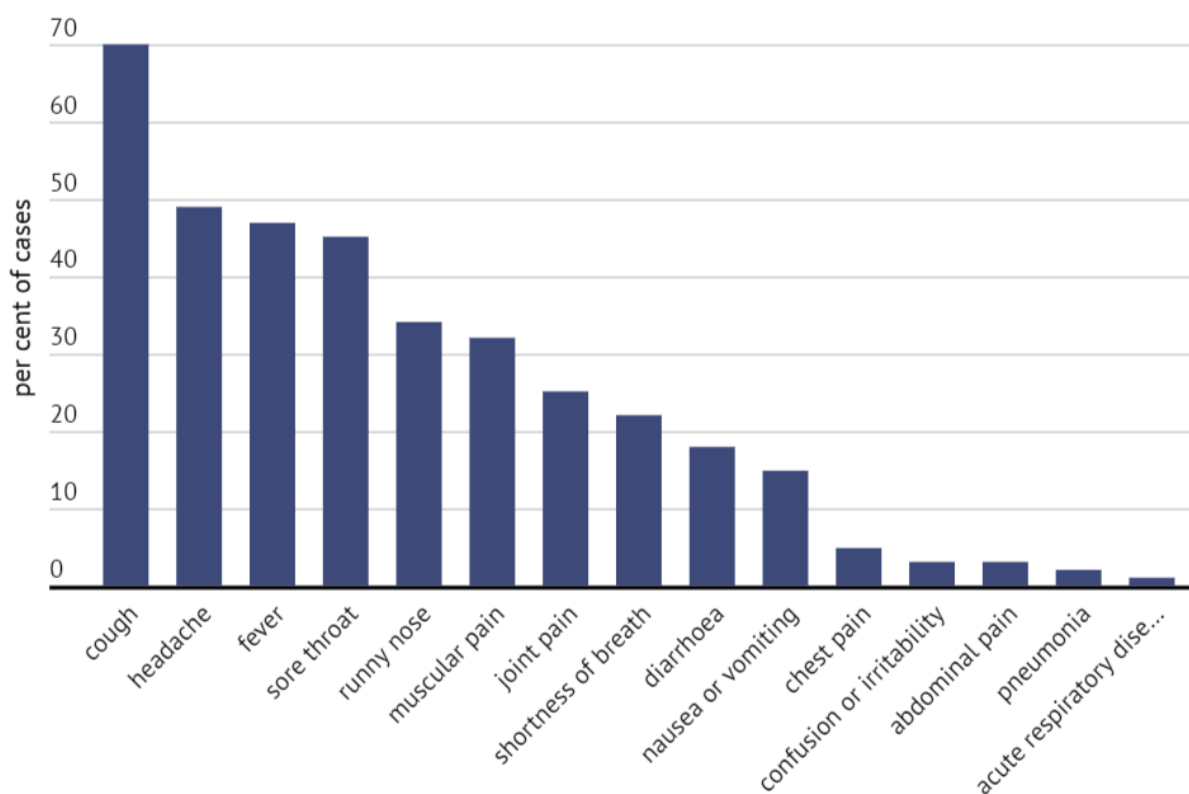
Hospitalisation rates really matter when it comes to saving lives. When intensive care units are full, the mortality rate for both COVID-19 and non-COVID-19 patients soars. To get an idea of what the Scythe might look like, check out what is happening right now in New York City, and also consider what it means about who gets treated and who does not.

Second, it assumes that removal of mandated physical distancing measures means we can get back to normal more quickly, because the virus ends up infecting most of the population and those who recover cannot infect anyone else. In fact, the virus is mutating, so it is possible - but, as far as we know, unlikely - that someone who recovers from one variant of COVID-19 may not be immune to another variant of the virus.

Some of those who recover but who needed to be on ventilators for an extended may period also face long-term health challenges. Australia would not be back to normal after the Scythe, because of lower labour force participation and reduced productivity, and key sectors of the economy would continue to suffer.

### Coronavirus symptoms in Australian cases

Based on 2257 cases for which symptom information available



*Data: Department of Health*

Third, the Scythe assumes that there are only two alternatives; mandated physical distancing that involves many months of physical distancing - what we call a "Slow Burn" - and the Scythe. In fact, there is a much preferred alternative called "the Hammer", that is a "go hard and go early" strategy that suppresses, and ultimately stops, the growth in the rate of infections such that the number of new infections is far less than the number who are recovering.

The Hammer requires sufficient physical distancing for at least three cycles of infection - say, for an initial six weeks - and then the gradual relaxation of mandated controls coupled with effective testing and tracing of people with COVID-19. With very low infection rates, after six weeks the economy would hopefully recover more quickly as people would be confident to work and play.

The Hammer is not just about "flattening the curve". It also means potentially shortening the curve. In other words, not only are the total number and peak number of infections dramatically reduced, but so is the time period in which the infection rate is unacceptably high. This saves a lot of lives. It also supports the economy.

There is no pretending that the economic costs of the Hammer strategy are low. COVID-19 has imposed, and will impose, very large economic costs, regardless of strategy. But if the Hammer is implemented early enough when the infection rate is still low, the costs will be much lower than the Scythe.

So what is the cost of the Hammer? With the Hammer, economic activity that is severely and negatively affected by mandated physical distancing would occur for roughly 12 per cent of 2020. During that time, even in the most extreme case we can conceive, economic activity would be halved. Thus, the temporary reduction in economic activity is roughly 6 per cent on an annual basis. Of course, Australia still incurs losses in income and economic activity after this period, but it can recover faster.

The Slow Burn, in contrast, is a strategy that involves early mandated physical distancing to prevent a high infection rate, but not enough to fully control the virus in the population. As a result of the suppression, the number of premature deaths is greatly reduced, but at the expense of an extended period of mandated physical distancing, possibly over several months. This may be a higher-risk strategy from a public health perspective and certainly is more costly to the economy than the Hammer.

As of April 7, it appears Singapore will change its strategy from what was akin to a Slow Burn to what it hopes will be a Hammer. This revised strategy involves an initial four weeks of lockdown that includes, for the first time, the closure of all schools and universities, and most workplaces.

Australia and some other countries such as New Zealand are in the best possible position to deliver the Hammer to COVID-19. From admittedly preliminary analyses, this makes sense in terms of both lives saved and the economy.

We do not know yet whether Australia's current physical distancing will amount to either the Slow Burn or the Hammer. Thankfully, the Australian strategy is certainly not the Scythe. The New Zealand strategy of an early lockdown, now adopted by Singapore, is intended to be the Hammer. Let's hope it delivers.

If Australia is to successfully arrive at the other side of a flattened and shortened curve with the Hammer, then it will need to undertake a lot of testing, tracing of those who are positive and their physical contacts, isolating the affected, and quarantining all new arrivals. It will also need to maintain some less costly physical distancing measures to ensure COVID-19 does not bounce back.

The question is: if Australia has a Hammer, and COVID-19 is a nail, why not use it?

**Quentin Grafton is director of the Centre for Water Economics, Environment and Policy at the ANU's Crawford School of Public Policy. Tom Kompas is a visiting professor at the ANU.**

This piece was published at The Canberra Times. Read the original version here: <https://www.canberratimes.com.au/story/6713810/is-australias-coronavirus-strategy-the-hammer-or-the-scythe/>

# Australia is at a coronavirus crossroads: ‘Go early, go hard’ is the best approach

QUENTIN GRAFTON, TOM KOMPAS, AND JOHN PARSLAW

16 JULY 2020

On July 15, there were 238 new cases of COVID-19 recorded in Victoria of which only a small proportion could be traced to existing cases.

Until the Melbourne lockdown, cases in Victoria had been doubling every seven days and almost all are a result of community transmission.

Lockdown of greater Melbourne, and soon the entire state, will suppress the virus but the multibillion-dollar question is, what to do next?

As we [wrote on March 30](#), we have consistently argued for a ‘go early, go hard’ approach; to impose a national lockdown to first suppress and then to eliminate community transmission.

Based on our modelling, we showed that elimination (NO COVID) generated the best outcome for both public health and the economy.

This is because elimination allows Australia to get close as is possible to the pre-COVID way of life, as our Kiwi cousins are currently enjoying.

Elimination greatly reduces the risk of a very expensive lockdown-relaxation-lockdown ‘yo-yo’ that Melbourne is now experiencing.

What we need to do, and should have done, is [aim for elimination of community transmission](#) and also build the best possible testing, tracing and supervised quarantine system.

So far, at a national level, we have failed to do either.

Fast forward to mid-July and we see that a country that did eliminate the virus, [New Zealand](#), with a nine-week ‘full-on’ lockdown, has done at least as well in terms of its decline in GDP as has Sweden, which never had a lockdown.

But in terms of public health outcomes, NZ is light years ahead.

NZ has about half the population of Sweden yet had only 22 COVID deaths, while [Sweden](#) has had more than 5500 deaths (more than 100 times higher death rate than NZ), with more deaths to come.

Elimination was one of two options provided to the national cabinet at the end of April by researchers from the [Group of Eight universities](#).

The national cabinet chose not to go for elimination and, instead, opted for suppression (but not elimination) of the virus and to live with low rates of infection in the community.

This decision was taken so as to minimise the economic damage associated with an extended lockdown.

But the paradox of lockdown is that early relaxation when there is still community transmission is high risk.

It ends up costing the economy much more compared to elimination because the infection will bounce back as social distancing is relaxed, as we are seeing in Victoria and in [other places in the world](#).

The success of the LOW COVID and a sustainable NO COVID strategy is contingent on a 'platinum plus' system of testing, contact tracing and quarantine of possible and confirmed cases.

Despite testing hundreds of thousands of Victorians, the system has not been good enough and there has been hidden transmission in Melbourne for weeks.

Some people have refused to get tested because, if they are in casual employment, they will lose income when they self-isolate and await their test result.

The incentive, therefore, is to go to work even if sick.

This incentive even applies to some of our casualised [healthcare workers](#), and not just in Victoria.

How crazy is that in the middle of a pandemic?

Several Australian jurisdictions, not just Victoria, have also [failed to test all arrivals in quarantine hotels](#).

As we now know (and should have known) there is a very real danger the virus could be seeded from quarantine to generate a renewed outbreak elsewhere.

This is especially true in Australia because almost all quarantine arrivals are located in our largest cities where a COVID-positive 'escapee' could infect many people in a short period of time.

States that sensibly imposed interstate border controls over the past few months have been vindicated despite legal action taken by Clive Palmer ([supported by the federal government](#)) in the High Court against these closures.

Several (WA, SA, NT and Tasmania) appear to have eliminated community transmission.

The alternative to state border controls is what we are currently seeing in the [US](#), a half-hearted attempt at a LOW COVID outcome (in most states) with virus transmission from state to state, and back again.

The solution to the 'what next' question is easy to answer but much harder to implement effectively.

First, Victoria needs to 'go early, go hard' and rapidly impose lockdown at the state level with the goal of elimination.

NSW must also act immediately by successively reimposing social distancing restrictions before the infection becomes unmanageable in that state.

Second, Australia (and Victoria is the priority place for deployment) needs a 'go early, go hard' strategy in terms of testing, contact tracing and much better supervised quarantine.

Australia needs (but does not have) the world's best possible testing, tracing and quarantine system.

It should not take [hours of queuing to get tested](#), as is happening in some places in NSW, and everyone should get their results within 48 hours (some people are waiting four days or more to get their test results).



Quarantine should, as much as is possible, be away from large population centres, testing should be mandatory on arrival and before exit, and the facilities should be managed by properly trained and resourced police and/or defence personnel supported by healthcare professionals.

Quarantine is not a 'tick box' exercise but is a critical first line of defence against transmission to a vulnerable Australian population.

Third, we need to employ relatively low cost but effective measures that reduce transmission.

These include the 1.5-metre social distancing rule, proper hand washing, and the wearing of masks in public spaces.

These measures need to be maintained so long as there is any community transmission within a state or territory.

There are no guarantees in this pandemic, but our modelling and the experience from pandemics elsewhere, including COVID, suggests that a 'go early, go hard' strategy for social distancing, quarantine, testing and contact tracing is the best.

This is what Australia should do going forward. There are no winners in the COVID game, but we can minimise the loss of life and the impact on the economy if we act smart and go early, go hard.

*Quentin Grafton is professor of economics and Australian Laureate Fellow at the Crawford School of Public Policy, the Australian National University.*

*Tom Kompas is professor of environmental economics and biosecurity in the School of Biosciences and the School of Ecosystem and Forest Sciences at the University of Melbourne and one of three Chief Investigators in the Centre of Excellence for Biosecurity Risk Analysis (CEBRA).*

*Dr John Parslow is a mathematician and modeller. He has more than 40 years of national and international experience in applied environmental modelling and natural resource management.*

This piece was published at The NewDaily. Read the original version here: <https://thenewdaily.com.au/news/coronavirus/2020/07/16/australia-coronavirus-crossroads/>

# Just how many people really have (and have had) COVID-19?

QUENTIN GRAFTON, STEVEN PHIPPS, TOM KOMPAS

18 NOVEMBER 2020

**True (population) infection rates are much higher than they seem.**

**New research published today shows that the number of cases of COVID-19 are much greater than reported, and this has important implications about how we respond to the pandemic crisis, Quentin Grafton, Steven Phipps, and Tom Kompas write.**

A [peer reviewed manuscript](#) published in the respected journal *Royal Society Open Science* today shows that in some countries, COVID-19 case numbers may be up to 17 times greater than those confirmed by testing.

According to [John Hopkins University](#) and the [World Health Organization](#) (WHO), as of 17 November, the global number of total cases – that is, all recovered, active, and fatal cases combined – was 55 million. Total deaths were 1.3 million, and the number of confirmed cases was increasing by about half a million per day.

Confirmed cases are the number of persons who have tested positive for [RNA](#) material of SARS-CoV-2 (the virus that causes COVID-19) present in their nasal secretions or sputum. As a complement to RNA testing, and to estimate the true infection rate, researchers have also undertaken [seroprevalence studies](#) that test for antibodies in blood samples. Identification of antibodies in the blood can indicate that a person either has or has recovered from COVID-19.

Seroprevalence studies need to be repeated regularly and be based on an appropriately stratified random sample of the population to obtain a reasonable estimate of the true (population) infection rate.

A challenge with seroprevalence studies is that, if the true rate of infection is relatively low (say one per cent or less), then the number of false positives or false negatives may make the sero-surveys unreliable as a means of estimating true infection rates.

This is true even if the sero-test has a high proportion of true positives and true negatives.

To combat this difficulty, we employed a statistical method called backcasting that allows us to obtain estimates of the true infection rate based on a range of infection [fatality rates](#) (0.37 to 1.15 per cent) and the time from [infection to symptoms](#) (4.1 to 7.0 days) and time from [symptoms to death](#) (12.8 to 19.2 days).

Using our method, we generated multiple random values based on the range of possible values of these three parameters (infection fatality rate, time to symptoms and time to death) to provide a 95 per cent confidence interval around our estimates of the true infection rate.

Our analysis covered 15 developed countries with a combined population of over 800 million people. Our backcasting method generated similar results to national [seroprevalence studies](#).

Importantly, we found that COVID-19 is far more prevalent than is suggested by reported statistics of confirmed cases identified by RNA tests.

We found that the true number of infections across our sample of 15 developed countries is 6.2 times greater (95 per cent confidence interval: 4.3–10.9) than the number of cases confirmed by RNA testing. We also found a strong negative relationship between the proportion of people testing positive for the virus from RNA testing and the detection rate of COVID-19 in the population.

Our method is novel and easy-to-use and especially valuable wherever there is reliable data on the number of fatalities attributable to COVID-19. Unlike reported infections based on RNA tests, backcasting is not dependent on the coverage or efficacy of testing regimes.

Backcasting is also scalable to a local, regional or national level, can be readily updated on a daily basis using data that has already been reported, and makes no assumptions with regard to how the number of COVID-19 infections has evolved over time.

Our approach is particularly advantageous in locations where there is little testing or limited capacity to forecast rates of infection but where there is a need, for the purposes of public health planning, for a more accurate population-level measure of COVID-19 infection.

While our method is robust, we highlight three limitations when comparing infection rates across countries and over time.

First, the age distribution across different populations needs to be broadly similar, because the infection fatality rate from COVID-19 is [highly dependent on age](#).

Second, the level of medical care across countries should also be comparable, because COVID-19 fatalities depend on access to medical services, such as the use of ventilators.

Third, the infection fatality rate should be broadly constant over time, as any substantial change may introduce biases into the estimated population infection rates.

Most countries in the world have undertaken fewer tests per 1,000 people than the 15 countries considered in this research, and also have a lower capacity to test for COVID-19. This suggests that globally the number of people who are infected with, or who have recovered from COVID-19, is many times greater than the reported number of cases from viral testing.

Even within our sample, the countries with the lowest detection rates (Belgium, France, Italy, and the United Kingdom) appear to have a population infection rate that could be up to 17 times greater (Italy) than reported by confirmed cases via John Hopkins University or the WHO.

While there are many ways to respond to COVID-19, our statistical measures of the true infection rate should promote better [public health decision-making](#). This is important because if governments do not know how many people have been infected in a population, it becomes very hard to plan a pandemic response effectively.

This piece was published at Policy Forum, Asia and the Pacific's platform for public policy analysis and opinion. Read the original version here: <https://www.policyforum.net/just-how-many-people-really-have-and-have-had-covid-19/>

# What have we learnt about responding to COVID-19 outbreaks?

QUENTIN GRAFTON, JOHN PARSLow, TOM KOMPAS, KATHRYN GLASS, EMILY BANKS

30 DECEMBER 2020

On New Year's Eve 2019, the [World Health Organization's](#) Country Office in the People's Republic of China was alerted to cases of "viral pneumonia" in Wuhan. This disease has since become known to everyone as COVID-19. As 2020 now ends, many countries are struggling to respond to a second wave (or even a [third wave](#)) of COVID-19 infections, through mandatory and voluntary social distancing measures, testing, contact tracing and isolation, border controls, and economic incentives and stimulus measures.

There is now enough evidence, collected across multiple countries, to show that the strategy that results in the lowest public health and economic costs when it comes to COVID-19 outbreaks in rich countries is to [go early, go hard](#) and go long enough to suppress infections, allowing testing and contact tracing to stop clusters of infections becoming major outbreaks.

Let's look at the difference between the responses in Australia, in particular Victoria, and western Europe.

In Victoria, social distancing recommenced in the second half of June in response to community transmission originating from a hotel quarantine breach. Widespread testing and contact tracing, the reintroduction of social distancing and the mandated use of masks outside slowed the growth rate of new infections. In August more stringent measures (including a curfew and travel-distance limits from home) were introduced, and all workplaces were closed except for essential activities.

Victorian COVID-19 fatalities peaked in early September. Most fatalities were [among elderly people](#) living in aged or retirement homes, as ["group distancing"](#) proved unsuccessful despite protocols on visiting the elderly in these homes. By mid-September there was a substantial fall in new daily cases, from a peak of 687 to less than 50, [which was attributable to stringent restrictions](#). Social distancing measures were progressively relaxed according to a widely available ["Roadmap for Reopening"](#), predetermined by the 14-day Melbourne and state averages of new daily cases. On December 6 the state was declared "COVID normal", with no community transmission since the end of October ([see our timeline graphic here](#)).

The first wave of COVID-19 infections in western Europe was also effectively suppressed with stringent social distancing measures progressively introduced in March and April. These measures were incrementally relaxed in June and July, while new daily case numbers were still in the hundreds.

For effective contact tracing, each positive case, on average, requires [over 30 contacts to be traced](#) within 48 hours. Consequently, new daily cases in western Europe during the northern summer were such that testing and contact tracing were insufficient to effectively suppress infections. Exponential growth in infections resumed from late July to August, and new daily cases in large western European countries [exceeded 10,000 per day](#) by the end of October.

As of November 1, per capita new daily cases (averaged over seven days and per 1000 people) were as follows: France 0.7, Germany 0.2, Italy 0.5, Spain 0.4 and the United Kingdom 0.3. By comparison, at its peak, new daily infections during Victoria's second wave were less than 0.1 per thousand people ([see our comparison graphic here](#)). In response to the high and increasing new daily cases in western Europe, various forms of "stay-at-home" measures were instituted in France, Italy, Spain and the United Kingdom. Germany implemented a series of national social distancing measures and then a national lockdown that is still ongoing.

Another area of contrast between the Australian and western European response has been the issue of border controls. Early implementation of strong border controls, with 14 days of supervised hotel quarantine for all overseas travellers since March, helped Australia to successfully suppress its first wave. Within Australia, states which succeeded in eliminating community transmission subsequently implemented internal border controls to prevent reinfection from other states, including from Victoria during its second wave. By contrast, international and internal border controls in western Europe have been more relaxed, with little or no supervised quarantine.

Both jurisdictions also made some similar mistakes. While the Victorian Roadmap presented decision rules for relaxing social distancing, no such details were publicly provided for the introduction of Victoria's measures. By July 22, there was evidence that existing [social distancing measures were insufficient](#) to "flatten the curve", with the 14-day average of new daily cases at about 400. A delay in implementing sufficiently stringent social distancing measures in Victoria until early August, and in western Europe in September when government experts recommended immediate and more stringent measures, resulted in larger second waves that, in some countries such as the [United Kingdom](#), have not yet been successfully suppressed.

So what do these contrasting results mean when it comes to the health and economic costs incurred by both jurisdictions?

Based on Australian Bureau of Statistics data at a Victorian level, we [modelled](#) the total economic costs of implementing social distancing. We estimated Victoria's economic costs of highly stringent social distancing from August 5 to October 27 at some \$20 billion. Costs not included in our estimate are increased non-COVID-19 morbidities, associated welfare losses from social isolation (e.g. poor mental health) and a decline in worker skills and expertise from an extended period of unemployment.

However, the counterfactual to imposing sufficiently stringent social distancing measures to suppress COVID-19 infections is the economic losses and public health costs of inadequate suppression. Using [epidemiological models](#) we constructed, informed by Victorian data, we found that the economic costs of inadequate social distancing measures would have resulted in much larger economic costs of between \$140 billion and \$380 billion.

The economic benefits of successful COVID-19 control are shown in a cross-country comparison of the economy and public health costs, as measured by OECD data showing the change in quarterly GDP from the fourth quarter of 2019 to the end of the third quarter of 2020, and COVID-19 fatalities per million people ([see our comparison chart here](#)). For Australia, New Zealand and the five largest western European countries (France, Germany, Italy, Spain, and the United Kingdom) we find a strong negative relationship between the cumulative change in quarterly GDP and the cumulative COVID-19 fatality rate. This observation is supported by an estimate of a statistically significant and

negative causal relationship between the quarterly fatality rate and quarterly GDP growth for these seven countries.

The Australian (including Victoria) and the western European responses to suppressing a second wave of COVID-19 provide important lessons. These include:

- early implementation of sufficiently stringent social distancing results in both lower economic and public health costs in rich countries;
- external and internal border controls, that include mandated and supervised quarantine, are effective at localising outbreaks;
- the response to COVID-19 must be adaptive and flexibly respond to the number of new daily cases;
- clear and consistent messaging is needed to promote community engagement and support for overall suppression goals and social distancing (start date, stringency and duration);
- decision-making about social distancing should be informed by on-the-ground public health expertise, epi-economic modelling and up-to-date public health data; and
- it is highly risky to rely primarily on testing and contact tracing to suppress infections, even in large and rich countries, when new daily cases are in the hundreds.

To read our full research paper, [click here](#).

**Quentin Grafton, Kathryn Glass and Emily Banks are academics at the Australian National University. Tom Kompas is an academic at the University of Melbourne. John Parslow is an independent researcher.**

This piece was published at The Canberra Times. Read the original version here: <https://www.canberratimes.com.au/story/7069717/what-have-we-learnt-about-responding-to-covid-19-outbreaks/>