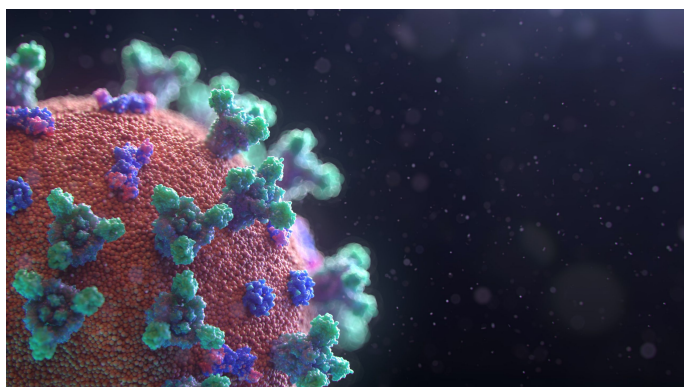


Why eliminating Covid-19 is critical: Since more waves of infection, hospitalisations and deaths are inevitable for other countries until a vaccine arrives

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There are really only three ways that a population can beat Covid-19: (i) eliminate the virus and keep infected people out (the approach NZ is taking); (ii) allow a sufficient proportion of the population to get infected and become immune to re-infection so there are no longer enough non-immune people to allow the virus to spread (this is called herd immunity and is estimated to be at least half of any population for Covid-19); or (iii) develop an effective vaccine, which is the ideal way of achieving herd immunity. Given a vaccine might still be a long way off, NZ's elimination strategy (if successful) is likely to avoid high numbers of deaths and the need for long periods of restrictions to suppress or mitigate the spread of Covid-19.

One of the key pieces of missing information on Covid-19 that will determine the likelihood and implications of each of these strategies is the proportion of people who are currently infected or have been infected and have recovered. These are the potentially immune people. However, it has been extremely difficult to determine because an unknown proportion of people have minimal or no obvious symptoms and so are not detected. Also, there are still concerns about the quality of the antibody tests to determine who has

already been infected. Further, the number of people who are infected is a rapidly moving target, so multiple population surveys would be required.

An alternative way to estimate the total number of infected people at any point in time is to use the Infection Fatality Ratio (IFR). This is simply the number of deaths that occur among, say 100 infected people. So, if the IFR was 1 in 100, then there would be one death among 100 infected people.

But calculating the IFR for Covid-19 is very difficult because it requires every infected person, whether they have symptoms or not, to be found. A number of researchers have tried to make this calculation using information from a range of sources, including the quarantined Diamond Princess cruise ship, which provided in essence a 'captive population' (and where the IFR was 1.8% on 18 April, albeit an older population).

While estimates of the IFR vary widely, one value can help us predict what is likely to happen in the next year or so, if countries don't instigate an ongoing strategy of intensive case finding, contact tracing, quarantine, and physical distancing.

If the true IFR value is around 1 in 100 (rounding up from Iceland where 11% of the whole population has been tested and the IFR was 0.5% on 17 April), that means that multiplying the current number of deaths in a country by 100 will give you an estimate of the number of people who had been infected. This is however the IFR of several weeks ago, because it typically takes around 2-4 weeks for infected people to die from the time they were infected. This calculation works only if the people who have died are typical of all people who die from Covid-19, so a country would probably need at least 100 deaths for the calculation to be meaningful. If this IFR is correct, consult the Worldometers Covid-19 website and compare the total confirmed cases per 1 million people with the total deaths per 1 million people for some of the worst effected countries to date. There have been approximately 400 deaths per million people in Spain, which if the IFR is 1 in 100, means there would have been approximately 40,000 infected people per million people (or 4% of the population) several weeks ago, yet the reported cases are under 4,000 per million people, a tenth of the likely number of true cases. This 4% is very far from the 50% plus of the population needed to achieve herd immunity in Spain.

Similarly, in the US the 100 deaths per million would translate into 10,000 infected people per million (or about 1% of the population), but only about 2,000 cases per million have been reported. Again, nearly all of the US population is likely to still be susceptible to further outbreaks.

These calculations have several profound implications.

1. Herd immunity is likely to be years away in these countries with major epidemics unless we develop an effective vaccine or antiviral or are willing to endure multiple further catastrophic waves of infections, hospitalisations and deaths.
2. The only reason some severely infected countries appear to be over a recent peak in the epidemic curve is because of the major restrictions they have put in place.
3. Ongoing vigorous case finding, intensive contact tracing and compulsory quarantine, along with enforced physical distancing (various levels of lock-down) will become the norm in most countries until a vaccine is developed or the virus can be eliminated.

Even if the estimated IFR is overestimated by a factor of 5 and the true ratio is 1 in 500, these implications remain valid, although there would be fewer new waves of infection and

herd immunity would be achieved earlier but still at huge further cost to life. If the IFR is underestimated by a factor of 5 and the true ratio is 1 in 20, the implications will be considerably worse than predicted here. Moreover, in the absence of any evidence that infection guarantees subsequent immunity, any scenario is worse than it looks (see Kissler et al).

Fortunately, New Zealand has chosen an elimination strategy which (if successful) means that the country will not need long periods of disease suppression or mitigation measures. That is, after elimination is achieved, NZ will be able to open up its economy to some level of “new normal” – though, with ongoing tight border controls and quarantine, this will still not allow international tourism to be re-established. Then once a vaccine or new anti-viral treatments are available – these border control measures could be reduced.

There are also signs that Australia is also considering elimination – with the Australian Prime Minister recently articulating “suppression/elimination” as the strategy. If Australia does achieve elimination – then the travel and trade between Australia and NZ could be further opened up. Another encouraging sign for the elimination approach in island jurisdictions is that Taiwan has successfully reached zero cases on some days of the last week (see Worldometers data). It also used rigorous border control with quarantine from early on in the Covid-19 pandemic.

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