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**A deliberate “population immunity”
strategy before a vaccine:
Why it wouldn’t work and why it
shouldn’t be tried**

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Submitted to The UK Government and the People of Great Britain
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A deliberate “population immunity” strategy before a vaccine: Why it wouldn’t work and why it shouldn’t be tried

Summary

A deliberate strategy of attempting to raise the level of population immunity by allowing or encouraging people at lower risk of hospitalisation or death to become infected is not only unlikely to achieve the desired objective of population immunity, but risks a significant amount of avoidable death and illness, without protecting the economy.

Evidence suggests that the duration of immunity achieved could be less than a year. In addition, guaranteed shielding of vulnerable groups is infeasible and there would be substantial mortality and morbidity even among the ‘non-vulnerable’. It would also increase health and social inequalities, with the most disadvantaged groups, particularly the elderly, deprived and the ethnic minority groups, being disproportionately impacted. Treatment for COVID-19 is improving all the time. Delaying as many people as possible becoming infected with coronavirus will save lives and ill-health as new treatments become available. Other countries have shown that the infection rates can be suppressed without highly damaging ‘lockdowns’ by using established infection control procedures, including excellent contact tracing followed by supported isolation.

Introduction

When a large proportion of a community becomes immune to a disease, the spread of the disease from person to person becomes substantially reduced. As a result, the whole community becomes protected, not just those who are immune. This phenomenon is often called “herd immunity” or better described as “population immunity”. Population immunity can be achieved in two ways: general spread of the disease through the population, or through vaccination. The latter is routinely used in the UK and internationally to generate population immunity as part of our childhood immunisation programme: for instance, the Measles, Mumps and Rubella (MMR) vaccination. Polio was eradicated in the UK years ago through mass vaccination but children still receive the polio vaccine to ensure that it does not return. The proportion of the population needing to have immunity to prevent further spread differs from infection to infection – and determines how many people need to be vaccinated against each specific infection to achieve population immunity. There is currently no vaccine for COVID-19 so any immunity in our population has been acquired through infection during the pandemic or through pre-existing resistance.

Mathematical models of the spread of COVID-19 take account of increasing levels of population immunity as more people are exposed to COVID-19, and also estimate the proportion of people who might be naturally resistant (for instance, by cross protection by non-COVID coronavirus immunity). However, this method of estimating population immunity and future spread is very different to advocating a national strategy of allowing a significant portion of the population to become infected without a vaccine. It is this deliberate strategy and method to reach a population immunity threshold which concerns Independent SAGE, the great majority of public health experts, and many others across society.

As cases of COVID-19 in the UK rise rapidly once again, [a debate](#) has restarted about whether to impose restrictions now to bend the curve back down and suppress COVID-19 until a vaccine becomes available, or [whether to pursue a deliberate strategy](#) of achieving population immunity without a vaccine. [The assumption is that vulnerable populations can be protected while the rest of](#)

[the population \(at low risk of hospitalisation and mortality\) can be safely encouraged to live life normally and be exposed to the virus without a vaccine](#). The idea is that many of the “low risk” population will get infected with COVID-19, and recover, until eventually the population immunity threshold is reached, after which the disease will gradually die out as there will not be enough people left who have not been infected to sustain transmission.

Independent SAGE believes that, in the absence of a vaccine, this kind of population immunity strategy would not work in the UK. It would be irresponsible and unethical to try. We outline the reasons why below.

Is it feasible?

1. Achieving population immunity without a vaccine might not be possible even if tried

We do not yet know how long immunity after recovery from COVID-19 infection lasts. While we hope it will be several years, it [might be less than one year](#) as it is for other coronaviruses that cause colds every year. [A few confirmed cases of reinfection](#) have already occurred. If immunity does fade within a year, then a population immunity strategy would not be sufficient to reduce the epidemic until the availability of an effective vaccine. Further, a vaccine may only provide short term protection, therefore requiring regular boosters.

Even if immunity lasted long enough to sustainably reduce the reproduction ratio (R) to below one, there would continue to be new infections whenever a susceptible person was exposed to someone who had an active infection. For instance, population immunity for tuberculosis (TB) was achieved in many countries years ago (as much by improving housing and nutrition as it was by vaccination or antibiotics). Even with a vaccine and antibiotics, [1.5 million people worldwide still die from TB every year](#). The persistence of new cases and deaths is in no small part influenced by insufficiently addressing conditions that increase vulnerability to TB such as poverty, substandard housing, food insecurity and chronic conditions such as diabetes - all risk factors also shared by COVID-19 and relevant to the UK. The lesson is that declining cases after population immunity is reached does not necessarily guarantee rapid decline and could leave disadvantaged populations particularly vulnerable.

2. We cannot seal off the vulnerable

We now better understand which factors are associated with hospitalisation and death from COVID-19: older age, deprivation, obesity, being from a black and ethnic minority background and health conditions such as diabetes, heart disease, lung disease (including asthma), kidney disease and those who are immuno-compromised. [A study analysing GP records](#) from almost 4 million adults estimated that over 20% (one in five) of the UK population is in a high-risk category, almost a quarter of whom are under the age of 70 and this does not take into account the [higher susceptibility of ethnic minority members of our communities](#). This equates to over 12 million people who would need to be sufficiently protected, many of whom will be in close and regular contact with other family members, including grandchildren and children particularly those living in multigenerational families.

[Another study](#), using Global Burden of Disease data, estimates that almost 30% of the UK population has at least one condition that places them at high risk of severe COVID-19. Even if those in high risk categories agreed to isolate, they would, almost by definition, need access to care and health care. They would need regular access to and interact with key workers such as supermarkets/grocery workers, plumbers, electricians, delivery drivers and other key workers, and many would be living with lower risk family who themselves would need to isolate or live a restricted outside life to prevent bringing COVID-19 home with them. The many young people who live with elderly relatives

in intergenerational homes (disproportionately those of ethnic minority background) or whose parents are vulnerable would be unable to live a “normal life” like their peers who lived alone or with other young people. And, of course, there are millions of people of working age who are at higher risk and who would be exposed in the workplace (including teachers, health care staff and other key workers).

Finally, there are no clear boundaries in terms of ‘risk’ from COVID-19. If we lift restrictions and concentrate on ‘aggressively protecting’ those perceived to be at high risk, millions of people who are at moderate risk will be exposed more, resulting in a substantial burden of serious illness in the ‘unprotected population’. This is a very well described outcome of strategies aimed at preventing illness in ‘high risk’ segments of a general population and is known as the [‘prevention paradox’](#).

In summary, separating out the more vulnerable population from everyone else seems an impossible task, even if only for the 9-12 months until an effective vaccine might be generally available.

Is it right?

3. COVID-19 is not harmless in younger people without other health conditions

It is certainly true that younger people, including children, without health risks/problems are at very low risk of hospitalisation or death. That said, the risk is not zero, and previously healthy younger people (but very few children) have been admitted to hospital and some have died. [Recent evidence given to parliament](#) and [from Italy](#) suggests that 85%-90% of people discharged from hospital following COVID-19 are still experiencing health problems months later.

We are finding out much more about [longer term health problems](#) that can occur following COVID-19, including in people who did not need hospitalisation and even in those who never experienced symptoms. So far, potentially long term problems have been discovered in the [heart](#) including [damage to the heart muscle and lining](#), the [blood vessels](#) creating risk of clots and stroke, [lung damage](#), [brain damage](#) and [kidney disease](#). We do not yet know whether this damage is permanent nor what proportion of people could be affected. Then there is also “[long COVID](#)”, where many people who never needed hospital admission report significant symptoms months after initial infection. These often include debilitating fatigue, muscle aches, coughing and breathlessness. The [Covid Symptom Tracker App](#), which has over 4 million users across the UK, found that [10% of people had symptoms for longer than 3 weeks](#), estimating that about 300,000 people in the UK experienced symptoms for more than 3 weeks, and 60,000 for more than 10 weeks. [A recent study from Ireland](#) found that over half of people who had recovered from their initial bout of COVID-19 experienced persistent fatigue 10 weeks later, regardless of how severe their initial illness was. [A study from the US](#) found that one in five people between 18-34 years old with no chronic medical conditions had not returned to normal health two to three weeks after they were tested. Childhood admissions following COVID-19 infection have also been reported with [severe multisystem disease](#).

It is not ethical to risk the long-term health of the public in this way without the public being consulted and being made aware of the health risks and potential burden which may be carried by a significant percentage of the population.

4. Such a strategy would make existing inequalities worse

Infection levels are highest in the most deprived areas, compounded by more severity of disease among black and minority ethnic populations. These groups are disproportionately represented among [key workers, including those in public facing roles and in the gig economy, and they are more exposed to coronavirus because they are less able to work from home](#). They are also less likely to be able to afford to self-isolate if sick, more likely to work in COVID unsafe environments and more

likely to live in overcrowded, multigenerational and substandard housing. COVID-19 will spread more rapidly, and with greater severity, in these communities while [more advantaged communities remain relatively protected](#). The burden of achieving population immunity would fall to those of lowest socio-economic status. The health consequences of COVID-19 are associated with negative economic impacts, thus exacerbating inequalities.

Finally, a population immunity strategy which requires the vulnerable to isolate and protect themselves while others have a “normal life” effectively places a large mental health burden (which in turn can impact on physical health) on millions of vulnerable people who are excluded from the activities of the rest of the population.

5. We should give science more time to find effective treatments

The hospital experience of initial wave of COVID-19 in March and April 2020 has led to improvements in care for patient with COVID-19, including effective treatments for those with more severe disease. Patients admitted to hospital with COVID-19 now have a much better chance of survival than they would have had in March. An enormous amount of medical research is ongoing into new treatments, and we are getting a better understanding the risk factors for long term impacts after COVID-19 (for instance [women seem at higher at risk than men from long COVID](#)). Suppressing transmission of COVID-19 for as long as we can (while waiting for an effective vaccine) will substantially improve outcomes if and when there are future spikes in infection.

6. We know how to suppress the virus without lockdown

Some have suggested that the [epidemiological concept](#) of population immunity should become a specific health [strategy](#) for dealing with this infection, often suggesting that it is the only option. They base this assertion on the belief that suppression “[is increasingly infeasible](#)” and that suppression involves too many detrimental impacts on personal liberties (including leisure and social life) as well as our economy¹. This assumes that strict comprehensive lockdowns are the only means of suppressing the virus. This is not true and ignores the substantial evidence worldwide of countries who have not only suppressed the virus during the initial wave but are continuing to suppress the virus with very few COVID-19 daily cases and deaths. This includes New Zealand, which is a much smaller and less crowded country than the UK, and countries with large urban populations such as South Korea (50 million people), Japan (126 million people), Taiwan (24 million people), Thailand (70 million people) and Vietnam (97 million people).

We can learn a lot from these countries: they managed to suppress the spread of COVID-19 through a combination of consistent public health messaging, behavioural strategies including social distancing, hand hygiene and other personal protective measures, and, most importantly, using robust testing, contact tracing and isolation. Those [countries which suppressed the virus most aggressively and rapidly, tended to experience the least impact on their economy](#). The European country with the [best testing and tracing system is probably Germany](#) and they experienced [far fewer deaths than similarly sized other European countries](#) including the UK. While we still do not have a test and trace system that is fit for purpose, we have good evidence as to how it should be done, with a de-centralised local strategy, with partnership between local government, public health bodies, primary care and local communities being key. We should not give up and pursue a population immunity strategy just because building a good test, trace and isolate system is difficult.

¹ Often [Sweden is used](#) as the exemplar country for a deliberate population immunity strategy (Independent SAGE published a case study on Sweden on 25th September exploring whether such an interpretation is justified).

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Following the science