

## Review on Potential Improvements in Public Health toward Vaccination under Covid-19

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### Abstract

The COVID-19 pandemic is expected to become endemic and come back with increased virulence. This paper outlines potential public health interventions, such as hygiene practices, social isolation, and face masks, as well as realistic future advancements. It focuses on the negative public health effects of lockdowns, the role of natural changes like weather, testing for surveillance and research purposes, testing to identify cases and contacts, including the role of antibody tests, the public health value of treatments, and molecular diagnostics. Population immunity will only develop through infection up until a vaccine is developed. It needs to be thought about but is now frowned upon to permit infection in people who are at very low risk while making society as a whole safer. An infection with a reproduction number of around 1 or slightly higher can be suppressed by a population immunity of between 40 and 50 percent. Importantly, COVID-19 now has a low mortality rate in children and adolescents, about comparable to influenza. It is necessary to measure the relative impact of lockdowns and COVID-19 damage. Now is the time for urgent public discussion, especially that on population immunity, guided by epidemiological facts.

**Keywords:** Health services; Disease prevention; Herd immunity; Population immunity; Pandemic epidemic

### Introduction

Similar to chess, preparing ahead is crucial in the field of public health. However, many authorities are reluctant to lay forth long-term strategies for combating the COVID-19 epidemic. Future options discussions could divert attention from the messages encouraging social isolation and staying at home. Leaders are concentrating on pressing matters, such as "the peak" of hospitalizations and fatalities, but getting there will require navigating perilous downhill terrain [1]. The COVID-19 pandemic has put us in zugwang, a chess situation when every move is bad and we have to consider any strategy, no matter how unpleasant. Lockdowns impair the physical and emotional health of the populace in addition to the economy because vaccines and curative treatments may be delayed for a long time. Especially in many low- and middle-income nations, mass testing will not be viable on a worldwide scale as it is in the well-developed, advanced economies like the US and Germany. We must consider alternatives to these initiatives. The conventional public health triangle of primary (stop it from happening), [2] secondary (pick it up early), and tertiary prevention (minimise the consequences) is summarised in along with interventions on the viral agent, host/population, and environment. Although this classification is typically used for people, I also apply it for communities in this work. This study aligns with an outline of possibilities provided by Bedford as well as the WHO strategy update that was released on April 14, 2020 [3-5] and subsequent updates on its website. I concentrate on ten fundamental public health issues taking into account their importance for herd immunity, which is more accurately referred to as population immunity in this context. A large percentage of the population is immune, which prevents infection from spreading from one person to another, providing the community with protection from a contagious disease. Although it can also happen naturally, vaccinations are typically how it is triggered. The table contains a number of significant points that are not fully covered in this essay, such as the necessity of conducting further study on the transmission of viruses, their infectious doses, evolving genetic makeup, and most importantly their virulence. It is crucial to identify the factors that raise risk in older populations, men, persons with cardiovascular diseases, and those who have type[6]

2 diabetes. I anticipate that host/population-focused interventions like hand-washing prohibitions and social seclusion will be extended, that lockdowns will be implemented—possibly intermittently and with [7-9] varying degrees of severity—and that the function of face masks and temperature checks in public life will become more apparent. With more precise data on incidence, prevalence, and death rates analysed by demographic parameters like age, sex, socioeconomic level, and ethnicity/race as well as clinical risk factors, public health surveillance systems and epidemiological research must be reinforced. Environmental improvements, allowing for behavioural adjustments such as social distance and hygiene, especially in overcrowded living and working environments, will be required. Also necessary will be efficient, all-encompassing healthcare as well as financial support for industries.

### Allowing The Pandemic To Unfold Naturally

Early and even current attempts to trivialise COVID-19 by comparing it to the flu were ineffective since COVID-19 affects elderly adults considerably more severely than it does children. According to estimates from the World Health Organization (WHO), roughly 20% of individuals diagnosed develop serious illness, 5% are critically ill, and 3% pass away. (Since the number of infected individuals is typically [6, 10] unknown, the infection fatality rate ranges in estimate from 0.1 to 0.5%) Without interventions, if 60–80% of the world's population contracted COVID-19, there might be 5–6 billion people afflicted, 1 billion extremely ill, and up to 30 million premature deaths. Infection and economic devastation will also have indirect effects, such as famine,

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homelessness, poverty, physical and mental sickness, and even death. Children and low-income countries will experience particularly severe collateral damage. The Spanish flu outbreak of 1918–19 brought about that. The COVID-19 pandemic breaks out during one of the most opulent eras in human history, allowing for a stronger reaction than in 1918. Population immunity would develop quickly if the epidemic was allowed to spread unchecked.

### Role of Natural Forces, Like Seasonal Change

Pandemics can end abruptly. This is what we anticipate with COVID-19. There was a brief break in the Spanish flu epidemic before the virus returned more virulently. Although lockdowns may be lifted during the summer, the virus tends to thrive and is contagious in most climates. Because other respiratory illnesses are less frequent and being outside lowers the risk of contracting an infection than [11] being indoors, infection in the summer may be less frequent and less severe than in the winter. However, in extremely hot areas, individuals seek refuge indoors from the heat.

### Materials and Method

#### Lockdowns

For primary, secondary, and tertiary prevention, lockdowns are crucial. The WHO emphasises that the majority of countries are implementing rigorous lockdowns for 6–8 weeks, but that this just buys time for the reproduction rate of infection ( $R$ ) to drop from approximately three to less than one. The extreme and stringent lockdown of Wuhan, China, lasted for nearly 12 weeks, from 23 January to 8 April. However, despite the return of the illness, life there is still not normal. Less than 5% of China's population, or roughly 60 million people, live in Hubei province, which includes Wuhan. In contrast to other [12–14] nations, the province may use national resources to survive. Some economies, like those in Ghana, cannot withstand even 6- to 8-week lockdowns; they are removed or collapse after a few weeks, while some nations, like Brazil, are opposing them. In the poorest nations, where the average age of the population is generally low and there is little chance of dying, prolonged lockdowns may result in higher rates of morbidity and mortality than COVID-19. Lockdowns' effects on health must be assessed, along with its advantages and disadvantages. 2. Lockdowns are likely to change and grow more regional as the situation warrants. Local communities are already mixing with one another, and frequent foreign travel is resuming. According to a UK-based policy, lockdowns should be eased when broad testing is taking place and when there are fewer than 500 deaths per day (182,500 deaths per year), and most regulations should be relaxed when there are fewer than 100 deaths per day (36,500 deaths annually). In England, the UK government appears to be taking this tack, whereas Scotland, Wales, and Northern Ireland are taking more cautious measures. Population immunity steadily develops during lockdowns, and those who are most at danger of severe morbidity and mortality are protected. Lockdowns will be loosened when population immunity increases.

### Discussion About Testing: Surveillance, Research, Isolation And Contact Tracing

Testing is essential for determining areas where the disease has not yet manifested itself as well as for primary, secondary, and tertiary prevention. The WHO has emphasised testing as essential until a vaccine or a cure are found, but the justification is rarely made clear to the general population. For public health monitoring and medical research to determine the incidence, prevalence, and effects of the disease, testing in chosen populations is crucial. Such information

assists us in revising our strategies by providing feedback, such as the percentage of the population that has [15] contracted the infection and may be immune. The advantage of identifying the virus or viral antigen in suspected cases is accurate clinical care (including protection of frontline employees) and the ability to isolate/quarantine confirmed cases. It is now possible to trace contacts so that their spread can be minimised by isolating them. This is preferable to requesting that everyone with respiratory symptoms separate themselves without conducting tests, but it necessitates substantial public health infrastructures (in addition to applications) as well as access to testing facilities and kit supplies. Testing and feedback on outcomes must be done quickly for it to be effective. Testing aids in preventing the spread of population immunity. Testing for virus and antigen is also helpful to determine whether COVID-19 survivors can return to normal without spreading the illness to others or endangering themselves by engaging in premature activities (tertiary prevention). People who have recovered will need to exercise caution because some may still be shedding the virus and their immunity may just be partial. Research is needed to determine whether some recovered people, particularly in vital services who have already returned to work, are contagious.

#### Antibody testing

Although the immune response to respiratory viruses is complicated, macrophages and lymphocytes, especially T-cells, play a crucial role in cellular responses. IgM or IgG antibodies are markers of potential immunity, although their absence does not always indicate a lack of immunity. People who have recovered from COVID-19 that has been proved must have some immunity. Although adults with minor or even asymptomatic infections may not develop a robust antibody response, they likely have a robust, innate defence mechanism like children do. There are various accessible and we need an accurate antibody test to determine who has been affected in the past. Even with 99% sensitivity and specificity, only roughly 82% of positive tests are accurate when the population prevalence is about 5%, as is the situation in many nations. This is known as the predictive power of a positive test. More accurate results could be obtained by combining several test types. People who have separated themselves due to common symptoms and antibodies have likely already had COVID-19 and are only partially immune. False positives and false negatives will always happen. However, antibody tests are incredibly useful for determining the level of population immunity. Surprisingly, a test's accuracy for gauging prevalence is typically different from its accuracy for use in clinical settings.

#### Mobilizing people who have recovered

People who have recovered need to be normalized, especially those who provide critical services. There have been discussions on the idea of immunity passports. A certificate stating that a person has had the virus, has recovered clinically, and is likely to be partially or completely immune is more accurate than an immunity passport because it doesn't guarantee anything that can't be guaranteed. Since there may soon be hundreds of millions of eligible persons worldwide, it is vital to take these clinical, ethical, legal, and practical considerations into account. I have demanded an open discussion with a jury of citizens.

#### Treatment for COVID-19 in relation to public health

The optimal course of action would be to prevent the infection from starting in the first place. However, such a course of treatment would have to be highly safe, particularly in young patients without underlying illnesses where COVID-19 is rarely lethal. Low- and middle-income nation's most likely couldn't afford it. Treatments are more likely to

shorten the infection's life span and severity of sickness. They may help improve public health by preventing the spread of disease, particularly to healthcare personnel. As a result, the development of population immunity will be slightly delayed.

### Immunity in those at high risk because of comorbidities

The severity of COVID-19's effects is greatest in those who have comorbidities, who are often older age groups, and especially if they have chronic respiratory diseases, type 2 diabetes, hypertension, or cardiovascular diseases. Public health initiatives should categorically support the reduction of risk factors, such as smoking, inactivity, excessive alcohol use, salt consumption, and exposure to air pollution. As population immunity through natural infection rises, individuals in these groups could reduce their risk of exposure to COVID-19, await effective immunisation, and gain indirect benefits.

### Involving the entire population especially those most vulnerable

The WHO has emphasised that the COVID-19 control approach must be global in scope and involve everyone. The WHO has highlighted the needs of packed groups, such as migrants, refugees, and asylum seekers, where the infection can spread easily. Especially now that international travel is troublesome, regulations and rules that make it illegal or difficult to house, employ, or offer health and other services to vulnerable persons (like undocumented migrants who cannot access public finances) need to be revised. Minorities and migrants are particularly affected by the pandemic because of their higher rates of home and workplace overcrowding, relative poverty, difficulty understanding and enforcing social distance rules, and predisposition for cardiovascular disease and type 2 diabetes. Such groups are infected in large numbers, but Due to their young age, considerably fewer people will contract COVID-19, which significantly increases population immunity.

### Population (herd) immunity via vaccination

Our best chance of containing the pandemic and the acceptable means to increase population immunity is through vaccination. The WHO has established a vaccine task group, and numerous vaccine development studies are now being conducted. Unfortunately, we cannot place our entire faith on vaccines because they may only be effective temporarily, particularly if the virus creates new strains. It is improbable that a vaccine will be developed this year that is efficacious, shown to be safe, producible in billions of doses, and accessible worldwide. Particularly for children or young people, safety that has been proven is crucial. Whether accidental or causal, serious illnesses or fatalities in young people after immunisation could hinder vaccination. A robust immune response is unlikely to occur in those over the age of 70 or immunosuppressed individuals, when the vaccine is most necessary. The effectiveness of vaccines must be proven in older populations and in those with underlying illnesses.

### Population immunity through natural infection

Herd immunity is the correct term, which has animal-related rather than human-related connotations. Herd immunity incites animosity and debate because it's typically seen as permitting the epidemic to

spread without any interventions. Reexamining the idea is necessary. Population immunity is the only long-term answer if safe and effective vaccines, life-saving preventative and therapeutic drugs, prolonged lockdowns, and the pandemic do not end spontaneously.

### Conclusions

The unchecked spread of the COVID-19 pandemic must not be permitted. Internationally, none of the responses are optimal, which is partially reflected in their variety. We need precise and thorough strategies, well-calculated series of actions that minimise harms, and are adapted for each country and region based on their context and resources because COVID-19 has put us in a bind. The pandemic must be stopped before it recurs annually, possibly worsening, especially in children and teenagers, and necessitating periodic lockdowns. We must immediately take into account all feasible public health initiatives and programmes.

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### Conflict of Interest

The authors declare that they have no conflict of interests.

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