# Getting Through the Pandemic in Europe in the Winter of 2020/21

# The Misuse of COVID-19 Herd Immunity Argument

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*'Jamais la France n'adoptera la stratégie de "l'immunité collective"'* [France will never adopt the stratgy of 'herd immunity']

—President Emmanuel Macron, October 28th 2020

'It is necessary for public health authorities to continue to monitor seroprevalence in unbiased population studies to understand how the pandemic is evolving, and how population immunity is developing. It is however, too early to say categorically that there is, or will be herd immunity at a certain level of seroprevalence…It is therefore dangerous, and unfounded in the science, to advocate use of herd immunity as a means to pandemic control at this time.'

—Professor Carlo Signorelli and colleagues, November 20th 2020

'We are not 'all in this together'. 'Herd immunity' is not a neutral policy; allowing the virus to 'rip through' the population so most of us can get it mildly means requiring poor people, black people, people in high-risk occupations, including health and care workers, overweight, vulnerable and ill people to take greater risk for us.'

—Professor John Middleton, President ASPHER
See also ASPHER President's blog for November 2020 https://www.aspher.org/articles,4,105.html (Accessed 30 November 2020).

After the initial lockdowns, countries have come to the realization that COVID-19 is going to stay with us. This understanding has led to strategic discussions on how to live with COVID-19 in a period of "new normal". Consequently, there has been renewed interest in a so-called herd immunity approach to managing the pandemic. This refers to the concept that a population that has already been widely infected will develop herd immunity to the virus, and this will eventually eliminate or significantly reduce community transmission and protect the most vulnerable, who must, in the meantime, be shielded. The debate has not been general across all nations; it has not been considered as a realistic policy in France, for example.

In COVID-19, the form of acquired population immunity from actual infections is different to the acquired herd immunity that follows systematic delivery of a comprehensive population vaccination programme. Given that promising candidate vaccines are on the horizon for commencing programmes of wider population use from early 2021, we would strongly advise that governments and their professional public health advisers hold firm for the winter with effective physical distancing and other non-pharmaceutical intervention (NPI) strategies to compress virus transmission and limit infection rates and impacts on health services.

We caution against the concept of naturally occurring herd immunity in the context of the pandemic, it is potentially dangerous and is unsupported by broader scientific evidence. We advise that such a form of haphazardly acquired herd-immunity would not end the pandemic but would probably result in recurring outbreaks and epidemics that place an unacceptable and longer strain on economies and healthcare systems. In the following we summarize the arguments that call into question whether COVID-19 herd immunity can be relied upon as a pandemic control strategy. These arguments can be grouped into several main themes: Lack of evidence, losing control and inevitably exposing vulnerable groups, unattainable herd immunity thresholds, and moral and ethical considerations.

The discussion on the fallacy of herd immunity should not necessarily lead us to the other extreme of reliance on recurrent lockdowns. There is a space for a sensitive 'dance' between the two poles of extreme NPI measures given the huge social and economic costs, versus losing control of the situation and allowing our health systems to be overwhelmed and with many vulnerable people losing their lives or facing long term health problems. As Jones and Helmreich presented in their historical analysis of how herd immunity entered the language of public health from veterinary sciences: "The language of herd immunity is part of the problem. A herd usually describes domesticated animals, especially livestock. Herd animals like cows, goats, or sheep are sacrificed for human consumption. Few humans want to be part of that kind of herd." (Jones and Helmreich; 2020). Seroprevalence studies that put more light on the dynamic of the pandemic, and its uneven distribution are important and should be encouraged, but we need to be careful in their interpretations. We cannot safely use the findings of seroprevalence studies to determine our pandemic control strategies. Until there exist efficient and safe vaccines, societies will need to continue to try to control the spread of the virus at the local level through public health measures and community action, to protect the most vulnerable people, and to support public health and medical systems.

## Inequalities and COVID-19

1. Part of the infection derived herd immunity argument is that vulnerable and older groups can be shielded while less vulnerable people acquire the infection and recover without consequence.

   This is incorrect and also an impractical stance. Poorer communities and also ethnic minority communities are less protected through overcrowded and multi-generational housing and the need to come into social contact for their often lower skilled occupations such as in social care or in poorly regulated work roles and places. They will also more commonly have pre-disposing health conditions and other risk factors from earlier ages.

2. Underestimation of the severity of the infection is also of key concern. Younger people may be more likely to survive the illness, but still need hospitalization and expert medical attention. There is growing realisation of the existence of long-covid and post covid syndromes. There is increasing concern about the

numbers of people affected with these syndromes and estimates of the numbers are rising. These syndromes are debilitating, create social dependence and threaten the future ability of affected people to work.

## Lack of evidence

1. According to Dr. William Foege, former Director of the Centers for Disease Control and Prevention, current discussions supporting the concept of herd immunity are composed of "hypothetical possibilities" that are not evidence-based. Additionally, when such discussions appear to be science-based, they are often "one dimensional", meaning that they lack depth and are often based on superficial analysis. (Foege, 2020).
2. Proposals to follow a non-vaccine herd immunity strategy were initially driven by studies conducted in Manaus, a large Brazilian city that was heavily impacted by COVID-19. Immunologist Ester Sabino at the University of São Paulo, Brazil, conducted a study showing that 66% of citizens had been infected with SARS-CoV-2 by the end of the first wave (Aschwanden, 2020; Buss et al, 2020). She and her colleagues hastily concluded that the numbers of susceptible people that were still vulnerable to SARS-CoV-2 was too small for transmission to survive, leading them to conclude herd immunity had been achieved. However, the hopes for herd immunity to take place were dampened when there was a subsequent surge in cases of infection (Boadle, 2020). (Figure 1)

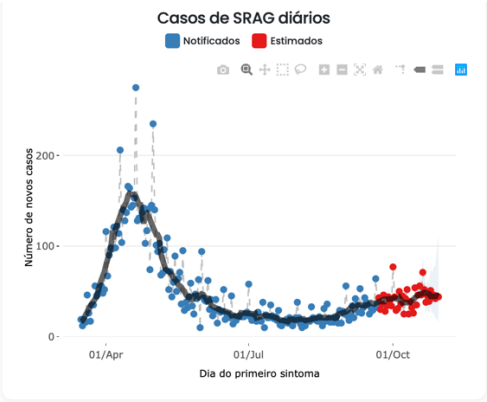


Figure 1. Cases of Severe Acute Respiratory Syndrome (SARS) in Manaus, Brazil, April-November 2020. The blue dots are the numbers of daily serious cases reported (observed) more than 40 days ago, for which we believe it is no longer necessary to correct for notification delays. The red dots are the numbers of daily serious cases estimated by correcting the delay between the date of the first symptom and the notification. The black line is the estimated trend, with a moving average for a period of 10 days.

Source: Observatório COVID-19 Br. URL: https://covid19br.github.io/municipios.html?aba=aba1&uf=AM&mun=Manaus&q=dia (Accessed 12 November 2020)

3. This fresh recurrence of cases proved that the city never truly achieved "community protection" and also raises some doubts if personal immunity to the virus degrades with time (Akpan, 2020). Furthermore, if this is the case, it is possible the virus will "bounce back" in places where the herd immunity threshold has apparently been reached naturally. This argument is supported by a case-study in New York City where high rates of the city's residents had been infected during the first wave, and yet for months the incidence rates have been steady. Some argue this sustained recovery is due to herd immunity; however, Virginia Pitzer, epidemiologist at the Yale School of Public Health argues, "if

we had reached sufficient herd immunity in New York, you would expect incidents to continue going down, not to be holding steady," (Akpan, 2020).

4. A lack of sufficient information on human immune system behaviors with SARS-CoV-2 also makes the concept of herd immunity dangerous (Newman, 2020). "For herd immunity to work, prior exposure to SARS-CoV-2 has to prime the immune system to produce a strong response to all future contact with the virus, and in turn, make the person less infectious," explains Stuart Ray, M.D., professor of medicine at the Johns Hopkins University School of Medicine. "We don't know if that happens with this specific coronavirus."

5. It is still unclear if the antibodies against SARS-CoV-2 developed by those that have been infected will protect them fully or generate wider herd immunity. Studies conducted in June and July 2020 created even more doubt on the concept of herd immunity; conducted in cities of Spain (Pollan M, *et al.* 2020) and Switzerland (Stringhini S, *et al.* 2020), they found that after months of population exposure to the virus, there was only an antibody seroprevalence of less than 10%. This led commentators in *The Lancet* to conclude that, "...any proposed approach to achieve herd immunity through natural infection is not only highly unethical, but also unachievable," (Jones & Helmreich, 2020). Current vaccine and immunity research has also been looking at the role of T-cellular mediated immunity that needs a deeper evidence base. (Doshi, 2020) If it is the case that people have pre-existing, or natural immunity to SARS-CoV-2, brought about through exposure to other coronaviruses, it is not yet shown in epidemiological studies that this is contributing to collective protection.

6. In a study commissioned by the UK Government's Department of Health and Social Care, scientists found that the accuracy of the AbC-19$^{TM}$ Rapid Test, used to test for SARS-CoV-2 antibodies, may be lower than previously suggested. The study, conducted by Mulchandani and colleagues found that "in a population with a 10% prevalence of previous SARS-CoV-2 infection, only 83.0% (78.3% to 86.8%) of positive results would be correct, and 17% would be incorrect," (Gill & Ponsford, 2020). However, these factors are contrasted by a similar study conducted by Robertson and colleagues which found a "sensitivity of 97.7% (95.7% to 99.3%) and a specificity of 100% (95% confidence interval reported as 100% to 100%)," (Gill & Ponsford, 2020). There are clear differences as to how each study determined known positives and known negatives. Such differences lead to the conclusion that the studies that test for SARS-CoV-2 seroprevalence cannot identify people who have and have not been exposed to the virus with certainty. This means that there is a high risk of obtaining false positives while using the test, and if antibody responses are used as an indicator of immunity, there is a risk for individuals and the government to make decisions based on inaccurate information. There is an urgent need to clarify that positive results from antibody testing do not provide definite evidence of exposure to the virus (Gill & Ponsford, 2020). As mentioned, seroprevalence studies are very important to understand the dynamic of the pandemic, yet caution must be taken with their interpretations.

7. A study led by Carlo Signorelli from the School of Medicine at University Vita-Salute San Raffaele, found a 42% seroprevalence in the Bergamo province of Northern Italy. It is the highest level recorded to date in European seroprevalence studies (Signorelli et al, 2020). Bergamo has, so far, suffered lower prevalence of COVID-19 as compared to neighboring Milan region in the second wave. (Figure 2)

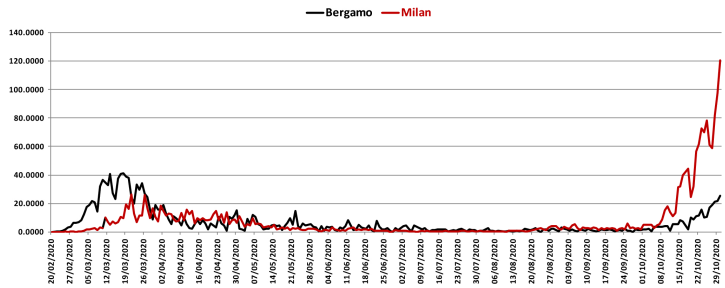


Figure 2. Cases of COVID-19 infection in Milan and Bergamo Northern Italy, February-October 2020. Source: Signorelli *et al*. (2020).

Even though it might provide insight to the possibility of the herd immunity approach, scientists' hopes have dwindled when comparing this case to that of Manaus. The Brazilian city observed a 66% seroprevalence after the first wave of the virus; nevertheless, the area is experiencing a resurgence. This led to the conclusion that it is too early to confidently say that there is or will be herd immunity at a specific level of seroprevalence (Signorelli et al., 2020).

8. Another problem in the concept of herd immunity is the lack of consideration and research evidence of the roles of children. As with many viruses each birth cohort would reinforce the population's vulnerability to the disease since they are born without immune defenses, making them prone to catching and spreading the disease (Akpan, 2020).

## Unattainable Herd Immunity Threshold

1. The herd immunity threshold refers to the proportion of the population that needs to become immune before the population is protected against further infection, it is often calculated using a basic formula, $1–1/R0$. According to Samuel Scarpino, a network scientist who studies infectious disease at Northeastern University in Boston, the herd immunity threshold is impossible to calculate accurately because it does not take human behavior into consideration. "Most of the herd-immunity calculations don't have anything to say about behaviour at all. They assume there's no interventions, no behavioural changes or anything like that," he says. Meaning that if a transient change in a population's behavior goes back to normal, the immunity threshold will change (Aschwanden, 2020). This statement is supported by Gypsyamber D'Souza, an epidemiologist at Johns Hopkins University in Baltimore, Maryland, who says

that because of the variability of factors that have a role in the calculation of the threshold, "herd immunity is not a steady state" (Aschwanden, 2020). Caitlin Rivers, an epidemiologist at the Johns Hopkins Center for Health Security in Baltimore, supports this argument, stating that "herd immunity is something that can be observed with certainty only by analysing the data in retrospect, maybe as long as ten years afterward," (Aschwanden, 2020). Using a statistic that might not even by applicable to the current situation makes the concept of achieving herd immunity even more dangerous.

2. According to Johns Hopkins University Bloomberg School of Public Health epidemiologists David Dowdy and Gypsyamber D'Souza, it is likely that 70% or more of the population would need to be immune to reach herd immunity for COVID-19. To put this number into perspective, "without a vaccine, over 200 million Americans would have to get infected before we reach this threshold" (Dowdy & D'Souza, 2020).
3. The US Food and Drug Adminstration (FDA) and the World Health Organization (WHO), have stated that a COVID-19 vaccine should be at least 50-percent effective to be approved, this benchmark would actually be too low to establish protective herd immunity (Akpan, 2020). It is important to consider that vaccine hesitancy is also prominent, meaning that not all those with access to a vaccine would actually get it, further reducing the vaccine's ability to establish herd immunity. The bare minimum standard of 50 percent, set by the FDA and WHO, would only protect half the population if everyone is vaccinated (Akpan, 2020).

## Ethical arguments

1. Ethical arguments support the scientific evidence that it is dangerous and unethical to depend on herd immunity to tackle the virus. The amount of people that would need to be infected in order to achieve herd immunity is overwhelming, and one cannot ignore the unnecessary deaths that come with it. Using the UK as an example, it would require over 47 million people to be infected. With a 2.3% fatality rate and a 19% rate of severe disease, the virus could leave more than a million people dead and eight million more needing critical care (Basau, 2020). The concept of using herd immunity to tackle the virus would mean that an enormous number of people would have to die and even more people experiencing severe disease with complications and chronic adverse effects. This would be an unethical strategy prioritizing a country's economic and political success over the lives of its citizens.
2. Another major source of ethical concern is the ostensible trade-off between lives and the economy. According to Xavier Symons "The real question we must ask is whether the prevention of a catastrophic COVID-19 mortality rate is more important than returning immediately to normal economic conditions?" Even though the needs of the vulnerable and elderly populations are extremely

relevant, it could be argued that they are outweighed by the needs of the rest of the population "who stand to suffer dire economic consequences if the government continues to pursue a virus suppression strategy" (Symons, 2020). Nevertheless, when considering the ethics of the strategy, it leads to the assumption that factors like health and life expectancy are variables that determine the value of a citizen's life. Relying on a herd immunity strategy creates a dichotomy between the lives that matter and the lives that do not, which is "deeply problematic". Symons writes, "We should think very carefully about any calculus that attempts to weigh avoidable deaths against improved economic outcomes" (Symons, 2020).

3. Aside from admitting the herd immunity strategy stands "on very weak foundations," Chris Witty, England's Chief Medical Officer commented that it is an unethical option. It would lead to a significant number or people dying who, if it weren't for the virus, would not have died. Additionally, it would apply much higher pressure on the National Health Service, leading to indirect damage to the population, and indeed, to occupational mortality risk to health service personnel. (Godlee & Looi, 2020)
4. Any ostensible trade off between economy and health also presumes there can be such a trade off. With the exception of the East Asian and Australasian economies, who dealt successfully with the pandemic early on, there is no evidence that economic performance can be restored if the pandemic is not first dealt with. (Hasell, 2020)

   Pursuing natural herd immunity is unethical, irresponsible, and morally unacceptable in democratic societies, which have an obligation to uphold the equal value of all citizens.

   Allowing a viral infection to spread, either freely or at a "reasonable rate", is profoundly unethical because it exposes large groups of citizens to life-threatening risks. Senior citizens, those with severe illness, and those who due to low income, low education, and limited job opportunities, are exposed to a significantly greater risk of mortality. The method discriminates against the elderly, the sick, and the poor, and diminishes human dignity and equal rights of citizens.

   Moreover, public authorities who would base their policies against Covid-19 epidemics on such an approach could be sued by individuals or groups, as it could lead to loss of opportunity in persons who will not be adequately protected.

## Summary

To summarize, our emphasis needs to be on using successful timely virus suppression strategies for getting through to summer while rolling out effective new vaccines. The economic and social costs of lockdown are considerable. Governments should support those hardest hit with income support and sustainable economic recovery packages.

This pandemic should be handled through community adoption of NPIs, reinforced by ensuing vaccination strategies when available and any other scientific developments alongside the many that have been rapidly developed so far. The advocates of natural herd immunity are voices that must be heard so that their questions can be answered and their assertions countered. They also remind us to look at the wider and enduring social, economic, and human costs of the pandemic. Yet, as presented the natural herd immunity argument, is not currently supported by scientific evidence, its achievement is still far away and might hit especially vulnerable groups, thus creating moral and ethical problems. The proposed strategies of herd immunity supporters must not be heeded as they well may be the siren voices that lead unsuspecting audiences onto the rocks. It is dangerous, and unfounded in the science, to advocate use of herd immunity as a means to pandemic control at this time.

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