

# HERD IMMUNITY FROM COVID-19

Maj Gen (R) Prof. Dr. Hamid Shafiq, HI(M)  
Department of Medicine, HITEC IMS, Taxila, Pakistan

---

The term “herd immunity” is used when enough members of a population get immune from an infection to successfully interrupt the chain of human-to-human transmission. In this way, spread of infection to the remaining susceptible individuals gets stopped. Herd immunity is also called community immunity or herd protection<sup>1</sup>.

To achieve herd immunity, a large enough percentage of the population needs to either get infected by it or get vaccinated against it. As far as Covid-19 is concerned, nobody knows how long and strong a protection would be provided by either of these ways. Young and vulnerable people who can't be vaccinated can be protected by herd immunity.

Typically for any infectious disease, 60% to 90% of the population is required to get vaccinated or infected before herd immunity could be achieved. As of now, approximately 10% of the world's population has been exposed to infection. Israel has taken the lead in moving towards herd immunity by vaccinating 60% of its population within a short span of time.

Statistically speaking herd immunity is said to be achieved if one infected person infects less than one person on average (effective reproduction number  $R$ ).

$R = (1 - pC)(1 - pI)R_0$

$pC$  (relative reduction in transmission rates due to non-pharmaceutical interventions)

$pI$  (proportion of immune individuals)

$R_0$  (reproduction number in the absence of control measures). For  $R_0 = 3$ , herd immunity threshold is expected to require 67% population immunity at the same point in time.

Children less than 10 years of age may be less infectious and less susceptible. In that case they can be omitted for the calculation of herd immunity.

T-cell reactivity has been noted in the absence of detectable humoral immunity among contacts of patients. However, their

protective role, if any, is not clear. Similarly, the protective role of common cold Corona virus immunity is also not clear. Immunity to seasonal Corona virus infection is short lived yet no one is sure about immunity to novel Corona virus (SARS-CoV-2). Re-infection has already been noted in many cases. Our immune systems are quick to forget certain viruses, but it's unclear whether the same is true for COVID-19<sup>2</sup>.

Fatality with COVID-19 is estimated to be 0.3 to 1.3%. An even higher proportion of patients suffer lasting health consequences of COVID-19 including blood clotting disorders (such as stroke and pulmonary embolism), autoimmune disorders (such as rheumatoid arthritis), and “long COVID” (encompassing a variety of symptoms such as headache, fatigue, “brain fog”, shortness of breath, and depression or anxiety). Trying to reach herd immunity through natural infection would come at a very high cost and not guarantee successful attainment of herd immunity either. Even with a 50% threshold of immunity, it would translate into millions of deaths. Men older than 60 years, especially with co morbidities are more susceptible to devastating consequences of COVID-19 infection. Their fatality rates go up to 3.3% and many more suffer other debilitating health consequences even if they survive the infection.

Effective vaccination is the acceptable way to reach herd immunity. At least 6 different vaccines are now available for public use. Each one of them comes with impressive safety and efficacy data that has been published and vetted in peer-reviewed journals.

In order to reduce the morbidity and mortality of COVID-19 as quickly as possible, vaccination is being first offered to the most vulnerable individuals in any community. If needed, vaccines can be routinely boosted<sup>3</sup>.

We know that herd effect has eradicated smallpox, reduced pertussis spread and has protective effects against influenza / pneumococcal infections. Generally high vaccination rate is needed to be successful<sup>4</sup>.

The ongoing SARS-CoV-2 pandemic has caused millions of deaths in clinically confirmed cases. Knowing the devastating consequences of achieving herd immunity through natural infection, and the chances that it may not work, it cannot be deemed a sensible path to take<sup>5</sup>. It is important to note that acquisition of herd immunity is not guaranteed through natural infection, because there may always be a sizeable reservoir of vulnerable individuals available to (re-) develop and transmit the disease. A coordinated mass vaccination campaign that

---

Correspondence to: Maj Gen (R) Prof. Dr. Hamid Shafiq, HI(M)  
Chief Editor HITEC Medical and Dental Journal  
Email: hamidshafiq.amc@gmail.com

Conflict of interest: None

Financial Disclosure: Nil

Received: 03-06-2021

Accepted: 01-07-2021

immunizes a majority of the population, within a short span of time (leaving behind too few unvaccinated and vulnerable individuals to continue the chain of transmission), is our best hope of ending this pandemic.

By the time COVID 19 pandemic ends, a large proportion of the population would be infected far above expected herd immunity threshold (around 2/3 rd.). Additional infections above threshold are referred as “overshoot”<sup>6</sup>. However, these infections will have occurred over a long span of time, with many formerly infected patients already having lost their natural immunity and being susceptible to getting re-infected and thereby infecting other members of the community as well.

Autumn and winter seasons are challenging because of the spread of infections especially in underdeveloped countries like ours. Protective measures like social distancing, use of face mask, and hand hygiene will further help in controlling the spread of infection. These measures can't be overemphasized in Pakistan. Use of antiviral drugs and other evidence-based treatments (such as steroids and awake proning for patients with

hypoxia and avoidance of potentially harmful and ineffective medication) is the best way forward until herd immunity is achieved.

## REFERENCES

1. “Herd Immunity”. Oxford Vaccine Group, University of Oxford. Archived from the original on 2 August 2019. Retrieved 12 December 2017.
2. “Cold-Causing Coronaviruses Don't Seem to Confer Lasting Immunity”. The Scientist Magazine\*. Archived from the original on 7 January 2021. Retrieved 26 January 2021.
3. Fontanet A, Cauchemez S (October 2020). “COVID-19 herd immunity: where are we?”. *Nature Reviews. Immunology*. 20 (10): 583–584. doi:10.1038/s41577-020-00451-5. PMC 7480627. PMID 32908300.
4. Kim TH, Johnstone J, Loeb M (September 2011). “Vaccine herd effect”. *Scandinavian Journal of Infectious Diseases*. 43 (9): 683–9. doi:10.3109/0365548.2011.582247. PMC 3171704. PMID 21604922.
5. Randolph HE, Barreiro LB (May 2020). “Herd Immunity: Understanding COVID-19”. *Immunity*. 52 (5): 737–741. doi:10.1016/j.immuni.2020.04.012. PMC 7236739. PMID 32433946.
6. Bergstrom CT, Dean N (1 May 2020). “Opinion: What the Proponents of ‘Natural’ Herd Immunity Don't Say”. *The New York Times*. Archived from the original on 3 June 2020. Retrieved 30 May 2020.

-----