

Covid-19 outbreak in Manaus suggests herd immunity may not be possible

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By Luke Taylor

Hospitals in the Brazilian Amazon are collapsing once again under the strain of treating covid-19 patients. This is despite the high rate of coronavirus infections in Amazonas during the first wave of the virus, and suggests that if herd immunity by infection is possible, it may be harder to achieve than previously thought.

In Manaus, the capital of Amazonas, hospital beds are unavailable. People are queuing to buy oxygen tanks from private suppliers to attempt to treat family or friends at home, as oxygen supplies in hospitals were exhausted as of 15 January.



Oxygen supplies have run out in hospitals in Manaus, Brazil, so people are buying cylinders from private companies to use at home

The state is “in the most critical moment of the pandemic”, said the region’s governor, Wilson Lima. It is the second time that Manaus has been in crisis since the pandemic began. In May 2020, the region recorded one of the worst fatality rates in Central and South America, then the epicentre of the pandemic.

The region’s poverty, crowded housing and lack of widespread access to clean water have fuelled the virus’ spread. Between March and October, 76 per cent of people in Manaus had contracted covid-19, according to a recent study co-led by Lewis Buss at the University of São Paulo.

The virus was so prevalent during the first wave that it created the belief that the region had reached herd immunity, says Jesem Orellana at the Oswaldo Cruz Foundation in Brazil.

“[The initial surge] created a favourable climate for a false victory over the epidemic in Manaus,” says Orellana. “We had politicians, business leaders and a large part of the local population defending that Manaus...had already reached herd immunity.”

A preliminary version of Buss’s study suggested that the virus’ spread could have slowed due to herd immunity. State authorities justified their inaction on that belief, says Orellana, and the public practised less social distancing. The second wave of cases has disproved the theory that the region has reached herd immunity.

It also raises concerning questions as to how the coronavirus remains so virulent in a region where the majority of the population have already been infected.

Buss and his colleagues ran serologic tests on 1000 blood samples from donors with no covid-19 symptoms. They found that 53 per cent of people had antibodies present.

“This serves as a lower bound on the prevalence of infection in Manaus and would be expected to confer an important level of population immunity,” he says.

They then applied a model to account for the natural decrease in antibodies over time. With the model applied, more than three-quarters of people in Manaus are estimated to have coronavirus antibodies.

Using blood donor samples presents room for inaccuracies, as they do not entirely reflect the makeup of the general population. The model used to account for the waning in antibodies is also based on estimates.

“But even if they are biased, it’s very likely that a large proportion of the population has been infected,” says Deepti Gurdasani at Queen Mary University of London.

“It raises a lot of questions about being able to reach the herd immunity threshold,” she says. “But more importantly, what it brings home is that even if you could reach the herd immunity threshold in some way, which obviously hasn’t been reached in Manaus, the cost is huge.”

Many experts have opposed the idea that herd immunity to the coronavirus can be achieved by most of the population becoming infected. In a memo published last year, 7000 scientists, healthcare workers and public health professionals said that natural herd immunity could be impossible as the duration that covid-19 antibodies last after infection is unknown.

The emergence of new variants of the coronavirus, some of which appear to evade antibodies, have increased doubts around the possibility of natural herd immunity. Existing vaccines could be slightly less effective against the new variants but are so effective that they should still offer protection. They could also be updated to account for new mutations.

A variant called P.1 has emerged in Manaus that shares similar mutations as of other fast-spreading variants identified in South Africa and the UK. The first reinfection with P.1 was reported in Manaus this week.

“It is plausible to suggest that P.1 has some combination of properties that are producing the situation in Manaus,” says William Hanage at Harvard University.

P.1 has been identified in Japan and has likely spread elsewhere. It’s not yet clear what role P.1 has played in the exponential spread of the virus in Manaus, given the widespread presence of antibodies in the local population. A higher transmission rate of the new variant could push up the herd immunity threshold, or antibodies produced by people to neutralise the virus could be declining more quickly than expected, leading to reinfections.

More likely, Hanage says, it has evolved to evade antibodies and is reinfecting people. This idea has only been supported in small-scale studies and needs further investigation.

“But one thing we can definitely learn,” he says, “is that anybody who starts talking to you about herd immunity being a viable strategy is somebody who you should not listen to.”