World view

By Aris Katzourakis

COVID-19: endemic doesn't mean harmless

Rosy assumptions endanger public health — policymakers must act now to shape the years to come.

The word 'endemic' has become one of the most misused of the pandemic. And many of the errant assumptions made encourage a misplaced complacency. It doesn't mean that COVID-19 will come to a natural end.

To an epidemiologist, an endemic infection is one in which overall rates are static — not rising, not falling. More precisely, it means that the proportion of people who can get sick balances out the 'basic reproduction number' of the virus, the number of individuals that an infected individual would infect, assuming a population in which everyone could get sick. Yes, common colds are endemic. So are Lassa fever, malaria and polio. So was smallpox, until vaccines stamped it out.

In other words, a disease can be endemic and both widespread and deadly. Malaria killed more than 600,000 people in 2020. Ten million fell ill with tuberculosis that same year and 1.5 million died. Endemic certainly does not mean that evolution has somehow tamed a pathogen so that life simply returns to 'normal'.

As an evolutionary virologist, it frustrates me when policymakers invoke the word endemic as an excuse to do little or nothing. There's more to global health policy than learning to live with endemic rotavirus, hepatitis C or measles.

Stating that an infection will become endemic says nothing about how long it might take to reach stasis, what the case rates, morbidity levels or death rates will be or, crucially, how much of a population — and which sectors — will be susceptible. Nor does it suggest guaranteed stability: there can still be disruptive waves from endemic infections, as seen with the US measles outbreak in 2019. Health policies and individual behaviour will determine what form — out of many possibilities — endemic COVID-19 takes.

Soon after the Alpha variant emerged and spread in late 2020, I argued that, unless infections were suppressed, viral evolution would be fast and unpredictable, with the emergence of more variants with different and potentially more-dangerous biological characteristics. Since then, public-health systems have struggled under the highly transmissible and more-virulent Delta variant, and now there is Omicron, with its substantial ability to evade the immune system, causing reinfections and breakthroughs. Beta and Gamma were also highly dangerous, but did not spread to the same extent.

The same virus can cause endemic, epidemic or pandemic infections: it depends on the interplay of a population's behaviour, demographic structure, susceptibility and immunity, plus whether viral variants emerge. Different conditions across the world can allow more-successful variants to evolve, and these can seed new waves of epidemics. These seeds are tied to a region's policy decisions and capacity to respond to infections. Even if one region reaches an equilibrium — be that of low or high disease and death — that might be disturbed when a new variant with new characteristics arrives.

> "It frustrates me when policymakers invoke the word endemic as an excuse."

COVID-19 is, of course, not the world's first pandemic. The fact that immune systems have evolved to cope with constant infections, and the traces of viral genetic material embedded in our own genomes from ancient viral infections, are testament to such evolutionary battles. It is likely that some viruses went 'extinct' on their own and still caused high rates of mortality on the way out.

There is a widespread, rosy misconception that viruses evolve over time to become more benign. This is not the case: there is no predestined evolutionary outcome for a virus to become more benign, especially ones, such as SARS-CoV-2, in which most transmission happens before the virus causes severe disease. Consider that Alpha and Delta are more virulent than the strain first found in Wuhan, China. The second wave of the 1918 influenza pandemic was far more deadly than the first.

Much can be done to shift the evolutionary arms race in humanity's favour. First, we must set aside lazy optimism. Second, we must be realistic about the likely levels of death, disability and sickness. Targets set for reduction should consider that circulating virus risks giving rise to new variants. Third, we must use — globally — the formidable weapons available: effective vaccines, antiviral medications, diagnostic tests and a better understanding of how to stop an airborne virus through mask wearing, distancing, and air ventilation and filtration. Fourth, we must invest in vaccines that protect against a broader range of variants.

The best way to prevent more, more-dangerous or more-transmissible variants from emerging is to stop unconstrained spread, and that requires many integrated public-health interventions, including, crucially, vaccine equity. The more a virus replicates, the greater the chance that problematic variants will arise, most probably where spread is highest. The Alpha variant was first identified in the United Kingdom, Delta was first found in India and Omicron in southern Africa — all places where spread was rampant.

Thinking that endemicity is both mild and inevitable is more than wrong, it is dangerous: it sets humanity up for many more years of disease, including unpredictable waves of outbreaks. It is more productive to consider how bad things could get if we keep giving the virus opportunities to outwit us. Then we might do more to ensure that this does not happen.

Aris Katzourakis is a professor who studies viral evolution and genomics at the University of Oxford, UK.
e-mail: aris.katzourakis@zoo.ox.ac.uk

JOHN CAIRNS