Is the Coronavirus as Deadly as They Say?

Current estimates about the Covid-19 fatality rate may be too high by orders of magnitude.

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A line at an emergency room in Brooklyn, N.Y., March 19.PHOTO: ANDREW KELLY/REUTERS

If it's true that the novel coronavirus would kill millions without shelter-in-place orders and quarantines, then the extraordinary measures being carried out in cities and states

around the country are surely justified. But there's little evidence to confirm that premise, and projections of the death toll could plausibly be far too high.

Fear of Covid-19 is based on its high estimated case fatality rate; 2% to 4% of people with confirmed Covid-19 have died according to the World Health Organization and others. So, if 100 million Americans ultimately get the disease, two million to four million could die.

We believe that estimate is deeply flawed. The true fatality rate is the portion of those *infected* who die, not the deaths from *identified* positive cases.

The latter rate is misleading because of selection bias in testing. The degree of bias is uncertain because available data is limited, but it could make the difference in predicting an epidemic that kills 20,000 and one that kills two million. If the number of actual infections is much larger than the number of known cases, then the fatality rate will consequently be much lower than currently thought. That's not only plausible but likely based on what we know so far.

Population samples from China, Italy, Iceland and the U.S. provide relevant evidence.

On or around Jan. 31, countries sent planes to evacuate citizens from Wuhan, China. When those planes landed, the passengers were tested for Covid-19 and quarantined. After 14 days, the percentage who tested positive was 0.9%. If this was the prevalence in the greater Wuhan area on Jan. 31, then, with a population of about 20 million, greater Wuhan would have had 178,000 infections, about 30 times more than the number of reported cases. The fatality rate, then, would be at least 10 times lower than estimates based on reported cases.

Next, the north-eastern Italian town of Vò, near the provincial capital of Padua.

On March 6, all 3,300 people of Vò were tested, and 90 were positive, a prevalence of 2.7%. Applying that prevalence to the whole province (population 955,000), which had 198 reported cases, suggests there were actually 26,000 infections at that time. That's more than 130 times the number of actual reported cases. Since Italy's case fatality rate of 8% is estimated using the confirmed cases, the real fatality rate could in fact be closer to 0.06%.

In Iceland, deCode Genetics is working with the government to perform widespread testing. In a sample of nearly 2,000 entirely asymptomatic (no symptoms) people, researchers estimated disease prevalence of just over 1%. Iceland's first case was

reported on Feb. 28, weeks behind the U.S. It's plausible that the proportion of the U.S. population that has been infected is double, triple or even 10 times as high as the estimates from Iceland. That also implies a dramatically lower fatality rate in the U.S..

The best (albeit very weak) evidence in the U.S. comes from the National Basketball Association. Between March 11 and 19, a substantial number of NBA players were tested. By March 19, 10 out of 450 players were positive. Since not everyone was tested, that represents a prevalence of 2.2%. The NBA isn't a representative population, and contact among players might have facilitated transmission. But if we extend that rate assumption to cities with NBA teams (population 45 million), we get at least 990,000 infections. The number of cases reported on March 19 in the U.S. was 13,677, more than 72 times lower. These numbers imply a fatality rate from Covid-19 far less than currently thought.

How can we reconcile these estimates with the epidemiological models?

One problem is that the test used to identify cases doesn't include people who were infected and recovered. Second, testing rates were woefully low for a long time and typically reserved for the severely ill. Together, these problems imply that the confirmed cases are likely much less than the true number of infections.

Epidemiological modelers haven't adequately adapted their estimates to account for these problems.

The epidemic started in China sometime in November or December. The first confirmed U.S. cases included a person who travelled from Wuhan on Jan. 15, and it is likely that the virus entered before that. Tens of thousands of people travelled from Wuhan to the U.S. in December. Existing evidence suggests that the virus is highly transmissible and that the number of infections doubles roughly every three days. An epidemic seed on Jan. 1 implies that by March 9 about six million people in the U.S. would have been infected. As of March 23, according to the Centers for Disease Control and Prevention, there were 499 Covid-19 deaths in the U.S. If our surmise of six million cases is accurate, that's a mortality rate of 0.01%, assuming a two-week lag between infection and death. This is one-tenth of the flu mortality rate of 0.1%. Such a low death rate would be cause for optimism.

This does not make Covid-19 a nonissue. The daily reports from Italy and across the U.S. show real struggles and overwhelmed health systems. But a 20,000- or 40,000-death epidemic is a far less severe problem than one that kills two million.

Given the enormous consequences of decisions around Covid-19 response, getting clear data to guide decisions now is critical. We don't know the true infection rate in the U.S. Antibody testing of representative samples to measure disease prevalence (including the recovered) is crucial. Nearly every day a new lab gets approval for antibody testing, so population testing using this technology is now feasible.

If we're right about the limited scale of the epidemic, then measures focused on older populations and hospitals are sensible. Elective procedures will need to be rescheduled. Hospital resources will need to be reallocated to care for critically ill patients. Triage will need to improve. And policy makers will need to focus on reducing risks for older adults and people with underlying medical conditions.

A universal quarantine may not be worth the costs it imposes on the economy, community and individual mental and physical health. We should undertake immediate steps to evaluate the empirical basis of the current lockdowns.