Seroprevalence of SARS-CoV-2 in Hong Kong returnees

We read with interest Kelvin Kai-Wang To and colleagues' paper, published in *The Lancet Microbe*, about the prevalence of antibodies to SARS-CoV-2 in returnees to Hong Kong from Hubei province in China.[1] We agree with the authors' conclusion that the reported seroprevalence of 4% indicates that the initial surge of infection did not result in population immunity. The study generated considerable social media interest for a finding that the authors reported in the discussion. The authors extrapolated from the estimated prevalence to calculate an infection fatality rate (IFR) for Hubei province. We believe that the calculation is flawed, however, and underestimates the IFR. The authors applied their seroprevalence estimate to the whole of Hubei province (total population 59 million). But they reported that 364 (80·5%) of 452 of returning travellers were from Wuhan and, of 17 people whom they classified as seropositive, 16 had been staying in Wuhan. COVID-19 was concentrated in Wuhan City (population 11 million) in January, and February, 2020 and accounted for the great majority of the reported cases and deaths in Hubei province;[2] within Wuhan there were 50 340 confirmed cases and 3869 confirmed deaths, whereas other cities in Hubei province reported 17 795 confirmed cases and 643 deaths in a population of approximately 48 million. The authors do not correct for the very different epidemic in Wuhan when compared with the rest of Hubei. Using the data from travellers from Wuhan alone, we can estimate the seroprevalence as 16 (4·4%) of 364 (95% CI 2·5–7·0%). Use of this point estimate of seroprevalence with the 3689 COVID-19 deaths reported in Wuhan returns an estimate of the IFR of 0·8%, which is considerably higher than the 0·16% reported when the data are inappropriately used as representative of Hubei as a whole. The estimate for Wuhan is consistent with the summary estimate preprinted in a systematic review (0·66%, 95% CI 0·52–0·8%) of studies worldwide.[3]

The reporting of the data in this study raises three important issues. First, we should expect estimates of the IFR in different countries and communities to vary because of differences in age structure and other risk factors, but not to the extent shown in this example. Second, single-point estimates of seroprevalence are not reliable when estimating the IFR because of multiple sources of uncertainty including diagnostic test accuracy, the timing of a study during the epidemic, and the precise sampling strategy used.[4] Third, study results including estimates of the IFR should be presented transparently, with all assumptions, in the results section, rather than in the discussion. Reconsideration of the data reported in the paper shows that the findings of this study are in fact congruent with those from elsewhere.

We declare no competing interests.

William P Hanage, Victor I Vincent, Nicola M Low
whanage@hsph.harvard.edu

Center for Communicable Disease Dynamics, Department of Epidemiology at Harvard T H Chan School of Public Health, Boston, MA, USA (WPH); China University of Geosciences, Wuhan, China (VIV); Institute of Social and Preventive Medicine, University of Bern, Switzerland

1 Seroprevalence of SARS-CoV-2 in Hong Kong and in residents evacuated from Hubei province, China: a multicohort study. *Lancet Microbe* 2020; **1:** e111–18.
2 Wikipedia. COVID-19 pandemic in Hubei. https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Hubei (accessed June 8, 2020).
3 Meyerowitz-Katz G, Merone L. A systematic review and meta-analysis of published research data on COVID-19 infection-fatality rates. *medRxiv* 2020; published online May 3, 2020 (preprint).
4 Larremore DB, Fosdick BK, Bubar KM, et al. Estimating SARS-CoV-2 seroprevalence and epidemiological parameters with uncertainty from serological surveys. *medRxiv* 2020; published online April 15, 2020 (preprint).