Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

results are mostly the consequence of what our prior beliefs were.

Taken together these problems indicate that Verity and colleagues' IFRs should be treated very cautiously when planning epidemic management. While awaiting actual measurements, we would base IFRs on the *Diamond Princess* outbreak data, with the Chinese case-fatality data informing the dependence of IFR on age. We have included a crude Bayesian model with its IFR estimates by age in the appendix. IFR estimates for corresponding populations are China 0·43% (95% credible interval 0·23–0·65), UK 0·55% (0·30–0·82), and India 0·20% (0·11–0·30). The strong assumptions required, by this approach too, emphasise the need for improved data. We should replace complex models of inadequate clinical data with simpler models of epidemiological prevalence data from appropriately designed random sampling using antibody or PCR tests.

See Online for appendix

We declare no competing interests.

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1 Verity R, Okell LC, Dorigatti I, et al. Estimates of the severity of coronavirus disease 2019: a model-based analysis. *Lancet Infect Dis* 2020; published online March 30. https://doi.org/10.1016/S1473-3099(20)30243-7.

Authors' reply

Published Online May 28, 2020 https://doi.org/10.1016/S1473-3099(20)30443-6

We are grateful for Simon Wood and colleagues' comments on our study,[1] which explore some important sensitivities in the data that were available early in the COVID-19 pandemic. Wood and colleagues' re-analysis puts more weight on the *Diamond Princess* outbreak data, arriving at an infection fatality ratio (IFR) in the range 0·23–0·65%, whereas our analysis used data from repatriation flights out of Wuhan, leading to an IFR in the range 0·39–1·33%. Both datasets are opportunistic, and neither is perfectly representative of the underlying population of interest. For example, although the *Diamond Princess* outbreak has a uniquely well characterised population, the transmission setting is unusual and therefore not necessarily representative of the broader populations that such estimates would be applied to. Furthermore, the health status of cruise ship passengers is not necessarily the same as the general population of a similar age, and the standard of care received by these passengers is likely to be different to that received in settings where the health system is under more strain. Given these limitations and the fact that the *Diamond Princess* outbreak data were incomplete at the time of our analysis (late February, 2020), we opted to focus on repatriation flight data.

Epidemics of novel diseases are inherently rapidly changing environments, which bring unique challenges from a data analysis point of view. Our position was neatly summarised by Michael Ryan, executive director of the WHO Health Emergencies Programme, who said that "perfection is the enemy of the good when it comes to emergency management. Speed trumps perfection."[2] Having early estimates, although imperfect, of the order of magnitude of the IFR (ie, knowing whether the IFR is nearer to 1% or 0·01%) is essential for strategic planning, and in this sense, the re-analysis by Wood and colleagues places the IFR on the same scale as our initial estimate. We also strongly support the call for appropriately designed prevalence studies, which are now urgently needed to provide direct estimates of the IFR with fewer limitations.

We declare no competing interests.

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Re-examining the notion of irrational antimicrobial prescribing in LMICs

The increasing consumption of Reserve antibiotics in low-income and middle-income countries (LMICs), as reported by Eili Klein and colleagues,[1] represents an intractable public health challenge. Given the high burden of antimicrobial resistance despite low per-person consumption, optimising antimicrobial prescribing in LMICs requires achieving a balance between reducing excess prescribing without stifling access to antibiotics when needed. Considering inappropriate or irrational prescribing to be a major cause for the high antimicrobial-resistance burden in LMICs, WHO has emphasised the need to improve antimicrobial resistance awareness among physicians in LMICs by promoting rational use of antibiotics.[2] However, research has shown that physicians in LMICs have adequate awareness of antimicrobial resistance.[3] This evidence prompts a closer examination of the notion of irrationality in antimicrobial prescribing in these countries.

Research investigating antimicrobial prescribing in LMICs highlights the conditions of uncertainty within which these physicians operate: at the level of the diagnosis, the patient, and the health-care system.[4] These uncertainties arise out of various scarcities. For example, diagnostic uncertainties (eg, whether the complaints are due to an infection, and if so, the pathogen responsible, its antimicrobial sensitivity pattern,