

Lesson from COVID: track mortality better

The inconsistency of excess-mortality estimates is excused in part by the difficulties of modelling – but only in part.

We will never know exactly how many people the COVID-19 pandemic has killed: too many deaths around the world still go unrecorded. Statistical analyses suggest, however, that in 2021, COVID-19 overtook coronary heart disease to become the world's leading cause of death. This conclusion comes not from official COVID-19 records, but from estimates of excess mortality: that is, deaths that exceed the levels that are expected.

This week in *Nature*¹, researchers working with the World Health Organization (WHO) publish details of their calculations of excess mortality during the pandemic, after releasing their first figures earlier this year. The data suggest that during 2020 and 2021, excess mortality was some 2.7 times greater than the official toll, at between 13.2 million and 16.6 million deaths, with the most-likely value 14.8 million.

This is, in fact, slightly more conservative than other estimates. In March, the Institute for Health Metrics and Evaluation (IHME), a global health-research centre at the University of Washington in Seattle, reported² a range of 17.1 million to 19.6 million excess deaths between 1 January 2020 and 31 December 2021, with a most-likely figure of 18.2 million. A team at *The Economist* magazine uses a machine-learning model to produce a constantly updated figure that was originally around 18 million, but currently lies at around 16 million (see go.nature.com/3d5bpc3).

For 2021 alone, the WHO puts excess mortality at somewhere between 9 million and 12 million; deaths from coronary heart disease are thought to have been around 8.9 million in 2019, the latest year for which estimates are available. These extra deaths also include those related indirectly to the pandemic, such as from illnesses that health-care systems might have been able to treat if it weren't for COVID-19-related disruption.

Demographers and data scientists who work on excess mortality are the first to emphasize that their efforts can only ever be estimates. Many countries don't collect or publish timely mortality data, so figures must be extrapolated from regional values or from survey estimates, or modelled by looking at what is known about the intensity of the pandemic in these countries, the containment measures used and various proxies for socio-economic conditions.

Even for the 100 or so countries that publish monthly national data on all deaths, reaching a figure for excess deaths involves constructing models to try to ascertain the

baseline of 'normal' deaths. Earlier this year, WHO scientists flagged mistakes in their first estimates for Germany and Sweden, and updated their figures. One study³ covering Denmark, Finland, Iceland, Norway and Sweden showed that the IHME results, in particular, are mysteriously out of line with those from the WHO and *The Economist*.

Given these caveats, what is the value of estimating excess deaths? First, it emphasizes the scale of the crisis, and highlights that many low- and middle-income countries that on the face of it saw few deaths were probably hit just as hard as richer countries, if not more so. People in these countries did not enjoy a secret immunity to COVID-19, even if their deaths were not recorded as assiduously as were those in higher-income nations.

Second, it underlines how much still needs to be done to improve systems for recording deaths. The United Nations is trying to track countries' success in registering deaths as part of its Sustainable Development Goals. Its latest records state that by 2020, 154 countries out of 188 tracked had death data that were "at least 75% complete". In countries with weak social safety nets, there might be little incentive for people to report deaths. When asked, many people say they didn't know they needed to. Census-type surveys can fill in some gaps later, but tend to focus on capturing maternal and child mortality. The UN children's charity UNICEF estimates that, globally, around half of all deaths are not officially counted; a non-profit public-health organization in New York City called Vital Strategies more optimistically suggests that 40% are unregistered.

Improving the processes used to record births and deaths, known as civil registration and vital statistics (CRVS) systems, is crucial to improving public health. The WHO is preparing a treaty to strengthen global preparedness for and resilience to future pandemics; creating better CRVS systems is not yet part of that, but it should be. More support should go to ventures that give nations information on how to improve their systems – at present, a hodge-podge of advisory groups are supported by the WHO and by Bloomberg Philanthropies and the Gates Foundation.

Better, more consistent reporting is a first step towards ironing out the discrepancies between estimates, and limiting the tendency for countries to pick metrics that suit their own conclusions. Comparisons between countries will remain difficult, making it challenging to determine which policies were more or less effective at limiting deaths, or how deadly the virus was in different groups. Many estimates, including the WHO's own, don't yet fully account for demographic differences between countries; for example, not adjusting their projections on the basis of age or sex. Straightening out the discrepancies will require collaborative and open conversations between researchers. None of those difficulties should detract from the overall effort to estimate the tragic impact of this ongoing pandemic, not only in terms of the people who have died, but also on the health of survivors.

1. Msemburi, W. et al. *Nature* <https://doi.org/10.1038/s41586-022-05522-2> (2022).
2. COVID-19 Excess Mortality Calculators. *Lancet* **399**, 1513–1536 (2022).
3. Kepp, K. P. et al. *Int. J. Epidemiol.* <https://doi.org/10.1093/ije/dyac204> (2022).

“During 2020 and 2021, excess mortality was some 2.7 times greater than the official toll.”