



Nuffield Department of Population Health, University of Oxford, Oxford, UK

Nazrul.Islam@ndph.ox.ac.uk

Cite this as: *BMJ* 2022;376:e285

<http://dx.doi.org/10.1136/bmj.e285>

Published: 04 February 2022

## “Excess deaths” is the best metric for tracking the pandemic

It's more informative and accurate than covid-19 deaths or cases

Nazrul Islam *epidemiologist*

Since the emergence of the covid-19 pandemic in early 2020, governments and international agencies have reported regular data on covid-19 cases and deaths. These metrics have consistently been used to track the pandemic's effects on human lives. But the pandemic is not just about illnesses and deaths caused by SARS-CoV-2. It has far reaching effects—direct and indirect—with short and long term consequences for both individuals and populations.<sup>12</sup>

Deaths from covid-19 account for only a fraction of the short term direct effects of SARS-CoV-2. Other critical outcomes include hospital admission, mechanical ventilation, and need for intensive care. Medium to long term direct effects include loss of smell and taste, chronic fatigue, breathlessness, chest pain, and arrhythmias.<sup>3</sup>

The pandemic has influenced virtually all aspects of life, including the social, economic, and political determinants of health,<sup>4</sup> thanks to policies such as physical distancing, severe curtailment of social and economic activity, mask wearing, vaccination programmes, and vaccine mandates.<sup>5</sup> Although restrictions on human mobility reduced air pollution<sup>6</sup> and deaths from road traffic incidents,<sup>7</sup> healthcare services have been widely disrupted,<sup>8</sup> with critical shortages of medical supplies and reduced access to emergency and non-emergency care.<sup>9–11</sup>

Accurately documenting these changes is essential to identify the clinical services and sectors worst affected and their effect on people's health. Missed care for conditions such as diabetes, cardiovascular disease, cancer, and mental health, for example, has short and long term implications for morbidity and mortality. Measuring the pandemic's effects only in terms of deaths due to covid-19 fails to accommodate these important outcomes.

Moreover, data on deaths from covid-19 are far from accurate or complete.<sup>12</sup> Multiple factors contribute to inaccuracies in documenting causes of death. First, not everyone who dies from covid-19 is tested, especially in resource poor settings.<sup>12</sup> Second, diagnostic tests for SARS-CoV-2 may fail to detect the virus (false negative) resulting in misclassification.<sup>13</sup> Third, the definition of covid-19 deaths has changed over time. When Public Health England changed its definition of covid-19 deaths in July 2020, for example, the number of officially reported deaths fell by 73%.<sup>14</sup>

All-cause mortality is not affected by these inaccuracies and captures both direct deaths from covid-19 and deaths caused indirectly by the pandemic.<sup>12</sup> Data on all-cause mortality allow us to estimate the number of “excess deaths” by comparing all deaths during the pandemic with a reference

estimate, the number of expected deaths had there been no pandemic.

The reference estimate, however, is not defined consistently. Many reports used a single pre-pandemic calendar year (such as 2018),<sup>15</sup> while others used an average of the past few years.<sup>16</sup> However, as overall mortality has been falling globally over the past decade or so, we would expect all-cause mortality in 2020 to be lower than in most previous years. A better approach would be to estimate expected deaths based on recent mortality trends, seasonal variability, and the demographic composition of the population.<sup>1</sup> Excess deaths would, then, be the difference between observed deaths from all causes and this informed estimate of expected deaths.

Excess deaths is a powerful metric even when causes of death are perfectly coded. For example, if two countries, A and B, with identical population structure and perfect data on causes of death report 1000 and 1500 covid-19 deaths, respectively, we might conclude that country A achieved better pandemic control than country B. However, estimated excess deaths in these two countries of 1900 and 1700, respectively, would mean that despite fewer covid-19 deaths, country A failed to prevent deaths from other causes directly or indirectly related to the pandemic. The two metrics give opposing perspectives on the relative effectiveness of these countries' pandemic control measures.

The scenario above could indicate that country A had relatively poorer healthcare resilience, and perhaps lacked a comprehensive pandemic preparedness policy to protect lives. Alternatively, country A may deliberately under-report deaths from covid-19 for political reasons, and the quantification of excess deaths reveals that they were indeed failing to protect lives. Data on excess deaths can be used to evaluate the overall effectiveness of a country's health policy interventions and to identify inequality among different population groups—categorised by age, sex, or ethnicity, for example.<sup>17</sup>

Recognising its importance, the World Health Organization and the UN Department of Economic and Social Affairs have established a technical advisory group to estimate the global burden of excess mortality associated with the covid-19 pandemic.<sup>18</sup> Excess deaths is an essential metric in tracking the impact of the pandemic both within and between countries, and governments worldwide should publish them alongside data on covid-19 cases and deaths.

Competing interests: I have read and understood BMJ policy on declaration of interests and declare I sit on the WHO and UN Department of Economic and Social Affairs technical advisory group on covid-19 mortality assessment.

Provenance and peer review: Commissioned; not externally peer reviewed.

- 1 Islam N, Shkolnikov VM, Acosta RJ, et al. Excess deaths associated with covid-19 pandemic in 2020: age and sex disaggregated time series analysis in 29 high income countries. *BMJ* 2021;373:n1137. doi: 10.1136/bmj.n1137. pmid: 34011491
- 2 Beaney T, Clarke JM, Jain V, et al. Excess mortality: the gold standard in measuring the impact of COVID-19 worldwide? *J R Soc Med* 2020;113:329-34. doi: 10.1177/0141076820956802. pmid: 32910871
- 3 Crook H, Raza S, Nowell J, Young M, Edison P. Long covid-mechanisms, risk factors, and management. *BMJ* 2021;374:n1648. doi: 10.1136/bmj.n1648. pmid: 34312178
- 4 Dawes DE. Health inequities: a look at the political determinants of health during the covid-19 pandemic. *Am J Health Stud* 2020;35:77-82. doi: 10.47779/ajhs.2020.191
- 5 Islam N, Sharp SJ, Chowell G, et al. Physical distancing interventions and incidence of coronavirus disease 2019: natural experiment in 149 countries. *BMJ* 2020;370:m2743. doi: 10.1136/bmj.m2743. pmid: 32669358
- 6 Venter ZS, Anan K, Chowdhury S, Lelieveld J. Covid-19 lockdowns cause global air pollution declines. *Proc Natl Acad Sci U S A* 2020;117:18984-90. doi: 10.1073/pnas.2006853117. pmid: 32723816
- 7 Yasin YJ, Grivna M, Abu-Zidan FM. Global impact of covid-19 pandemic on road traffic collisions. *World J Emerg Surg* 2021;16:51. doi: 10.1186/s13017-021-00395-8. pmid: 34583713
- 8 World Health Organization. Second round of the national pulse survey on continuity of essential health services during the covid-19 pandemic. WHO, 2021. <https://www.who.int/publications/item/WHO-2019-nCoV-EHS-continuity-survey-2021.1>
- 9 Ranney ML, Griffith V, Jha AK. Critical supply shortages—the need for ventilators and personal protective equipment during the covid-19 pandemic. *N Engl J Med* 2020;382:e41. doi: 10.1056/NEJMp2006141. pmid: 32212516
- 10 Mansfield KE, Mathur R, Tazare J, et al. Indirect acute effects of the COVID-19 pandemic on physical and mental health in the UK: a population-based study. *Lancet Digit Health* 2021;3:e217-30. doi: 10.1016/S2589-7500(21)00017-0. pmid: 33612430
- 11 Department of Health and Social Care, Office for National Statistics. Direct and indirect health impacts of covid-19 in England. 2021.
- 12 Whittaker C, Walker PGT, Alhaffar M, et al. Under-reporting of deaths limits our understanding of true burden of covid-19. *BMJ* 2021;375:n2239. doi: 10.1136/bmj.n2239. pmid: 34642172
- 13 Zhang Z, Bi Q, Fang S, et al. Insight into the practical performance of RT-PCR testing for SARS-CoV-2 using serological data: a cohort study. *Lancet Microbe* 2021;2:e79-87. doi: 10.1016/S2666-5247(20)30200-7. pmid: 33495759
- 14 Heneghan C, Oke J. Public Health England has changed its definition of deaths: here's what it means. Centre for Evidence-Based Medicine, 2020. <https://www.cebm.net/covid-19/public-health-england-death-data-revised/>
- 15 Woolf SH, Masters RK, Aron LY. Effect of the covid-19 pandemic in 2020 on life expectancy across populations in the USA and other high income countries: simulations of provisional mortality data. *BMJ* 2021;373:n1343. doi: 10.1136/bmj.n1343. pmid: 34162598
- 16 Office for National Statistics. Coronavirus (COVID-19) latest insights. 2022. <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19latestinsights/deaths#deaths>
- 17 Rossen LM, Ahmad FB, Anderson RN, et al. Disparities in excess mortality associated with covid-19—United States, 2020. *MMWR Morb Mortal Wkly Rep* 2021;70:1114-9. doi: 10.15585/mmwr.mm7033a2. pmid: 34411075
- 18 World Health Organization, United Nations Department of Economic and Social Affairs. Technical advisory group on covid-19 mortality assessment. 2021. <https://www.who.int/data/technical-advisory-group/covid-19--mortality-assessment>