



EDITORIALS

Science and politics of disaster death tolls

Science must prevail

Debarati Guha-Sapir *professor*¹, Francesco Checchi *professor*²

¹Centre for Research on the Epidemiology of Disasters, Institute for Health and Society, University of Louvain, Brussels, Belgium; ²Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, UK

In August 2018, almost a year after Hurricane Maria swept through Puerto Rico, an academic study placed the death toll at about 46 times the number declared earlier by President Trump.¹ The heated debate that followed the publication shows why these figures can be so controversial.^{2,3} High death tolls indicate the severity of a natural disaster but can also point to politically damaging inadequacies in the relief effort and to underlying poverty and inequality in the affected population.

The accurate documentation of deaths from disasters and conflicts helps create an objective historical record that informs national and international improvements in preparedness and response. Establishing who died, how, and where—basic epidemiological questions—also helps direct resources to the most vulnerable populations, increasing the effectiveness of humanitarian measures.

Counting deaths is politically sensitive, however, particularly in conflict settings where different combatants attribute civilian deaths to opposing forces for clear partisan reasons. Estimations of the death tolls from the conflicts in Darfur,^{4,5} Iraq,⁶ and Democratic Republic of Congo^{7,8} are still highly controversial. Objective research in these setting is difficult, although research from Syria does identify aerial bombings by the government as a disproportionate cause of death among civilians and children.⁹ Overestimation and underestimation of deaths from armed conflicts are common, equally problematic, and lead to protracted disputes that distract attention from conflict resolution.

Deaths from natural disasters have traditionally been less susceptible to political controversy, but this has clearly changed. The death toll from Hurricane Maria was disputed from the start after President Trump and the US State authorities reported just 66 deaths. This astonishingly low figure was attributed to a rapid and effective response and held in stark contrast to the high death toll (close to 2000) after Hurricane Katrina in 2005.

An independent national survey published in July 2018 estimated that 4645 extra deaths were associated with Maria, relative to the number of deaths in the same period a year before.¹⁰ This estimate was limited by wide confidence intervals (793 to 8498). A second independent report¹ placed the death toll at a little

under 3000 using a “body count” approach, meticulously compiling records from mortuaries and death certificates.

Accountability

A study reporting about 15 000 excess deaths from the 2003 heatwave in France led to the resignation of the director general of the French Ministry of Health and to major policy changes to reduce the effect of future heatwaves.^{11,12} We have yet to see any political accountability for deaths from Hurricane Maria.

Authorities may also be reluctant to establish accurate mortality figures when they have been slow to act on early warnings. In Myanmar, this reluctance probably led the military government to block humanitarian access to a region devastated by Cyclone Nargis, which killed around 140 000 people in 2008.¹³ It later transpired that the authorities had failed to transmit clear cyclone warnings to the population at risk in the Irrawaddy delta and were unwilling to allow humanitarian organisations into the area to witness the devastation.^{14,15}

High death tolls from natural disasters can point to inefficiencies in state infrastructure, discrimination, or overt hostility of the state towards a minority population. Large differences between official estimates and those reported by civil society organisations and independent researchers usually indicate deep social inequalities. Deaths within illegal squatter communities may be overlooked in official counts, especially when there is a compensation scheme for disaster related deaths or if there is a disproportionate share of deaths in poor communities.

Death tolls from disasters have thus become powerful evidence for enhancing accountability of those charged with protecting the public; methods of estimation are consequently under increasing scrutiny. The two approaches most commonly used today are sample surveys—with inevitably large confidence intervals and all the usual sampling biases that prevail in affected communities—and a body count approach that analyses mortuary records, death certificates, and vital registration records.

Both approaches are sound if the limitations are clearly stated and understood. But researchers are also exploring statistical applications new to humanitarian settings. Bayesian estimation

is one such approach, combining qualitative expert guidance with quantitative information to generate more robust estimates of death tolls. Others, such as capture-recapture estimation, can make use of multiple data sources. Both methods need further evaluation.

Credible death tolls are important for community recovery after crises; they influence policy change and enhance political accountability. Watertight and transparent methods adapted for humanitarian settings are essential. Verifiable body counts from mortuaries and vital registration records are arguably the soundest option currently available, while estimations from sample surveys need more innovative thinking from epidemiologists, statisticians, and demographers. Either way, it is vital to offset informal calculations influenced by political partisanship with valid and evidence based data on lives lost.

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- 1 Milken Institute School of Public Health. Ascertainment of the estimated excess mortality from Hurricane Maria in Puerto Rico. George Washington University, 2018.
- 2 Wang A. Sorry, Mr President: the Hurricane Maria death toll in Puerto Rico didn't grow by magic. Washington Post 2018 Sep 15. https://www.washingtonpost.com/politics/2018/09/15/sorry-mr-president-hurricane-maria-death-toll-puerto-rico-didnt-grow-by-magic/?utm_term=.021198895508

- 3 Withnall A. Puerto Rico: outrage as death toll rises to 2 975 after Trump administration hailed "good news story." *Independent* 2018 Aug 29. www.independent.co.uk/news/world/americas/puerto-ricohurricane-maria-death-toll-latest-2975-trump-federal-disaster-a8512106.html
- 4 Degomme O, Guha-Sapir D. Patterns of mortality rates in Darfur conflict. *Lancet* 2010;375:294-300. 10.1016/S0140-6736(09)61967-X 20109956
- 5 United States Government Accountability Office. Darfur crisis: death estimates demonstrate severity of crisis, but their accuracy and credibility could be enhanced, GAO, 2006.
- 6 Reynolds P. Huge gaps between Iraq death estimates. BBC News 2006 Oct 20. http://news.bbc.co.uk/2/hi/middle_east/6045112.stm
- 7 Moore J. New study argues war death are often overestimated. *Christian Science Monitor* 2010 Jan. <https://www.csmonitor.com/World/Africa/2010/0122/New-study-argues-war-deaths-areoften-overestimated>
- 8 Cressey D. Counting the human costs of conflict. *Nature*. 2008 Nov 12. <https://www.nature.com/news/2008/081112/full/news.2008.1223.html>
- 9 Guha-Sapir D, Rodriguez-Llanes JM, Hicks MHR, et al. Civilian deaths from weapons used in the Syrian conflict. *BMJ* 2015;351:h4736. 10.1136/bmj.h4736 26419494
- 10 Kishore N, Marqués D, Mahmud A, et al. Mortality in Puerto Rico after Hurricane Maria. *N Engl J Med* 2018;379:162-70. 10.1056/NEJMsa1803972. 29809109
- 11 Le Tertre A, Maulpoix A, Carre N, et al. *Impact sanitaire de la vague de chaleur d'août 2003 en France*. Institut de Veille Sanitaire, 2003.
- 12 OBS. Canicule: le n°1 de la DGS a démissionné. 2003. <https://www.nouvelobs.com/societe/20030818.OBS4972/canicule-le-n-1-de-la-dgs-ademissionne.html>
- 13 SIGMA-SwissRe. Natural catastrophes and man-made disasters in 2017: a year of record-breaking losses. 2018. http://www.swissre.com/library/publication-sigma/sigma_1_2018_en.html
- 14 Suwanvanichkij V, Mahn M, Maung C, et al. After the storm: voices from the delta. 2009. https://www.jhsph.edu/research/centers-and-institutes/center-for-public-health-and-human-rights/_pdf/AfterTheStorm_Fullreport_2ndEd_May09.pdf
- 15 Padma TV. Ignored warnings "worsened" Myanmar cyclone disaster. *Sci Dev Net* 2008 May 9. <https://www.scidev.net/global/policy/news/ignored-warnings-worsened-myanmar-cyclone-disaster.html>

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