

OPINION

The health burden of climate change: A call for global scientific action

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A now-famous study calculated in 2003 that at least 166,000 annual deaths and 5.5 million disability-adjusted life years from malnutrition, diarrheal disease, malaria, floods, and cardiovascular diseases might already be attributable to anthropogenic climate change [1]. These estimates helped set one of the first baselines on the gravity of climate injustice: developed countries experience less than 0.15% of a global health burden for which they are largely responsible [2]. But today, these estimates—and the data and methods that powered them—are increasingly out-of-date. The planet is now 1.2°C warmer than pre-industrial temperatures, with a roughly 50% chance of passing 1.5°C in the next half-decade, and the accelerating impact on human health has been conspicuous. Despite this, sources like the World Health Organization (WHO) are still forced to rely on these outdated estimates: compared to the hundreds of studies that project future climate risks, relatively little is known about the real-time impacts of climate change on human health.

The consequence of that knowledge gap for investment and political willpower is profound. The health impacts of climate change are still often seen as preventable future problems, contingent on mitigation's success or failure; as a result, the health sector is under-prioritized by climate change adaptation efforts [3], and often lacks the political mandate to advance adaptation on its own compared to other emergency priorities. Globally, between 0.5% and 5% of all climate adaptation funding supports the health sector [4, 5]; although health was identified as the third priority sector (after water and agriculture), none of the 203 projects funded by the United Nations Framework Convention on Climate Change Adaptation Fund since 2015 have been primarily dedicated to adaptation in the health sector. This status quo is woefully insufficient to avoid—or even monitor—the millions of preventable deaths related to climate change.

We are issuing an urgent call for multilateral investment to commission a Global Burden of Climate Change Study, modeled off and complimentary to the Global Burden of Disease (GBD) study, but tasked with a global stocktake of the historical and real-time health impacts of the climate crisis. By establishing a global scientific body responsible for climate-health assessment, researchers, decisionmakers, and other stakeholders have the opportunity to come together and address dozens of gaps in scientific knowledge. Today, extreme temperatures are arguably the only climate hazard with a well-studied global mortality cost [6]; the health burden of other direct impacts like storms, floods, and droughts remain largely uninventoried. A handful of vector-borne diseases like malaria and Lyme disease have also been studied in some

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depth [7], but dozens of others remain largely unassessed. Other infectious diseases of poverty, especially respiratory and parasitic diseases, are still severely neglected; so, too, are the zoonotic viruses that pose the greatest epidemic and pandemic threats. Non-communicable diseases are even further from comprehensive assessment; key impacts that might be severely underestimated include hypertension [8], chronic kidney disease [9], and poor mental health (including suicides [10]).

For all of these hazards and more, the global impact of climate change remains mostly unquantified, in large part due a lack of basic data. Building on the successes of programs like the WHO's Global Influenza Surveillance and Response System, a Global Burden of Climate Change Study could establish a new platform for equitable and confidential data sharing among national surveillance systems. Assembling high-resolution transnational datasets on climate-relevant clinical outcomes would allow scientists to begin applying statistical methods for the detection and attribution of climate change impacts, a powerful set of tools that have only minimally been applied to health so far [11]. Just as a decade of advances in extreme event attribution have paved the way for real-time programs like World Weather Attribution (worldweatherattribution.org), transforming media coverage of extreme weather and supporting climate litigation, the Study would be able to provide a real-time, standardized, and complete picture of health impacts around the world. In doing so, it would be a major step forward from—and substantially empower future iterations of—programs like the Intergovernmental Panel on Climate Change reports and the *Lancet* Countdown study, which are limited to evidence synthesis from existing, incomplete sources. With better quantitative models in hand, Study scientists could also make more accurate and nationally-tailored predictions about future health risks, and would be better equipped to estimate the financial incentives for both emissions reduction and investments in adaptation.

A Global Burden of Climate Change Study would be a significant undertaking, and would require a concerted effort to bring together transdisciplinary expertise, including (but not limited to) climate scientists, meteorologists, disaster risk scientists and managers, public health professionals, statisticians, economists, ecologists, geographers, clinicians, policymakers, and civil society leaders. Just as the GBD Study has built a critical workforce in the field of health metrics evaluation, this would be an unprecedented opportunity to train a new generation of early career scientists and practitioners to value, work closely with, and communicate across these diverse disciplines and sectors. The transdisciplinary workforce developed by the Study would be a lasting asset, and could spearhead communication with in-country policymakers and the public about climate policy and adaptation needs. Moreover, the investment in building and maintaining both a trained workforce and research infrastructure (computational, physical, and otherwise) would be a key advance for climate change research, and would have immediate returns for basic public health beyond climate adaptation efforts.

For that reason, we believe that (unlike the GBD Study) the leadership of a Global Burden of Climate Change Study should be based in countries at the frontlines of climate change impacts—more often than not, the same countries that are most marginalized by the existing colonial infrastructures of global health. For example, a Secretariat for the GBCCS could be based on the African continent, which faces the greatest current and future risks from climate change [1]; less than 4% of global funding for climate change research goes towards understanding those risks—of which only 14% actually goes to African universities [12]. The Study could therefore situate itself alongside other efforts like the African Pathogen Genomics Initiative that are building a flourishing scientific ecosystem in the countries most neglected by existing global health institutions. Perhaps even more importantly, the Study would provide an evidence base about loss and damage that these countries could use to lobby for climate justice on the international stage, steering new financing mechanisms that could directly enable

the attainment of universal health coverage and the development of climate-resilient health systems [13, 14]. In doing so, we believe a Global Burden of Climate Change Study would be a critical step towards understanding and surviving the unprecedented threat to global human health posed by the climate crisis.

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