



LETTERS

A child who has become malnourished as a result of a measles infection eats lunch in a measles isolation ward of a hospital in the Democratic Republic of the Congo.

Edited by **Jennifer Sills**

COVID-19 policies: Remember measles

Nearly 120 million children in 37 countries are at risk of missing their measles-containing vaccine (MCV) shots this year, as preventive and public health campaigns take a back seat to policies put in place to contain coronavirus disease 2019 (COVID-19) (1). In March, the World Health Organization (WHO) issued guidelines indicating that mass vaccination campaigns should be put on hold to maintain physical distancing and minimize COVID-19 transmission (2). The disruption of immunization services, even for short periods, will lead to more susceptible individuals, more communities with less than the 95% MCV coverage needed for herd immunity, and therefore more measles outbreaks globally. A mere 15% decrease in routine measles vaccinations—a plausible result of lockdowns and disruption of health services—could raise the burden of childhood deaths by nearly a quarter of a million in poorer countries (3). Solutions for COVID-19, especially among the global poor, cannot include forgoing vaccinations.

Suspending mass vaccination campaigns is particularly pernicious in countries embroiled in conflict. Malnutrition among children and mothers in these regions is all too common—and increases mortality for

those also infected by measles (4). In the conflict-affected regions of Ituri and North Kivu in eastern Democratic Republic of the Congo (DRC) alone, COVID-19 precautions are expected to delay measles vaccinations for nearly a million children (1).

COVID-19 mortality has so far been low in most poorer countries and trivial compared with the immediate risk of mortality due to measles. In the DRC, for example, the total number of deaths due to COVID-19 as of June was 37 (5), whereas the 2019 measles outbreak in the conflict region of eastern DRC killed more than 6000 people in a matter of months, mostly children (6). In some poor countries, more than 40% of the population is younger than 14 years old (7). This demographic group is the least affected by COVID-19 (in terms of symptoms, mortality, and transmission) (8) but at serious risk of measles (9). In addition, because many people in these countries live in cramped housing with unavoidable crowding, policies to minimize COVID-19 at the expense of measles prevention may not even be effective (10).

Postponement of measles campaigns prioritizes panic-driven policies for controlling COVID-19 without consideration of these policies' costs. If children are not immunized within the correct age window, they forgo benefits of lifelong immunity (11). Whole cohorts of children may be left unprotected. We must balance priorities of containing COVID-19 with

efforts to control other high-transmission disease threats in poor countries, especially those affected by conflict.

Debarati Guha-Sapir^{1*}, Maria Moitinho de Almeida¹, Mory Keita², Gregg Greenough³, Eran Bendavid⁴

¹Centre for Research on Epidemiology of Disasters, Research Institute on Health and Society, Université Catholique de Louvain, Brussels, Belgium. ²World Health Organization, Regional Office for Africa, Dakar Hub, Dakar, Senegal. ³Brigham and Women's Hospital, Department of Emergency Medicine, Boston, MA 02115, USA. ⁴Stanford University, Center for Health Policy, Stanford, CA 94305, USA.

*Corresponding author.
Email: debarati.guha@uclouvain.be

REFERENCES AND NOTES

1. The Measles & Rubella Initiative, "More than 117 million children at risk of missing out on measles vaccine, as COVID-19 surges" (World Health Organization, Geneva, 2020).
2. WHO, "Guiding principles for immunization activities during the COVID-19 pandemic: Interim guidance" (2020); <https://apps.who.int/iris/handle/10665/331590>.
3. T. Robertson *et al.*, *Lancet* **8**, E901 (2020).
4. WHO, "Measles vaccines: WHO position paper—April 2017," *Weekly Epidemiological Record/Relevé Épidémiologique Hebdomadaire* **92**, 205 (2017).
5. Worldometer, Congo (2020); www.worldometers.info/coronavirus/country/congo/.
6. WHO, Africa, "Deaths from Democratic Republic of the Congo measles outbreak top 6000" (2020).
7. J. Ausubel, "Populations in Europe, Northern America are older than in other regions" (Pew Research Center, 2020).
8. CDC COVID-19 Response Team, *MMWR Morb. Mortal. Wkly. Rep.* **69**, 422 (2020); www.cdc.gov/mmwr/volumes/69/wr/mm6914e4.htm.
9. A. Minetti *et al.*, *PLOS Med.* **10**, e1001544 (2013).
10. G. Bhardwaj *et al.*, "Cities, crowding, and the coronavirus: Predicting contagion risk hotspots" (World Bank Group, Working Paper, Open Knowledge Repository, 2020); <https://openknowledge.worldbank.org/handle/10986/33648>.
11. S. Southeray, "Reviews suggest first measles vaccination typically best after 9 months of age" (Center for Infectious Disease Research and Policy, 2019).

10.1126/science.abc8637

Restart science stronger after COVID-19

As the scientific enterprise and its supporting institutions rebuild from the disruptions caused by the coronavirus disease 2019 (COVID-19) pandemic, we must support the graduate students and young investigators whose developing careers have been interrupted or irretrievably damaged. Even before the pandemic, the next generation of the scientific workforce faced problems such as limited job opportunities and narrow career training, inadequate mentoring, and a less diverse and inclusive scientific establishment (1, 2). Studies of these challenges have yielded recommendations for at least partial solutions, but few changes have been implemented (1, 2). The pandemic has now increased the urgency of these issues, which must be addressed if science is to thrive in the future.

More than 60% of new Ph.D.s will not pursue careers in academic research. Graduate curricula must therefore be at least partially redesigned to accommodate their broader career interests (3). Mentorship quality can be improved with appropriate faculty training (4). The lack of diversity, equity, and inclusion in science must be taken seriously and ameliorated. Resources may have to be redistributed to ensure that younger scientists have independent careers earlier than has become common. Let us not waste the opportunity presented by this crisis to address longstanding problems. As we rebuild, we should look hard at our own enterprise, make some changes, and restart science stronger.

Alan I. Leshner

CEO Emeritus, American Association for the Advancement of Science and Former Executive Publisher, *Science*, Washington, DC 20005, USA. Email: alan.i.leschner@gmail.com

REFERENCES AND NOTES

- National Academies of Sciences, Engineering, and Medicine, *Graduate STEM Education for the 21st Century* (National Academies Press, 2018).
- National Academies of Sciences, Engineering, and Medicine, *The Next Generation of Biomedical and Behavioral Sciences Researchers: Breaking Through* (National Academies Press, 2018).
- Council of Graduate Schools, *Understanding Career Pathways for Program Improvement* (Council of Graduate Schools, 2015).
- National Academies of Sciences, Engineering, and Medicine, *The Science of Effective Mentorship in STEM* (National Academies Press, 2019).

10.1126/science.abd5780

Uphold the nuclear weapons test moratorium

The Trump administration is considering renewing nuclear weapons testing (1), a

move that could increase the risk of another nuclear arms race as well as an inadvertent or intentional nuclear war. Following in the long tradition of scientists opposing nuclear weapons due to their harmful effects on both humanity and the planet (2), we ask the U.S. government to desist from plans to conduct nuclear tests.

During the Cold War, the United States conducted 1030 nuclear weapons tests, more than all other nuclear-armed nations combined (3). In 1996, the United States signed the Comprehensive Nuclear Test Ban Treaty (CTBT), agreeing not to conduct a nuclear weapons test of any yield (4). The United States has not yet ratified the CTBT but did spearhead the 2016 adoption of UN Security Council Resolution 2310, which calls upon all countries to uphold the object and purpose of the CTBT by not conducting nuclear tests (5).

Eight of the nine nuclear-armed states, including the five permanent members of the UN Security Council, have observed a moratorium on nuclear testing since 1998 (3, 4). The ninth, North Korea, responding to international pressure, stopped testing warhead detonations (as opposed to missile flights) in 2017 (6). If the United States ratified the CTBT, joining the 168 countries who have already done so (4), there is a good chance that the other holdout countries would ratify the treaty as well (7).

In contrast, restarting U.S. nuclear weapons tests of any size, underground or aboveground, would give license to other countries, such as North Korea, India, and Pakistan, to resume testing. If the tests are underground, radioactive materials could leak into the local environment, including water supplies (8); if in the atmosphere, which is currently prohibited by the 1963 Limited Nuclear Test Ban Treaty (9), such tests would spread radioactivity, sometimes very widely (8). Once the United States breaches the treaty, there will be no way to prevent other nations from carrying out tests of larger warheads or to control leaks into the environment and atmosphere. Even a “limited” nuclear exchange between nuclear-armed nations can cause untold local death and destruction, as well as global climate and agricultural catastrophes stemming from the climate impacts of smoke from fires ignited by nuclear weapons (10).

The current U.S. arsenal includes thousands of warheads, together capable of obliterating every major city in any country on Earth. Yet the United States has embarked on a \$1.7 trillion nuclear weapons enhancement program (11), of which the proposed testing would be one small—but dangerous—component. All nations, including the United States,

should continue to reduce the number of nuclear warheads in the world’s arsenals, not increase their efficacy or develop more lethal versions. Senator Edward Markey and Senate colleagues recently announced the Preserving Leadership Against Nuclear Explosives Testing (PLANET) Act, which would deny funding for and thereby prevent the renewal of testing (12). We urge the Senate to pass this bill and to ratify the CTBT immediately.

Jonathan King*, Martin Chalfie, Noam Chomsky, Joseph Cirincione, Sean Decatur, Melissa Franklin, Joseph Gerson, David P. Goldenberg, Gary Goldstein, William Hartung, Ira Helfand, Daniel Holz, Peter C. Kahn, Sheldon Krinsky, Edward Loechler, Val Moghadam, Stuart A. Newman, David Ozonoff, Prasannan Parthasarathi, William Phillips, H. David Politzer, Robert P. Redwine, Richard J. Roberts, Alan Robock, Catherine Ann Royer, Suzanne Scarlata, Elaine Scarry, George F. Smoot, Robert Socolow, Susan Solomon, Andrew Strominger, Eric J. Sundberg, Mriganka Sur, Max Tegmark, John F. Tierney, Cornelia van der Ziel, Michael VanElzakker, Frank N. von Hippel, Lawrence Wittner, Henry H. Wörtis

*Corresponding author. Email: jaking@mit.edu
The full author affiliations are available online.

REFERENCES AND NOTES

- J. Hudson, P. Sonne, “Trump administration discussed conducting first U.S. nuclear test in decades,” *The Washington Post* (2020).
- J. C. Jolly, *Endeavor* **26**, 149 (2002).
- Arms Control Association, *The Nuclear Testing Tally* (2019); www.armscontrol.org/factsheets/nucleartesttally.
- Comprehensive Nuclear Test Ban Treaty (CTBT) (2020); www.nti.org/learn/treaties-and-regimes/comprehensive-nuclear-test-ban-treaty-ctbt/.
- Arms Control Association, UN Security Council Backs CTBT (2016); www.armscontrol.org/ACT/2016_10/News/UN-Security-Council-Backs-CTBT.
- Arms Control Association, Chronology of U.S.-North Korean Nuclear and Missile Diplomacy (2020); www.armscontrol.org/factsheets/dprkchron.
- D. Choubey, “The CTBT’s importance for U.S. national security” (Carnegie Endowment for International Peace, 2009).
- Comprehensive Nuclear Test Ban Treaty Organization, General Overview of the Effects of Nuclear Testing (www.ctbto.org/nuclear-testing/the-effects-of-nuclear-testing/general-overview-of-the-effects-of-nuclear-testing/).
- John F. Kennedy Presidential Library and Museum, Nuclear Test Ban Treaty (www.jfklibrary.org/learn/about-jfk/jfk-in-history/nuclear-test-ban-treaty).
- A. Witze, *Nature* **579**, 485 (2020).
- Arms Control Association, U.S. Nuclear Modernization Programs (2018); www.armscontrol.org/factsheets/USNuclearModernization.
- Ed Markey, U.S. Senator for Massachusetts, “Senator Markey, Senate colleagues announce legislation to prohibit restart of U.S. nuclear weapons testing” (2020).

COMPETING INTERESTS

D.H., R.S., and S. Solomon are members (in an unpaid advisory capacity) of the Science and Security Board of the Bulletin of the Atomic Scientists. J.F.T. is affiliated with the Center for Arms Control and Non-Proliferation.

SUPPLEMENTARY MATERIALS

Author affiliations
www.sciencemag.org/content/369/6501/262.2/suppl/DC1

10.1126/science.abd3313

COVID-19 policies: Remember measles

Jennifer SillsDebarati Guha-SapirMaria Moitinho de AlmeidaMory KeitaGregg GreenoughEran Bendavid

Science, 369 (6501),

View the article online

<https://www.science.org/doi/10.1126/science.abc8637>

Permissions

<https://www.science.org/help/reprints-and-permissions>

Use of think article is subject to the [Terms of service](#)