
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

from the Water Protectors. First, addressing the social determinants of health requires dismantling the upstream systems of power that structure society, such as racial capitalism and settler colonialism.[4] Second, working upstream requires a collective, longitudinal pursuit of justice. The movement to resist Line 3 has been organising for 13 years, building restorative communities and germinating relationships of trust among multisectoral coalitions. Third, human and natural ecosystem health is inter-related and we must prioritise addressing climate change as essential health work. Fourth, just as some Water Protectors risk arrest or danger to their bodies, so too must health-care workers risk confrontation with power holders in our health-care and political systems.

In our efforts to deeply engage with the social determinants of health, Water Protectors, who prevent the destruction of life and assert the sovereignty of Indigenous people, are an exemplar of truly upstream health and healing.

WL is the executive director of Honor the Earth. All other authors declare no competing interests.

*Mary Owen, *Michael Westerhaus, Amy Finnegan, Laalitha Surapaneni, Winona LaDuke*
**west0591@umn.edu**

Center of American Indian and Minority Health, University of Minnesota, Duluth, MN, USA (MO); Global Medicine (MW) and Division of General Internal Medicine (LS), University of Minnesota, Twin Cities, MN, USA; University of St Thomas, St Paul, MN, USA (AF); Honor the Earth, MN, USA (WL); Center for International Health, St Paul, MN 55104, USA (MW)

1 McKinlay J. The case for refocusing upstream: the political economy of illness. In: Conrad P, ed. The sociology of health and illness: critical perspectives, 7th edn. New York, NY: Worth Publishers, 2005: 551–64.
2 Schulz LO, Bennett PH, Ravussin E, et al. Effects of traditional and western environments on prevalence of type 2 diabetes in Pima Indians in Mexico and the U.S. *Diabetes Care* 2006; **29:** 1866–71.
3 King M, Smith A, Gracey M. Indigenous health part 2: the underlying causes of the health gap. *Lancet* 2009; **374:** 76–85.
4 Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav* 1995; **35:** 80–94.

For more on **COVAX** see https://www.gavi.org/covax-facility

## Vaccine scarcity in LMICs is a failure of global solidarity and multilateral instruments

To address COVID-19 vaccine scarcity, Ivan Sisa and colleagues[1] justify placebo-controlled trials in low-income and middle-income countries (LMICs), arguing that these countries have "less capacity to negotiate and purchase vaccines than do high-income countries" and that the global shortage can be overcome with more vaccine producers coming from such trials. We are concerned that this reasoning sets the wrong precedent because approving such a trial should show that evidence can only be reached with this design.[2] Furthermore, LMICs should not ignore the urgent need to increase production and distribution[3] of already efficacious vaccines.

In the interest of saving people's lives, vaccine development demands working towards improved capacities on the road from discovery (free of patent restrictions) to manufacturing and equitable distribution. Therefore, clinical trials should be done simultaneously, engaging volunteers and researchers across a broad range of LMICs and high-income countries. Furthermore, study protocols should provide robust assurances that participants will have access to the vaccine when their priority group is eligible in the general population. Finally, emphasis should be made on other pressing issues, such as adopting low dead space syringes to prevent discarding residues, thus improving vaccine volume.[4]

Ensuring efficacious vaccines are made widely available and at fair cost, when high-income countries are hoarding up to five times what they need[5] and prices are speculative, would require making alliances with countries (eg, Brazil or India) with the capacity to produce generic vaccines, alongside efficient syringes, and means of storage and transportation. Notwithstanding, LMICs will need support from additional partners in other regions of the world.

We declare no competing interests.

**Irene Torres, Daniel Lopez-Cevallos, Osvaldo Artaza, Barbara Profeta, JaHyun Kang, Cristiani Vieira Machado*
**irene.torres@octaedro.edu.ec**

Fundación Octaedro, Quito 170505, Ecuador (IT); School of Language, Culture, and Society, Oregon State University, Corvallis, OR, USA (DL-C); Facultad de Ciencias de la Salud, Universidad de las Américas, Santiago de Chile, Chile (OA); Fribourg, Switzerland (BP); College of Nursing and Research Institute of Nursing Science, Seoul National University, Seoul, South Korea (JK); Oswaldo Cruz Foundation-Fiocruz, Rio de Janeiro, Brazil (CVM)

1 Sisa I, Noblecilla E, Orozco F. Rationale to continue approving placebo-controlled COVID-19 vaccine trials in LMICs. *Lancet* 2021; **397:** 878.
2 Krause PR, Fleming TR, Longini IM, et al. Placebo-controlled trials of COVID-19 vaccines—why we still need them. *N Engl J Med* 2021; **384:** e2.
3 Torres I, Artaza O, Profeta B, Alonso C, Kang J. COVID-19 vaccination: returning to WHO's Health For All. *Lancet Glob Health* 2020; **8:** e1355–56.
4 Jara CP, Velloso LA, de Araújo EP. Optimizing COVID-19 vaccine usage. *medRxiv* 2020; published online Jan 1. https://doi.org/10.1101/2021.01.04.21249167 (preprint).
5 UN Security Council. Secretary–General calls vaccine equity biggest moral test for global community, as Security Council considers equitable availability of doses. Feb 17, 2021. https://www.un.org/press/en/2021/sc14438.doc.htm (accessed Feb 24, 2021).

## Global COVID-19 vaccine roll-out: time to randomise vaccine allocation?

The global COVID-19 vaccine roll-out might be the largest public health exercise ever done. COVAX, the vaccines access pillar of the COVID-19 Tools Accelerator, supported by WHO, UNICEF, and others, expects to deliver two billion doses to 190 countries in 1 year. At present, 13 vaccines have received approval in various jurisdictions. The roll-out provides an opportunity, unparalleled in human history, to learn about vaccines.

All approved vaccines have shown efficacy in randomised trials; however, there have been no direct comparisons between each vaccine. COVID-19 vaccines, both approved and in development, represent various new and existing technologies including mRNA (Pfizer–BioNTech and Moderna), viral vector (Oxford–AstraZeneca, Janssen, Cansino, and Gamaleya), inactive virus (Sinovac and Sinopharm), attenutated virus (Codagenix), and protein (Novavax and Sanofi–GlaxoSmithKline) vaccines. Most countries have or will have access to more than one vaccine type.

In 2000, Lilford and colleagues[1] proposed the so-called tracker studies. Although the COVID-19 vaccine roll-out is on a different scale to most medical technologies, it is illustrative of the rapid change often associated with the development of new treatments in many areas of medicine. Health technologies, particularly devices, are subject to frequent modifications in their design once introduced, and the entry of new competitors with slight or large modifications is frequent. Adoption of these new technologies can happen uncritically[1,2] and independently of their actual effectiveness.[3,4] A tracker study would start early in periods of rapid technological change; patients would be randomised between reasonable alternatives, and new alternatives can be introduced into the randomisation scheme as they become available. Such a design can borrow features from adaptive randomised trials,[5] and it can incorporate features of network meta-analysis that permit the estimation of the difference in effectiveness of two alternatives, even if they were not directly compared.[6] These studies differ from conventional randomised trials that are typically one-off events following preset and rigid protocols.

With more vaccines in the pipeline, the global COVID-19 vaccine roll-out is the exact type of situation Lilford and colleagues[1] predicted. At present, there exists sufficient equipoise that it would not be unreasonable to randomise the type of vaccine an individual received. In high-income countries particularly, the public health infrastructure can track disease outcomes at the individual level. Given the unprecedented investment in COVID-19 preventive measures, there is an imperative to maximise our learning, which will become one of the best defences we have against future pandemics.

RJL reports support from the UK National Institute for Health Research (NIHR) Applied Research Collaboration West Midlands, NIHR Global Health Research Unit on Improving Health in Slums, and NIHR Research and Innovation for Global Health Transformation. SIW declares no competing interests.

*Samuel I Watson, Richard J Lilford
**s.i.watson@bham.ac.uk**

University of Birmingham, Birmingham B15 2TT, UK

1 Lilford RJ, Braunholtz DA, Greenhalgh R, Edwards SJL. Trials and fast changing technologies: the case for tracker studies. *BMJ* 2000; **320:** 43–46.
2 Grimes DA. Technology follies: the uncritical acceptance of medical innovation. *JAMA* 1993; **269:** 3030–33.
3 Sorenson C, Drummond M, Torbica A, Callea G, Mateus C. The role of hospital payments in the adoption of new medical technologies: an international survey of current practice. *Health Econ Policy Law* 2015; **10:** 133–59.
4 Goldman D, Smith JP. Socioeconomic differences in the adoption of new medical technologies. *Am Econ Rev* 2005; **95:** 234–37.
5 Bothwell LE, Avorn J, Khan NF, Kesselheim AS. Adaptive design clinical trials: a review of the literature and ClinicalTrials.gov. *BMJ Open* 2018; **8:** e018320.
6 Li T, Puhan MA, Vedula SS, Singh S, Dickersin K. Network meta-analysis-highly attractive but more methodological research is needed. *BMC Med* 2011; **9:** 79.

## Peruvian research: striving for the highest standards

For 60 years, Universidad Peruana Cayetano Heredia (UPCH) in Lima, Peru, has contributed to world-class knowledge in tropical medicine, high-altitude medicine and physiology, public health, and basic sciences with the highest research standards and ethics. We therefore read with interest the World Report by Lucien Chauvin,[1] in which we found some inaccuracies that we would like to clarify.

First, the Peruvian National Institute of Health has not suspended UPCH from conducting clinical trials. Only the site corresponding to Sinopharm's phase 3 BBIBP-CorV vaccine trial has been stopped from initiating future studies during the current investigations of research misconduct. This measure preserves the ongoing trial, protects its volunteers, and assures the study's completion, led by a newly designated principal investigator.

We also wish to stress that once we acknowledged the regrettable events associated with a batch of additional vaccine doses held outside of the study, the university's community demanded the removal of the researchers involved from the clinical trial. We also urged for the resignation of UPCH's president and vice-presidents for having received some of these doses. All university members involved in the scandal are under investigation and will face sanctions according to the statutory disciplinary and ethical regulations of UPCH.

As UPCH's leading researchers, and in line with the values that gave rise to our institution, we feel vicariously ashamed and apologise to the community for the involvement of UPCH's name in such an unfortunate case. We assure the national and international scientific community that we will continue our research activities at the highest standards according to our tradition.

We declare no competing interests. Signatories of this Correspondence are listed in the appendix.

*Jorge Arévalo, Francisco C Villafuerte, Martin Montes, Theresa J Ochoa, on behalf of researchers from Facultad de Ciencias y Filosofía and from Instituto de Medicina Tropical Alexander von Humboldt, Universidad Peruana Cayetano Heredia
**jorge.arevalo@upch.pe**

Raul Sifuentes/Stringer/Getty Images

See **Online** for appendix