Inclusive access to science in post-COVID era: Strategic entry points for improved livelihoods

The COVID-19 pandemic has brought unprecedented enthusiasm for science with the expectation of accessing safe and effective vaccines as quickly as possible. As it turned out, these expectations were met at an exceptional speed.\(^1\) This perhaps represents the greatest triumph of science in the 21st century, where, for the first time, concerted global efforts ensured the delivery of vaccines in the shortest possible time recorded in history. Of significance, is the reality that the pandemic also has created conditions within which citizens could receive immunisations, with a significant number rejecting vaccine nationalism.\(^2\) Despite this success, however, we are still a long way from immunising the entire world population, especially in Latin America and Africa.\(^3\) While high-income countries are flooded by vaccine supplies and offer booster doses to entirely vaccinated populations,\(^4\) new variants are being discovered in countries like South Africa.

Long before the onset of the pandemic, science has been at the centre stage, especially with the explosion of the knowledge ecosystem enabled by social media. Anti-climate movements, anti-vaccine, and other forms of science denialism have been spreading with disruptive consequences for quite some time.\(^5\) However, the pandemic was just the right trigger to escalate the levels of attacks on science. In a recent statement, at its 2021 International Conference the Global Young Academy (GYA) warned about the growing perception that trust in science has weakened, raising questions about how science is communicated to the public.\(^6\) Strong engagement in scientific communication and dissemination has been used as a weapon, a kind of antidote in modern times,\(^7\) by those wishing to counteract denialist movements and increase confidence in science.

Obviously, science can improve education to create a scientific culture that helps overcome these drawbacks, improving health and well-being in a world on the move. Perhaps a more significant challenge is to disseminate the value of the scientific method and demonstrate that its use supports evidence-based insights for a better quotidian human life.\(^8\) This is important in order to popularise the time-tested scientific tradition that scientific data are open for rebuttal, but this needs to be done scientifically while employing similar trials in terms of scientifically validated methods, instead of addressing them through public outrage, emotions or perceptions.

However, according to the *Science*’s Editor Holden Thorp in an article entitled *Persuasive words are not enough*,\(^9\) the scientific community is up against a sophisticated, data-driven machine devoted to making sure that science doesn’t entirely succeed and the history of this is quite clear. Furthermore, he highlighted that the scientific community may be losing the battle against this digital mass of disinformation. Consequently, the only way to win this fight is to harness the same sophisticated tools used to bring science down.

It’s time to look in the mirror again. This digital industry of misinformation had also compromised effective and rapid public health responses during the last two Ebola outbreaks in the Democratic Republic of Congo (DRC) between 2018 and 2019\(^10,11\) and Sierra Leone between 2015 and 2016.\(^12\) Underpinning these waves of misinformation are social, political, and economic factors. Consequently, efforts to promote significant positive effect on the public acceptance of science should include not only the same sophisticated digital tools in the name of science but strategies that take into consideration, these socio-economic and political factors. For example, it is important to ensure equitable access to fact-based information, which should be directed to hundreds of thousands of vulnerable and hard-to-reach people, who often live in slums or who are displaced (migrants and refugees), and who are, for the most part, heavily affected by the ongoing humanitarian migration crisis.\(^13\)
Although the intervention required to enable vulnerable groups to achieve food security and improved nutrition security in Africa and Latin America are known, efforts to address shocks and nutritional vulnerabilities created by COVID-19 may be hampered by the impact of misinformation on the pandemic. This may also compromise inclusive food availability and access in the regions. This is clear from the sheer number of vulnerable groups in many parts of the world. For example, a 2018 World Bank data\textsuperscript{14} shows that the percentage of slum dwellers (compared to urban population) in the Democratic Republic of Congo, Sierra Leone, Peru, and Brazil was 78, 59, 33 and 16, respectively. These countries are home to those more affected by the pandemic as well.

The devastating effects of COVID-19 on these ‘unfair geographies’ represent an opportunity to guide policymakers and the scientific community in a manner that leaves no one behind. Alternative views that argue for leveraging on philosophical postures in knowledge husbandry and delivery of scientific information have been advanced. For example, Tiago and Willis built on the were pointed out in the arguments of Mykhalovskiy and collaborators,\textsuperscript{15} to underscore ‘the use of philosophical postures typical of the social sciences are vital for the construction of the space between public health and the social sciences’ in the \textit{International Journal of Health Planning and Management} Editorial.\textsuperscript{16} This is especially feasible if and when policymakers demonstrate willingness to better address public health interventions that are linked to the complex socio-epidemiological phenomena, some of which have only come to light with the development of COVID-19. The same authors alluded to critical realism as an element of the multi-stakeholder approach in articulating and implementing interventions that ultimately affect diverse populations (including ethnic minorities, immigrants, vulnerable socioeconomic groups, etc.). This underscores the need to consider intervention in public health not as a specific issue of the scientific domain of public health, but as a space intertwined with the social sciences. We posit that disregarding these epistemological approaches, which though differing from the positivist strategy of communication widely used, limits the global efforts of paving a way for a positive and coherent debate on science. This represents an innovative move to approach the current syndemic context of COVID-19, even as this debate is taking place a slippery slope of social media.

There is no doubt that public debate is good for science,\textsuperscript{17} especially for increasing public confidence in science. However, to effectively communicate science is to ensure inclusivity in discussion on and about science. This will, among other things, entail bringing vulnerable groups out of oblivion and onto the table. Without their participation, the goal of attaining equitable access to high-quality science and providing the intellectual pushback against misinformation and denialism, shall remain a mirage.

We submit that to bridge the link between science and politics, stakeholders should deepen the application of science while keying community-based development programs and projects, into higher-level development goals, including the Africa Union Agenda 2063 and United Nations Sustainable Development Goals (SDG).

Although popular manifestations against scientific evidence seem to be on the rise as documented worldwide, they are weaker in countries where, traditionally, decision are guided by public policies that have at their core, the deployment scientific methods their formulation and implementation.\textsuperscript{18}

Conversely, popular ‘refutations’ against scientific data have gained significant momentum in settings that do not recognise in science as an important ally. Consequently, this evolves into hostile movements through social media, as observed in South America and elsewhere. This further underscore the need for deeper application of science and mainstreaming it into the political landscape, where it shall contribute in strengthening the democratic process and growth.\textsuperscript{19}

Building on the lessons on the COVID-19 vaccine, the new malaria vaccine\textsuperscript{20} not only represents a hope to protect vulnerable children helping them to become healthy adult citizens in Africa and Latin America; but also presents an opportunity to document experiences and learning routes in demonstrating the role of scientific literacy on improving livelihoods. These lessons include but are not limited to (i) the use of sophisticated tools in disseminating science; and (ii) knowledge husbandry on science and knowledge products that are accessible to all, especially people living in slums and the homeless (iii) deepening the application of science in policy formulation and implementation and (iv) leveraging on multi-stakeholder engagement in the design and implementation of science-led programs and interventions. Stakeholder must all rise to the challenges of science denial, anti-vaccination, conspiracy theories and...
misinformation, which hinder access to innovation and technologies derived from science. Despite the challenges in this respect, it is encouraging that post-COVID recovery and economic growth seem to be in sight again. Even as we grapple with the impacts of Covid-19 pandemic and Ebola outbreak the challenges for confronting them remain open as we seek to boost scientific confidence.

ACKNOWLEDGEMENTS
We want to thank Professor Maxwell Lima Filho (Federal University of Cariri - UFCA) for encouraging our participation in the Mora na Filosofia Project. Our letter was based on that.

ETHICS STATEMENT
Hereby, I, Thiago Lustosa Jucá, consciously assure that for the manuscript Inclusive Access to Science in Post-COVID Era: Strategic Entry Points for Improved Livelihoods the following is fulfilled: (1) This material is the authors’ own original work, which has not been previously published elsewhere. (2) The paper is not currently being considered for publication elsewhere. (3) The paper reflects the authors' own research and analysis in a truthful and complete manner. (4) The paper properly credits the meaningful contributions of co-authors and co-researchers. (5) The results are appropriately placed in the context of prior and existing research. (6) All sources used are properly disclosed (correct citation). Literally copying of text must be indicated as such by using quotation marks and giving proper reference. (7) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content. The violation of the Ethical Statement rules may result in severe consequences.

Thiago Lustosa Jucá1
Abdulrazak Baba Ibrahim2
Marcio Viana Ramos1
Rérisson Máximo3,4
Lorenzo Roberto Sgobaro Zanette5

1Department of Biochemistry, Federal University of Ceará (UFC), Fortaleza, Brazil
2Department of Biochemistry, Ahmadu Bello University, Nigeria/Forum for Agricultural Research in Africa (FARA), Accra, Ghana
3University of São Paulo (USP), São Paulo, Brazil
4Federal Institute of Ceará (IFCE), Quixadá, Brazil
5Department of Biology, Federal University of Ceará (UFC), Fortaleza, Brazil

Correspondence
Thiago Lustosa Jucá, Department of Biochemistry, Federal University of Ceará, Fortaleza, Brazil.
Email: tiagolustosajuca@gmail.com
Abdulrazak Baba Ibrahim, Department of Biochemistry, Ahmadu Bello University, Nigeria/Forum for Agricultural Research in Africa (FARA), Accra, Ghana.
Email: biorazi@gmail.com

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID
Thiago Lustosa Jucá  https://orcid.org/0000-0001-6895-6365
REFERENCES

1. Li Y, Tenchov R, Smoot J, Liu C, Watkins S, Zhou Q. A comprehensive review of the global efforts on COVID-19 vaccine development. ACS Cent Sci. 2021;7(4):512-533. https://doi.org/10.1021/acscentsci.1c00120

2. Wagner CE, Saad-Roy CM, Morris SE, et al. Vaccine nationalism and the dynamics and control of SARS-CoV-2. Science. 2021;373(6562):eaaj7364. https://doi.org/10.1126/science.aj7364

3. Our World in Data. 2021. Accessed October 16, 2021. https://ourworldindata.org/covid-vaccinations

4. Ledford H. Six months of COVID vaccines: what 1.7 billion doses have taught scientists. Nature. 2021;594:164-167. https://doi.org/10.1038/d41586-021-01505-x

5. Vosoughi S, Roy D, Aral S. The spread of true and false news online. Science. 2018;359(6380):1146-1151. https://doi.org/10.1126/science.aap9559

6. GYA Releases Position Statement on Trust in Science. 2021. https://globalyoungacademy.net/gya-releases-position-statement-on-trust-in-science/

7. Gross M. Communicating science in a crisis. Curr Biol. 2020;30:R737. https://doi.org/10.1016/j.cub.2020.06.052

8. Thorp HH. Looking ahead, looking back. Science. 2022;375(6576):5. https://doi.org/10.1126/science.abn8856

9. Thorp HH. Persuasive words are not enough. Science. 2020;368(6498):1405. https://doi.org/10.1126/science.abd4085

10. Vinck P, Pham PN, Bindu KK, Bedford J, Nilles EJ. Institutional trust and misinformation in the response to the 2018-19 Ebola outbreak in North Kivu, DR Congo: a population-based survey. Lancet. 2019;19:529-536. https://doi.org/10.1016/S1473-3099(19)30063-5

11. Joe T. Ebola: public trust, intermediaries, and rumor in the DR Congo. Lancet. 2019;19(5):457-458. https://doi.org/10.1016/S1473-3099(19)30044-1

12. Yamanis T, Nolan E, Shepler S. Fears and misperceptions of the Ebola response system during the 2014 - 2015 outbreak in Sierra Leone. PLOS Neglected Trop Dis. 2016;10:e0005077. https://doi.org/10.1371/journal.pntd.0005077

13. Zimmerman C, Kiss L, Hossain M. Migration and health: a framework for 21st century policy-making. PLoS Med. 2011;8(5):e1001034. https://doi.org/10.1371/journal.pmed.1001034

14. The World Bank Data. 2018. Accessed October 16, 2021. https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS?locations=NG

15. Mykhalovskiy E, Frohlich KL, Poland B, Di Ruggiero E, Rock MJ, Comer L. Critical social science with public health: agonism, critique and engagement. Crit Publ Health. 2018;29(5):522-533. https://doi.org/10.1080/09581596.2018.1474174

16. Correia T, Willis K. Applying critical realism to the COVID-19 pandemic to improve management of future public health crises. Int J Health Plann Mgmt. 2022;37:599-603. https://doi.org/10.1002/hpm.3376

17. Thorp HH. Public debate is good for science. Science. 2021;371(6526):213. https://doi.org/10.1126/science.abg4685

18. Wite A. How to protect US science from political meddling after Trump. Nature. 2022;601:310-311. https://doi.org/10.1038/d41586-022-00009-w

19. Tollefson J. How Trump damaged science — and why it could take decades to recover. Nature. 2020;586:190-194. https://doi.org/10.1038/d41586-020-02800-9

20. Maxmen A. Scientists hail historic malaria vaccine approval — but point to challenges ahead. Nature. Published online October 8, 2021. https://doi.org/10.1038/d41586-021-02755-5