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## Post-covid reforms: can we avoid fighting the last war?

**Anna Bezruki** and **Suerie Moon** explain why post-pandemic reforms are unlikely to leave the world fully prepared for the next emergency and argue for a focus on strong monitoring systems and flexible arrangements

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Covid-19 has exposed glaring gaps in the global system for preventing, detecting, and responding to potential pandemics. Attention to, and political momentum for, reform is building with a series of high level international reviews,<sup>1-3</sup> and calls for a pandemic treaty by more than 25 heads of state and the director general of the World Health Organization.

The last major effort to reform pandemic preparedness followed the 2014-16 west African Ebola crisis. Looking at what was and was not implemented after Ebola provides insight not only into how that reform process has affected the global covid-19 response but also into future potential challenges.

After the Ebola crisis there was strong overall agreement on what needed to change. Attention centred on strengthening national preparedness in developing countries and buttressing the international safety net (eg, funding, technical assistance, humanitarian aid) for when an outbreak overwhelmed a country's national capacities.<sup>4</sup> Some of these reforms have proved critical in the response to covid-19. However, there were also gaps (inadequate action on identified problems) and blind spots (issues not identified) in that reform process (table 1).

**Table 1 | Summary of post-Ebola reforms, gaps, and blind spots**

Category	Reforms	Gaps	Blind spots
Country commitments under International Health Regulations (IHR)	<ul style="list-style-type: none"> <li>Increased attention to, investment in, and external assessment of preparedness in some countries</li> <li>Some new institutions created, such as the Africa Centres for Disease Control and Prevention</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate accountability mechanisms for IHR compliance</li> <li>Insufficient mechanisms to encourage rapid outbreak reporting for all states, or to manage travel and trade restrictions</li> <li>Newly developed metrics for measuring preparedness not adequately predictive</li> </ul>	<ul style="list-style-type: none"> <li>Severity of preparedness weaknesses in high income countries</li> </ul>
Science, technology, and knowledge sharing	<ul style="list-style-type: none"> <li>New coordinating and funding mechanisms for research, including WHO blueprint and Coalition for Epidemic Preparedness Innovations (CEPI)</li> <li>Increase in the rapid sharing of some knowledge and data during outbreaks</li> </ul>	<ul style="list-style-type: none"> <li>Unstable and inadequate funding for research into countermeasures</li> <li>Need for funding for a greater number of pathogens, and for therapeutics and diagnostics in addition to vaccines</li> <li>Few efforts to strengthen sharing of clinical trial data, or of pathogen samples and genomic sequencing data</li> </ul>	<ul style="list-style-type: none"> <li>Lack of arrangements to ensure equitable access to countermeasures</li> </ul>
International health, and humanitarian system	<ul style="list-style-type: none"> <li>Renewed prioritisation of funding and institutional arrangements for outbreak response at WHO</li> <li>Strengthening of humanitarian aid system as a safety net</li> </ul>	<ul style="list-style-type: none"> <li>Unstable and inadequate funding for WHO</li> <li>WHO's limited ability to hold member states accountable</li> </ul>	<ul style="list-style-type: none"> <li>The safety net offered by the humanitarian aid system is wholly inadequate in the event of a pandemic. Need for much broader and more robust arrangements for international cooperation during pandemics, across a wide set of issues, such as finance, trade, food security, and migration</li> </ul>
Financing	<ul style="list-style-type: none"> <li>New funding mechanisms, including CEPI and initiatives through the World Bank and WHO</li> <li>Increases in research funding for emerging infectious disease</li> </ul>	<ul style="list-style-type: none"> <li>Unstable and inadequate funding for national preparedness, WHO, and research into countermeasures</li> <li>Need for more countries to contribute</li> <li>Difficult to track financing</li> </ul>	<ul style="list-style-type: none"> <li>Outbreaks can precipitate urgent financial needs in countries of all income levels</li> </ul>
Leadership, monitoring, and accountability	<ul style="list-style-type: none"> <li>New mechanisms for monitoring and accountability, including Global Preparedness Monitoring Board and Independent Oversight and Advisory Committee</li> </ul>	<ul style="list-style-type: none"> <li>Overall, accountability for global preparedness still insufficient</li> </ul>	<ul style="list-style-type: none"> <li>Some national governments lack the political will to take necessary measures to control outbreaks.</li> <li>Deliberate misinformation and lack of public trust</li> </ul>

The same is likely to be true after covid-19: some crucial reforms will be made, but not every problem will be addressed and issues specific to covid-19 are likely to be prioritised. What does this tendency to “fight the last war” mean for the post-covid reform process now getting under way? We discuss below the difference post-Ebola reforms made for covid-19, the remaining gaps and blind spots, and implications for the future.

## Reforms implemented after Ebola

Several critical reforms after Ebola have strengthened the global response to covid-19. For example, important improvements were made to national and regional epidemic preparedness, including the creation of WHO’s joint external evaluation “peer review” process between countries, in which 96 countries had participated by mid-2020.<sup>5</sup> However, it is unclear how many countries had tackled identified gaps in outbreak response before covid-19. The Africa Centres for Disease Control and Prevention was also created in the wake of Ebola; it has emerged as a regional leader in covid-19, providing guidance and training, creating a platform to pool orders for diagnostics and medical countermeasures, and securing a large volume of vaccines for the continent.

In addition, investments in research and development of countermeasures have increased. A clear failure to invest adequately in vaccines, diagnostics, and therapeutics for Ebola before 2014 led to recommendations for increased, sustained investments in research into high risk pathogens.<sup>4</sup> This call was partially heeded, including through the creation of new mechanisms for the coordination and funding of countermeasures research. The Coalition for Epidemic Preparedness Innovations (CEPI) was created to spur vaccine development for emerging infectious diseases, and total research expenditure for these diseases grew to an estimated \$886m (£630m; €730m) in 2018.<sup>6</sup> Development of vaccines, diagnostics, and therapeutics for covid-19 has received billions in funding,<sup>7</sup> and as of April 2021, more than 12 vaccines were approved for use in at least one country,<sup>8</sup> more than 860 diagnostics were commercially available,<sup>9</sup> and more than 300 treatment candidates were under investigation.<sup>10</sup>

Numerous data sharing failures occurred in the 2014–16 Ebola epidemic, leading to a substantial, measurable increase in the rapid sharing of some kinds of scientific data during outbreaks—particularly in the Zika virus outbreak starting in 2015.<sup>11,12</sup> Approaches seen in Zika, including dedicated data sharing portals, the lifting of journal paywalls, and preprint usage have all expanded in covid-19.<sup>13,14</sup>

Furthermore, WHO was strengthened. WHO was criticised during the west African crisis for having dismantled its capacity to respond to outbreaks, being slow to declare a public health emergency of international concern, hesitating to challenge member states, and coordinating poorly with other organisations. WHO subsequently became the focus of multiple reforms, including re-elevating the priority given to outbreaks and creating the health emergencies programme in 2016. WHO has been at the political and operational centre of the global covid-19 response: it has exhorted political leaders to act, briefed the media regularly, set priorities, and convened key stakeholders involved in pandemic response, including through its Research and Development Blueprint and the Access to COVID-19 Tools (ACT) Accelerator. It has provided technical assistance and teams to affected countries and rapidly published over 800 standards and guidelines to assist national governments.<sup>15</sup>

## Gaps

Despite many steps forward, reforms after Ebola were partial, leaving gaps that have proved costly in covid-19.

Under the 2005 International Health Regulations (IHR), countries are expected to ensure they have the capacity to detect and respond to outbreaks, report outbreaks rapidly to WHO, and refrain from imposing trade and travel restrictions unless justified by scientific or public health principles. However, national preparedness remains insufficient in many countries, and metrics for measuring preparedness created after Ebola have had limited validity.<sup>16</sup> Many countries were ill prepared for covid-19, including high income countries whose preparedness had been largely assumed.

After Ebola it was observed that the IHR obligation for states to report outbreaks is both too general and unenforceable, and that states face strong economic disincentives to report.<sup>9</sup> These (dis)incentives remained largely unchanged post-Ebola for most countries. Although China received praise for reporting the covid-19 outbreak considerably faster than it did SARS in 2002, it has also faced criticism for delays in sharing relevant information.

A host of travel and trade restrictions implemented during the 2014–16 Ebola epidemic were viewed as unwarranted on scientific grounds<sup>17</sup> and were criticised for hindering aid delivery, exacerbating the economic toll of the outbreak,<sup>4</sup> and potentially violating the IHR.<sup>18–20</sup> However, no new guidelines were introduced to better govern trade and travel in outbreaks. In covid-19, a cascade of countries and territories (185 at a peak in May 2020) adopted partial or total border closures despite WHO recommendations to the contrary.<sup>21–23</sup> As of March 2021, 144 countries had adopted trade restrictions, notwithstanding calls by the World Trade Organisation and International Monetary Fund to lift export limits on medical supplies and food.<sup>24–26</sup> A robust debate on the effects and efficacy of these measures is ongoing. Nevertheless, current governance arrangements for outbreak related travel and trade restrictions are clearly insufficient to both control the spread of disease and minimise economic disruption.

In addition, the international sharing of pathogen samples and related genomic sequencing data and (in exchange) access to benefits such as vaccines or drugs, was not a focus after Ebola. Access to physical samples has not been a major problem in covid-19 given the rapid spread of the virus, but the reliability of sharing of genomic sequencing data has garnered increased attention as new variants of the virus associated with greater transmissibility, worse outcomes, and reduced vaccine efficacy began to appear and spread. At the same time, inequities in global access to covid-19 vaccines have been glaring. The lack of international arrangements to ensure more reliable sharing of samples and benefits is likely to pose problems in future outbreaks.

Furthermore, despite some progress since Ebola, financing continues to be unstable and inadequate. We need to ensure adequate public funding of research to develop countermeasures, including for a greater number of pathogens; into technologies beyond vaccines; and from a broader set of countries. The long bemoaned structural problem of WHO’s unstable and inadequate financing remains; member states did not agree to significantly increase their obligatory assessed contributions to WHO after Ebola. The bulk of WHO’s funding—more than 80%—now comes from voluntary (not mandatory assessed) contributions, which funders can reduce at will.<sup>27</sup> This limits WHO’s operational and technical capacities, as well as its political space to manoeuvre between the inevitably intense political pressures from member states during outbreaks.

While substantial sums have materialised in response to covid-19, it is unclear if there will be sustained investment in preventing future outbreaks or if, after the pandemic has subsided, preparedness will return to its usual underfunded state. The “cycle of panic and neglect” that has characterised outbreak financing for the past few decades will not be broken by covid-19 unless longer term robust financing arrangements are put in place. Tracking such financing will also require increased transparency.

Finally, some new mechanisms for monitoring and accountability were implemented post-Ebola, including the creation of the Global Preparedness Monitoring Board and the independent oversight advisory committee for WHO’s health emergencies programme. However, covid-19 has shown that no accountability arrangement was strong enough to ensure global preparedness.

### Blind spots

Some of the blind spots in the post-Ebola reviews have proved critical in covid-19. For example, during the west African crisis, misinformation spread widely and public health measures were at times politicised, leading to confusion and mistrust of government actions.<sup>28 29</sup> Subsequent discussions, however, generally framed public mistrust and non-compliance as a problem of development: lack of education, longstanding suspicions of the government and Western science, and a hesitancy to alter traditional practices. This framing implied that public mistrust was confined to poorer countries, carrying with it at least a whiff of neocolonialism and

overlooking the risk of widespread mistrust in higher income countries.

The covid-19 pandemic has shown the error of this view as countries at all levels of wealth have struggled with public trust and politicisation of the virus. Numerous countries, including the UK and France, have seen protests against government imposed restrictions. False information—for example, about the supposed efficacy or harms of vaccines, drugs, and other technologies—has spread, fed in some cases by politicians. Better understanding is needed of how to mobilise public support for health measures, counter disinformation, and build public trust.

In addition, equitable access to countermeasures—one of the primary challenges in covid-19—was overlooked after Ebola. Covax, the multilateral initiative for equitable access to covid-19 vaccines, had to be created nearly overnight in 2020 as nothing analogous was in place. As of March 2021, Covax had secured an estimated 2.25 billion vaccine doses, enough to fully vaccinate about 20% of the population in participating countries,<sup>30</sup> and 98 countries had committed to self-financing doses through Covax.<sup>31</sup> However, amid concerns about a limited supply through at least 2021, several countries with the means to do so secured vaccines bilaterally from manufacturers, outside of Covax (fig 1). Large scale pre-orders placed by a small number of wealthy countries secured most of the limited global supply, leaving little left for Covax, at least in the short term. Many countries still do not know when they will get access to which vaccines and at what volumes.

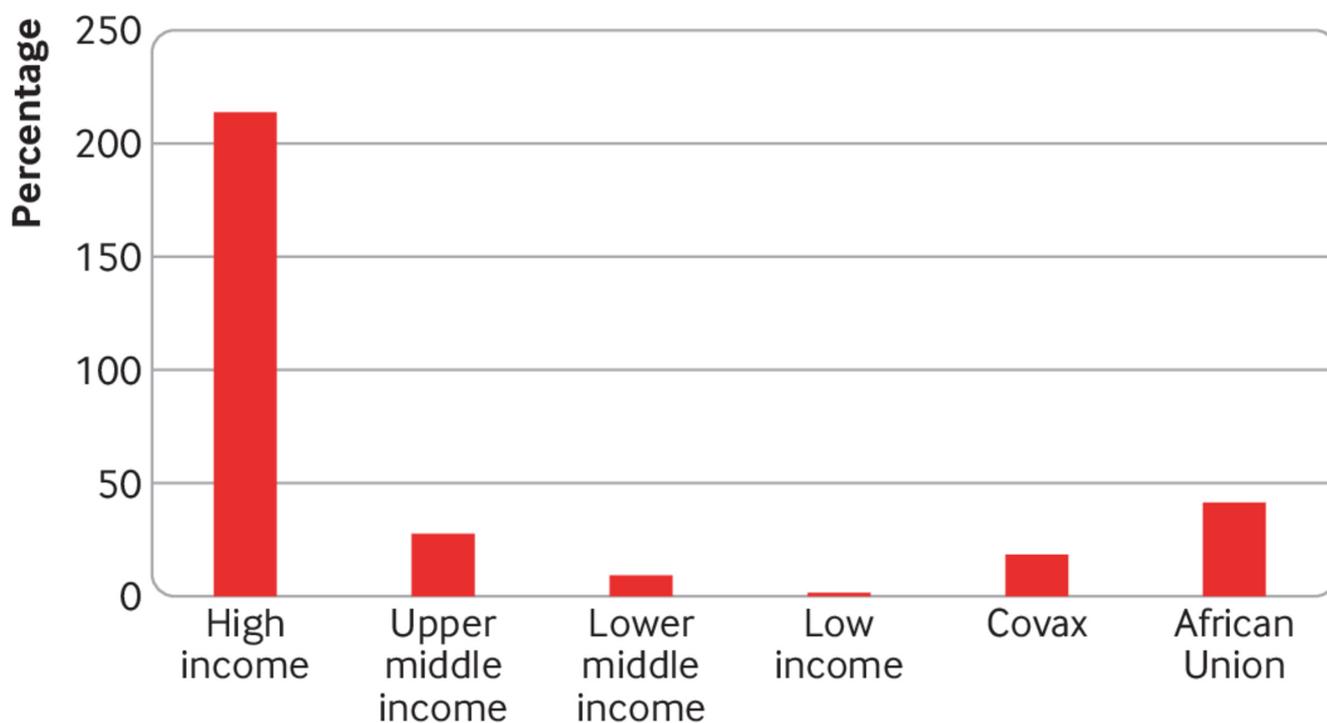


Fig 1 | Percentage of the population covered by vaccine purchase arrangements that have been publicly reported as of 25 March 2021, by country income level (as defined by the World Bank). Multilateral purchases by the EU are included in the high income category. Middle income categories are likely significant underestimates, given that Russia, China, and India have not publicly stated how many vaccine doses they are purchasing for domestic use. See <https://www.knowledgeportal.org/covid19-vaccine-arrangements> for more information

Similarly, access to diagnostics remains patchy. The diagnostics pillar of the ACT Accelerator has announced arrangements for 370 million low cost tests<sup>32 33</sup>; however, by March 2021 it had received only 16% of its estimated funding needs.<sup>34 35</sup> If game changing drugs

are developed, further access challenges are looming: ACT-Accelerator’s therapeutics arm is also underfunded,<sup>34 36</sup> efforts to share intellectual property and technology have largely gone

unsupported,<sup>37</sup> and few measures to ensure equitable distribution are in place.

Finally, before the covid-19 pandemic, it was falsely assumed that national governments would take the necessary measures to protect their populations in the event of an outbreak, in so far as their resources allowed. Yet for many months political leaders denied the severity of the threat and refused to take adequate action, including in Brazil, the UK, Tanzania, and the US. Research is needed to improve understanding of how to anticipate and mitigate such political unwillingness to act. Technical reforms in the health sector will not be enough.

## Considerations for post-covid reforms

The post-Ebola experience offers several lessons. First, reforms matter: even with the limitations noted here, changes made in the wake of Ebola have proved critical for strengthening the global response to covid-19. Second, geopolitical fragmentation makes it likely that only a few of the major reforms proposed will be implemented. Therefore, we will not entirely avoid fighting the last war: the reform agenda is likely to reflect the specific problems that covid-19 exposed, with priorities emerging only from political negotiations.

In light of this limited and politicised reform process, a top priority should be improving global monitoring, accountability, and review arrangements for pandemic preparedness. A robust monitoring system would provide greater visibility over a complex system. Ongoing regular feedback on the state of global preparedness—and the effect of any reforms—would facilitate the types of adaptations that will undoubtedly be necessary as circumstances change, as gaps not prioritised in response to covid-19 become apparent, and as political attention ebbs and flows. Getting ready to face future pandemics requires not only closing the gaps that have proved costly in covid-19, but also recognising the shortcomings inherent to the reform process itself—that is, the tendency to fight the last war.

### Key messages

- The global response to covid-19 has benefited from reforms implemented after the west African Ebola crisis
- These include national preparedness, increased data sharing, international investment in vaccine research, and a stronger WHO
- However, gaps and blind spots in that reform process left the world unprepared for the magnitude, breadth, and severity of the covid-19 pandemic
- Wide ranging reforms are needed, but only a few are likely to be implemented, particularly those most relevant to covid-19
- Post-covid reforms should prioritise continuous monitoring of the global system and flexible arrangements to adapt governance as new possible pandemics emerge

- 1 WHO. Report of the review committee on the functioning of the International Health Regulations (2005) during the COVID-19 response. 2021. <https://www.who.int/publications/m/item/a74-9-who-s-work-in-health-emergencies>
- 2 Independent Oversight and Advisory Committee for the WHO Emergencies Programme. Report for 74th World Health Assembly. 5 May 2021. <https://www.who.int/groups/independent-oversight-and-advisory-committee>
- 3 Independent Panel for Pandemic Preparedness Response. Covid-19: make it the last pandemic, 2021 review <https://theindependentpanel.org/mainreport/>
- 4 Moon S, Leigh J, Woskie L, et al. Post-Ebola reforms: ample analysis, inadequate action. *BMJ* 2017;356:j280. doi: 10.1136/bmj.j280. pmid: 28115316
- 5 WHO. Joint external evaluation (JEE) mission reports. <https://www.who.int/ihp/procedures/mission-reports/en/>.

- 6 Chapman N, Doubell A, Tuttle A, et al. G-Finder 2020: landscape of emerging infectious disease research and development: preventing the next pandemic. Policy Cures Research, 2020. <https://www.policycuresresearch.org/analysis>
- 7 Policy Cures Research. COVID-19 R&D tracker analysis. 2020. <https://www.policycuresresearch.org/vaccines-clinical-trial-results-summary>
- 8 Craven J. COVID-19 vaccine tracker. Regulatory focus. 2021. <https://www.raps.org/news-and-articles/news-articles/2020/3/covid-19-vaccine-tracker>
- 9 FIND. SARS-CoV-2 diagnostic pipeline. <https://www.finddx.org/covid-19/pipeline/>
- 10 Milken Institute. COVID-19 treatment and vaccine tracker. Apr 2021. [https://covid-19tracker.milkeninstitute.org/#treatment\\_antibodies](https://covid-19tracker.milkeninstitute.org/#treatment_antibodies)
- 11 Haug CJ, Kieny MP, Murgue B. The Zika challenge. *N Engl J Med* 2016;374:1801-3. doi: 10.1056/NEJMp1603734. pmid: 27028782
- 12 Johansson MA, Reich NG, Meyers LA, Lipsitch M. Preprints: an underutilized mechanism to accelerate outbreak science. *PLoS Med* 2018;15:e1002549. doi: 10.1371/journal.pmed.1002549. pmid: 29614073
- 13 Fraser N, Brierley L, Dey G, et al. Preprinting the COVID-19 pandemic. *bioRxiv* 2020:2020.05.22.111294. [Preprint.] doi: 10.1101/2020.05.22.111294
- 14 Lachapelle F. Covid-19 preprints and their publishing rate: an improved method. *medRxiv* 2020 [Preprint]. doi: 10.1101/2020.09.04.20188771
- 15 WHO Director General. COVID-19 response. 2021. [https://apps.who.int/gb/eb-wha/pdf\\_files/EB148/B148\\_16-en.pdf](https://apps.who.int/gb/eb-wha/pdf_files/EB148/B148_16-en.pdf).
- 16 Haider N, Yavinsky A, Chang Y-M, et al. The Global Health Security index and Joint External Evaluation score for health preparedness are not correlated with countries' COVID-19 detection response time and mortality outcome. *Epidemiol Infect* 2020;148:e210. doi: 10.1017/S0950268820002046. pmid: 32892793
- 17 Otsuki S, Nishiura H. Reduced risk of importing Ebola virus disease because of travel restrictions in 2014: a retrospective epidemiological modeling study. *PLoS One* 2016;11:e0163418. doi: 10.1371/journal.pone.0163418. pmid: 27657544
- 18 Pattani R. Unsanctioned travel restrictions related to Ebola unravel the global social contract. *CMAJ* 2015;187:166-7. doi: 10.1503/cmaj.141488. pmid: 25534600
- 19 Tejpar A, Hoffman SJ. Canada's violation of international law during the 2014-16 Ebola outbreak. *Can Yearb Int Law* 2017;54:366-83. doi: 10.1017/cyl.2017.18.
- 20 Rhymer W, Speare R. Countries' response to WHO's travel recommendations during the 2013-2016 Ebola outbreak. *Bull World Health Organ* 2017;95:10-7. doi: 10.2471/BLT.16.171579. pmid: 28053360
- 21 WHO. Updated WHO recommendations for international traffic in relation to COVID-19 outbreak. 2020. <https://www.who.int/news-room/articles-detail/updated-who-recommendations-for-international-traffic-in-relation-to-covid-19-outbreak>
- 22 WHO. Statement on the second meeting of the International Health Regulations (2005) emergency committee regarding the outbreak of novel coronavirus (2019-nCoV). 2020. [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)).
- 23 UN, WTO. Covid-19 related travel restrictions a global review for tourism. 2020. <https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2020-05/TravelRestrictions%20-%2029%20May.pdf>
- 24 International Monetary Fund. WTO and IMF heads call for lifting trade restrictions on medical supplies and food. 2020. <https://www.imf.org/en/News/Articles/2020/04/24/pr20187-wto-and-imf-joint-statement-on-trade-and-the-covid-19-response>.
- 25 International Trade Centre. Covid-19 temporary trade measures. Market access map. 2020. <https://www.macmap.org/covid19>
- 26 World Trade Organization. COVID-19: measures affecting trade in goods. 2020. [https://www.wto.org/english/tratop\\_e/covid19\\_e/trade\\_related\\_goods\\_measure\\_e.htm](https://www.wto.org/english/tratop_e/covid19_e/trade_related_goods_measure_e.htm).
- 27 WHO. How WHO is funded. 2020. <https://www.who.int/about/planning-finance-and-accountability/how-who-is-funded>
- 28 Blair RA, Morse BS, Tsai LL. Public health and public trust: Survey evidence from the Ebola virus disease epidemic in Liberia. *Soc Sci Med* 2017;172:89-97. doi: 10.1016/j.socscimed.2016.11.016. pmid: 27914936
- 29 Yamanis T, Nolan E, Shepler S. Fears and misperceptions of the Ebola response system during the 2014-2015 outbreak in Sierra Leone. *PLoS Negl Trop Dis* 2016;10:e0005077. doi: 10.1371/journal.pntd.0005077. pmid: 27755553
- 30 GAVI The Vaccine Alliance. Covax global supply forecast. 2021. <https://www.gavi.org/sites/default/files/covid/covax/COVAX%20Supply%20Forecast.pdf>
- 31 WHO. Covax announces additional deals to access promising covid-19 vaccine candidates; plans global rollout starting Q1 2021. 2020. <https://www.who.int/news/item/18-12-2020-covax-announces-additional-deals-to-access-promising-covid-19-vaccine-candidates-plans-global-rollout-starting-q1-2021>
- 32 WHO. Global partnership to make available 120 million affordable, quality COVID-19 rapid tests for low- and middle-income countries. 2020. <https://www.who.int/news-room/detail/28-09-2020-global-partnership-to-make-available-120-million-affordable-quality-covid-19-rapid-tests-for-low-and-middle-income-countries>
- 33 FIND. Cost of rapid COVID-19 tests halved as global investment ensures availability of high volumes for low- and middle-income countries. 2021. <https://www.finddx.org/newsroom/pr-22jan21/>

- 34 Economist Intelligence Unit. The covid-19 health funding tracker.. 2020. <https://covidfunding.eiu.com/>
- 35 FIND, The Global Fund. Access to COVID-19 Tools (ACT) Accelerator diagnostics partnership. 2020. [https://www.finddx.org/wp-content/uploads/2020/05/ACT-A-Dx\\_Investment-Case\\_FINAL.pdf](https://www.finddx.org/wp-content/uploads/2020/05/ACT-A-Dx_Investment-Case_FINAL.pdf)
- 36 ACT Accelerator. Urgent priorities and financing requirements at 10 November 2020: averting the deepening human & economic crisis due to covid-19. 2020. <https://www.who.int/docs/default-source/coronaviruse/act-accelerator/act-a-urgent-priorities-financing-requirements-final-single-11nov20.pdf>
- 37 Ren G. Progress on covid-19 technology pool inches along as sister initiative to pool vaccine procurement accelerates. *Health Policy Watch* 2020. <https://healthpolicy-watch.news/progress-on-covid-19-technology-pool-inches-along-as-sister-initiative-to-pool-vaccine-procurement-accelerates/>

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