# Analysis of the institutional landscape and proliferation of proposals for global vaccine equity for COVID-19: too many cooks or too many recipes?

Susi Geiger,[1] Aisling McMahon [2]

[1]School of Business, UCD, Dublin, Ireland
[2]Department of Law, Maynooth University, Maynooth, Ireland

**Correspondence to**
Dr Aisling McMahon, Department of Law, Maynooth University, Maynooth, W23F2H6, Ireland; aisling.mcmahon@mu.ie

Received 22 June 2021
Accepted 19 October 2021



**To cite:** Geiger S, McMahon A. *J Med Ethics* Epub ahead of print: [please include Day Month Year]. doi:10.1136/medethics-2021-107684

## ABSTRACT

This article outlines and compares current and proposed global institutional mechanisms to increase equitable access to COVID-19 vaccines, focusing on their institutional and operational complementarities and overlaps. It specifically considers the World Health Organization's (WHO's) COVAX (COVID-19 Vaccines Global Access) model as part of the Access to COVID-19 Tools Accelerator (ACT-A) initiative, the WHO's COVID-19 Technology Access Pool (C-TAP) initiative, the proposed TRIPS (Trade-Related Aspects of Intellectual Property Agreement) intellectual property waiver and other proposed WHO and World Trade Organization technology transfer proposals. We argue that while various individual mechanisms each have their specific individual merits—and in some cases weaknesses—overall, many of these current and proposed mechanisms could be highly complementary if used together to deliver equitable global access to vaccines. Nonetheless, we also argue that there are risks posed by the proliferation of proposals in this context, including the potential to disperse stakeholder attention or to delay decisive action. Therefore, we argue that there is now a clear need for concerted global multilateral action to recognise the complementarities of specific models and to provide a pathway for collaboration in attaining global equitable access to vaccines. The institutional infrastructure or proposals to achieve this amply exist at this point in time—but much greater cooperation from industry and clear, decisive and coordinated action from states and international organisations are urgently needed.

## INTRODUCTION

COVID-19 has claimed the lives of over 3.47 million people, with more than 167.32 million cases globally (figures accurate at the time of writing May 2021),[1] and these official figures may be an underestimate.[2] It has significantly impacted the mental health and well-being of many millions more[3] and posed ongoing and severe economic effects.[4] In the early phase of the pandemic, many global political leaders issued calls that emerging COVID-19 vaccines should be a 'global public good'[5 6]—exemplifying a commitment that vaccines should be accessible to everyone globally. This commitment is aligned with a growing acceptance that equitable global vaccine access is vital to bring COVID-19 under control, as without it, risks of the virus re-emerging and new strains developing remain—thus as Dr Mike Ryan (WHO Executive Director of the Health Emergencies Programme) stated: 'No one is safe until everyone is safe.'[7]

Yet, over a year since the declaration of a global pandemic, we have still not achieved global equitable access for COVID-19 vaccines; rather, the inequity around vaccine access is increasing. In April 2021, only 0.3% of COVID-19 vaccines were distributed to low-income countries,[8] with predictions that up to 90% of people in 67 low and middle-income countries (LMICs) would not have vaccine access in 2021.[9] Meanwhile, many governments in high-income countries (HICs) prioritised the vaccination of people within their states over global equitable access leading to accusations of vaccine nationalism,[10 11] and of HICs paying lip service to the ideal of global vaccine equity.

A complex global institutional landscape has emerged for pathways to achieve equitable global access for vaccines, involving the establishment and promotion of several mechanisms to pool, share or donate COVID-19 vaccines and associated technologies, know-how and intellectual property rights (IPRs). In some cases, proposals around how to achieve vaccine equity have become a matter of institutional tugs-of-war.

This article contributes to existing debates around global equitable access to COVID-19 vaccines by providing an outline of each of the main (current and proposed) global mechanisms and by examining the advantages and potential drawbacks, specifically, of the *multiplicity of institutional mechanisms* for global vaccine distribution that has emerged. We argue that the creation and coexistence of several global mechanisms seeking to achieve global access are in some cases necessary due to the complementarities and different purposes of various mechanisms. We also acknowledge that this multiplicity is a consequence of the rapidly evolving situation where different mechanisms were seen as needed at different points of the crisis. At the same time, we argue that the proliferation of instruments, particularly for those with similar aims, which potentially compete for financial resources, public attention and buy-in from governments and industry, could jeopardise the attainment of global vaccine equity.

Accordingly, we argue that it is critical that there is greater scrutiny of the benefits or potential shortcomings of each proposed mechanism, of their complementarities and of the effects that the emerging *multiplicity* of initiatives and institutional dynamics between such proposals give rise to. Global vaccine equity is needed to bring the pandemic under control. Therefore, the success of these global mechanisms is hugely significant for public health, and thus, we argue that such institutional issues warrant much greater attention within

the global health and public policy communities in order to assess current pathways and blockages to achieving equitable access to COVID-19 vaccines and to ensure we establish viable blueprints for addressing future pandemics. Accordingly, the institutional interactions between current proposals form the primary focus of this article.

In making such arguments, the first section provides an overview of key global models proposed or in existence to achieve equitable access to vaccines, focusing specifically on international proposals at the WHO and World Trade Organization (WTO) levels.[i] The second section then examines the extent to which this emerging proliferation of instruments is needed to address global equitable access to vaccines, or whether it may in some cases hinder its attainment. The third section concludes by highlighting the need for greater scrutiny around the institutional dynamics between and across these various proposed instruments if we are to achieve global vaccine equity for this and future pandemics.

For brevity, we consider only *global* WHO/WTO-level mechanisms aimed at achieving equitable vaccine access in this comparison. We acknowledge the existence of regional proposals to achieve broader vaccine access for COVID-19 but do not examine these here.[ii] Having said that, the existence of such regional proposals reinforces the current proliferation and multiplicity of endeavours in this context.[iii]

## Global equitable access to COVID-19 vaccines: proposed mechanisms

This section outlines and critiques the main mechanisms at the WHO and WTO levels for achieving global equitable access to vaccines, namely: (a) the WHO's COVAX (COVID-19 Vaccines Global Access) model; (b) voluntary licensing/sharing mechanisms, including (1) the WHO's proposed COVID-19 Technology Access Pool (C-TAP); (2) the WTO's proposed 'third way' approach; and (c) the Trade-Related Aspects of Intellectual Property Agreement (TRIPS) intellectual property waiver proposal to (temporarily) waive certain intellectual property rights (IPRs) over COVID-19 health technologies.[12–14] We outline key elements of each system/proposal highlighting their potential benefits and shortcomings in terms of their likelihood of contributing pathways towards global equitable access to vaccines. Such understandings are drawn on in the second section, where we focus specifically on the likely effects of the current multiplicity of instruments, including their complementarities, or alternatively, the potential for multiplicity to delay or detract from the success of other models.

### Equitable access within traditional paradigms: COVAX

From the early stages of the pandemic, concerns arose that when vaccines against COVID-19 were developed, countries that could pay the most (i.e., HICs) would likely gain priority and early access, leaving LMICs behind. To address such concerns, the vaccine allocation aspect of COVAX was formulated. COVAX is the vaccine pillar of the WHO's Access to COVID-19 Tools Accelerator (ACT-A) system. It is a public–private partnership launched in April 2020 by the WHO with support from donors including the Bill & Melinda Gates Foundation, the Coalition for Epidemic Preparedness Innovations (CEPI) and Gavi.[15]

Three main objectives to the COVAX pillar have been identified, namely: (1) to provide funding to rapidly accelerate research and development of vaccines against COVID-19; (2) to use financing measures to stimulate increased investment in vaccine manufacturing capacity; and (3) to seek equitable access/distribution of vaccines for COVID-19.[13 16] Here, we focus primarily on the latter—examining the role of COVAX in achieving equitable vaccine access.

COVAX distinguishes between 'self-funded' and 'funded' countries. To achieve global equitable access to vaccines, the original idea presented behind COVAX was that 'self-funded' countries (mostly HICs) would provide an upfront payment and a commitment to purchase their allocated vaccine doses through COVAX.[13] For HICs, three main advantages of participation were proposed. First, participation in COVAX would allow HICs to hedge their vaccine procurement strategy and diversify their vaccine candidate portfolios.[17] At the time, this was a potentially significant benefit as COVAX was established in April 2020 when it was not yet clear which of the vaccines in development would be successful. Second, participation was said to act as an insurance policy for HICs as it would significantly increase their chances of securing vaccines, even if their own bilateral arrangements/negotiations with pharmaceutical companies failed. Third, COVAX indicated participation was in the self-interest of HICs as global access to vaccines is needed to bring the pandemic under control. It was envisaged that participating HICs would be able to request vaccine doses for up to 10%–50% of their population, the number of doses for HICs to be determined based on the amount of money paid into COVAX.

Alongside this, 92 LMICs participate in COVAX as 'funded' countries and are financially supported to obtain vaccines through the COVAX Advance Market Commitment financing instrument.[18 19] Under COVAX's original plans no country could receive doses through COVAX for more than 20% of their populations until funded countries obtained enough doses for 20% of their populations.[17] COVAX's initial target was to secure 2 billion doses of COVID-19 vaccines in 2021, with a particular emphasis on securing doses to protect healthcare workers and vulnerable people.

However, over one year in, supply for COVAX has been severely limited due to the scarcity of vaccine supplies to meet demand, hampering COVAX's ability to deliver vaccines to LMICs.[20 21] By late May 2021, 70 million doses had been shipped through COVAX to 126 countries.[22] Whilst predictions in May 2021 suggest COVAX would deliver 1.8 billion doses of vaccines to 92 LMICs by early 2022 for approximately 27% population coverage in such countries[23], such targets are considerably short of total population coverage and well below current vaccine coverage in most HICs.[24] Furthermore, these predictions may be optimistic, particularly given that the Serum Institute of India, one of the largest suppliers to COVAX, is not expected to export vaccines again until late 2021, due to the health crisis in India.[12 25] COVAX also has a considerable funding gap for 2021 of over US$2.6 billion for COVAX and US$19 billion for the ACT Accelerator.[26] Moreover, the increasing calls for COVID-19 vaccine booster doses for vaccinated people in

[i]We focus specifically on vaccines—however, we acknowledge that access to therapeutics and diagnostics is also important for COVID-19.

[ii]These include, for example: the European Health Emergency Preparedness and Response Authority (HERA) Initiative, https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12870-European-Health-Emergency-Preparedness-and-Response-Authority-HERA-_en (accessed 26 May 2021).

[iii]There are proposals for a pandemic treaty to address pandemic preparedness—as this has not yet been adopted, and for the purposes of brevity, we do not consider this here: see, Nebehay S. Time has come for pandemic treaty as part of bold reforms—WHO's Tedros. 31 May 2021. *Reuters* https://www.reuters.com/world/china/who-agrees-study-major-reforms-meet-again-pandemic-treaty-2021-05-31/ (accessed 31 May 2021).

HICs may exacerbate demands for vaccine production, with the potential to divert further supplies from LMICs and exacerbate the global vaccine inequity between HICs and LMICs.[12]

Additionally, it is questionable whether HICs are merely showing lip service to the ideal of global vaccine equity through COVAX. Many HICs have opted to procure their vaccines outside of the COVAX system, favouring bilateral agreements with pharmaceutical companies. HICs have also openly competed with other HICs, and COVAX, for access to COVID-19 vaccines. Eccleston-Turner and Upton highlighted as early as April 2020 that many self-financing countries were making donations to COVAX but did not give commitments to procure their own vaccines through COVAX—they deemed that this 'half-in, half-out approach to multilateral cooperation can only be detrimental to the COVAX Facility in the long term, and it reinforces fears … that the facility will begin to receive doses only after developed countries have started to receive their supplies'.[13] Sadly, this fear has materialised with a vast inequity between HICs and LMICs around vaccine access. HICs acting in competition with COVAX arguably have also fuelled buyer competition for limited vaccine supplies between HICs and COVAX, which may have further enabled companies to demand more favourable terms for vaccine access.[iv] [27]

Moreover, critics of COVAX voice concerns about COVAX's progression from a focus on equity to a charity or a donation-based model.[28] [29] Indeed, South Africa's statement to the WTO on 23 February 2021 stated that:

> The model of donation and philanthropic expediency cannot solve the fundamental disconnect between the monopolistic model it underwrites and the very real desire of developing and least developed countries to produce for themselves.[30]

COVAX has no mechanisms to increase manufacturing capacity or enable technology transfer or intellectual property (IP) sharing so that LMICs could produce their own vaccines. Instead, under the COVAX model, LMICs remain reliant on HICs for vaccine supplies or donations, and COVAX on its own as an institutional measure does not change this reliance, nor does it enable preparedness for future pandemics.

Thus, to date, COVAX has not levelled the playing field for vaccine procurement, and some have criticised it for being part of the problem by maintaining or enabling the *status quo*.[31] That being said, COVAX is one of few mechanisms delivering vaccine access to LMICs, and the immediate public health need for COVAX cannot be discounted. However, in our view, COVAX is at best a short-term solution that will not achieve the global equitable access needed to bring COVID-19 under control, nor will it lead to the systemic change needed to prepare systems for future pandemics. These shortcomings underpin the urgent need for alternative, sustainable solutions to expand production capacity if global equitable vaccine access for COVID-19 or future pandemics is to be achieved.

## Voluntary licensing/sharing mechanisms

Two alternative types of mechanisms have been put forward as a pathway to attaining global vaccine equity, namely: *voluntary systems* for licensing or sharing of IPRs, data and know-how around COVID-19 health technologies such as: (1) the WHO's C-TAP or (2) the WTO's proposal of a 'third way'; and initiatives which are *mandatory in nature* that suspend IPRs for COVID-19 health technologies, under the (3) TRIPS waiver proposal. Several differences exist across such systems/proposals, which we will now discuss.

Notably, IPRs are a feature of all these models because, as discussed elsewhere,[12] [14] IPRs are a central component to discussions on access to health technologies for COVID-19 for many reasons.[v] We acknolwedge that different types of IPRs including, patents and tradesecrets can affect access to COVID-19 vaccines and other health technologies, we focus primarily on patents in this discussion. For example, if a third party uses a patented technology (eg, an element of a medicine/vaccine) without the rightsholder's permission, they could be liable for patent infringement. Thus, patents, and particularly how they are used by rightsholders, affect how a technology is provided, by whom and on what terms. In practice, multiple rightsholders will likely have relevant IPRs related to a vaccine. Thus, manufacturing a vaccine could require multiple licences from different rightsholders.[12] Furthermore, as mechanisms for technology transfer can expediate the scale-up of vaccine production, many current proposals also discuss systems to enable technology transfer.

### *COVID-19 Technology Access Pool*

The idea behind C-TAP was proposed by the President of Costa Rica in March 2020.[32] C-TAP was officially launched in May 2020 by the WHO in partnership with the Government of Costa Rica as part of the Global 'Solidarity Call to Action'. C-TAP is a multilateral global pooling mechanism for IPRs, data, know-how, cell lines, etc, related to COVID-19 vaccines, medicines and diagnostics. C-TAP is based on an open-science ideal and backed by the values of solidarity, international cooperation and shared responsibility.[33] Under C-TAP, it is intended that pharmaceutical companies would voluntarily pool and share relevant IPRs, knowledge, know-how, etc, to address COVID-19. C-TAP works with implementing partners including the United Nations-backed Medicines Patent Pool (MPP), which facilitates C-TAP to make IPRs available via non-exclusive licensing. C-TAP is also intended to have enhanced arrangements for technology transfer to boost local production of vaccines and other health technologies in LMICs via the Technology Access Partnership and the MPP.[33] The MPP, established in 2010, has a track record in the licensing of IPRs within the public health context.[34] Between 2012 and 2020, it agreed licensing deals delivering almost 18.55 billion doses of treatment.[35] C-TAP's link with the MPP provides it with a strong operational foundation to deliver a voluntary licensing platform for COVID-19 health technologies.

Backed by the WHO, institutionally, C-TAP could be seen as complementary to COVAX.[33] Unlike COVAX, C-TAP focuses on the scale-up of manufacturing capacity, which has the potential to assist longer term capacity building in LMICs for vaccines and other crisis-relevant technologies such as personal protective equipment, medicines and diagnostics.

Nonetheless, while C-TAP's aims are laudable, its practical implementation has encountered challenges. At the time of writing (May 2021), no pharmaceutical company has shared their IPRs through C-TAP; the pool remains 'empty', so to speak. Even in the face of the pandemic, pharmaceutical companies continue to refuse to share IPRs, technology and know-how with C-TAP.[36] Moreover, only 41 country governments have publicly supported C-TAP,[37] with limited support from HICs.

[iv] For example, such competition could make it difficult for states/regions to resist clauses providing for indemnity for companies in such contexts: see ref [27].

[v] For a comprehensive discussion of the role of IPRs in the COVID-19 vaccine context, presenting a case in favour of the TRIPS waiver see ref 12.

Critics have spoken of C-TAP's 'failure to launch',[38] and of the lack of WHO support in promoting C-TAP, the lack of political leadership behind C-TAP and a lack of clarity over what (if any) funding is committed to C-TAP.[39] On 27 May 2021, the WHO and the President of Costa Rica issued another call for all WHO states to support C-TAP.[40] It remains to be seen if this call will increase support. In sum, C-TAP has many useful features; however, the continued lack of industry cooperation, despite the threat posed by COVID-19, remains its Achilles' heel.[14]

### *A third way: technology transfer hubs*

Alongside C-TAP's vision of global multilateral cooperation, several other technology transfer and licensing models have been proposed, ranging from facilitating bilateral commercial licensing (namely deals between manufacturing and pharmaceutical companies to produce greater numbers of vaccines—based on the status quo model) to tools that focus on multilateral exchanges driven by public good concerns.

In February 2021, for example, WTO Director-General Ngozi Okonjo-Iweala called for a 'third way' between private licensing arrangements and the proposed TRIPS IP waiver (discussed below). This proposed 'third way' approach was presented as a mechanism for 'facilitating technology transfer within the framework of multilateral rules, so as to encourage research and innovation while at the same time allowing licensing agreements that help scale up manufacturing of medical products'.[41] Limited details have been provided on the 'third way' approach since; however, participation appears to be at the discretion of industry, and it is not entirely clear how it differs from existing licensing models.

Just under a month later, as a separate initiative, the WHO published an Expression of Interest call to potential manufacturers and IPRs' holders for an mRNA vaccine technology transfer hub as part of the ACT-A mechanism.[42] The hub aims to expand capacity in LMICs aiming to 'transfer a comprehensive technology package and provide appropriate training to interested manufacturers in LMICs'.[43] The proposal envisages either the sharing of IPRs or non-exclusive licensing of IPRs related to mRNA vaccines in LMICs.[43]

The initiative would initially prioritise mRNA vaccines, and the WHO has stated that it 'could expand to other technologies in future'.[43] In April, four weeks after the announcement, the hub received 50 expressions of interest from interested mRNA vaccine manufacturers, though the major mRNA IPR holders had yet to react.[44] The MPP publicly endorsed this WHO proposal, highlighting that this type of facility may help to meet demands for COVID-19 vaccines and in the longer term would create 'the infrastructure and technical know-how to produce routine vaccines locally once this pandemic subsides, thereby establishing sufficient local capacity to meet the needs of any future pandemic'.[45] Similar to C-TAP, by focusing on capacity building, a technology transfer hub has the potential to play a decisive global public health role beyond COVID-19. Yet, also similar to C-TAP, there is considerable reluctance by rightsholders to engage with it.

In general terms, creating a technology transfer hub of the type envisaged by the WHO would help enable expedient upscaling of vaccine manufacturing for COVID-19. However, the fact that multiple organisations are suggesting the creation of mechanisms for technology transfer could divide resources and capacity for their creation. Moreover, the relationship between the WTO third way proposal and WHO proposed scheme(s) is unclear. It is also not entirely clear how the proposed WHO hub links with the C-TAP model—this hub could complement C-TAP, but the pathways between the hub and C-TAP need greater clarity.

Fundamentally, voluntary models like those discussed set up systems where industry generally remains in a position of power over whether, or to what extent, they wish to participate, raising considerable ethical issues around the power of rightsholders as gatekeepers for access to vaccines and other essential health technologies,[14] which is particularly problematic in health emergencies.

### TRIPS waiver

In the absence of greater engagement by industry with voluntary mechanisms to achieve global vaccine equity, a proposal was brought by India and South Africa to the WTO in October 2020 and revised in May 2021,[46] which calls for a temporary global waiver of certain TRIPS provisions. The waiver proposes to suspend certain intellectual property obligations for 'health products and technologies' related to the prevention, treatment or containment of COVID-19.[43] If the waiver were implemented, it would temporarily suspend certain IPRs at the TRIPS level for COVID-19 health technologies—thereby clearing intellectual property obstacles with a view to contributing towards a pathway for greater global manufacturing capacity and production for COVID-19 vaccines and other health technologies.[12] The waiver is proposed for a minimum period of three years. Following this, there would be a review, and if the circumstances justifying the waiver were deemed to cease to exist, the WTO would then determine the waiver's termination date.[12]

Many HICs including the European Union (EU) have opposed this waiver proposal, despite mounting public pressure and civil society calls for its adoption. As of May 2021, the waiver is co-sponsored by over 60 countries, as well as the entire Africa Group and Least Developed Country Group at the WTO. On 5 May 2021, the USA announced its support of a narrower version of the waiver for vaccines only,[47] whereas the original and revised proposal by India and South Africa covers 'health products and technologies' (including vaccines, therapeutics and diagnostics). Nonetheless, this move by the USA prompted echoes of support from other world leaders of a waiver proposal, signalling their openness to follow suit.[48]

It remains to be seen how the waiver proposal will evolve at the WTO level: there are concerns that agreeing a waiver text may be difficult, that it may take time for a text to be adopted or that negotiations may result in a text that is not workable in practice.[12] However, the proposal is an important step in achieving global equitable access to vaccines and to address intellectual property obstacles,[12] needed to facilitate the upscale of manufacturing capacity for COVID-19 vaccines. It also has a strong legal, political and strategic value and could act as a lever to encourage greater cooperation by pharmaceutical companies in voluntary systems for sharing/licensing of IPRs and technology transfer related to the COVID-19 vaccines.[12]

Nonetheless, institutional jostling is also evident in this context, and some argue that debates around a WTO proposal for a 'third way' aimed to detract from the momentum the TRIPS waiver proposal had built.[49] Yet over recent months the consensus has broadened that decisive action is needed to enable more manufacturers, particularly in LMICs, to build capacity for COVID-19 vaccines, with prominent politicians and scientists publicly supporting the move towards a waiver,[50] and with the US's endorsement seen as a historical moment.

## Institutional multiplicity: dissipating resources or consolidating public discourse?

The previous section provided an overview of the current institutional landscape of multiple proposed mechanisms to achieve broader access to COVID-19 health-technologies emerging at a global level, which are overlapping in some respects, including in their institutional sponsorship or prospective sources of funding. In this section, we analyse the potential synergies between these instruments, highlighting the complementary nature of many instruments, but also providing a set of arguments around why multiplicity, particularly among tools with similar mechanisms and institutional backing, could be detrimental to achieving pathways towards global vaccine equity.

### Timeline

Prior to assessing the complementarities and potential drawbacks of the proliferation of instruments, it is useful to reflect on the timeline of their development. Such instruments emerged at different points during the pandemic, and we acknowledge these different proposals could be seen as developing in response to the developing crisis, to industry's reactions and to numerous countries engaging in 'vaccine nationalism'.

The idea behind C-TAP was first discussed in March 2020, but not officially launched by the WHO until May 2020, while the COVAX system was launched in April 2020 in response to a call by G20 leaders in March 2020 for global collaboration around COVID-19.[51]

Thus, COVAX was launched soon after the WHO declaration of a global pandemic. The system, including its model for vaccine distribution, was set up amidst the backdrop of (as now shown well-founded) fears that LMICs would be left behind in securing access to COVID-19 vaccines once these were approved. Accordingly, COVAX could be viewed as an immediate response to an emerging crisis. However, as the crisis worsened, and as vaccine nationalism intensified—with many HICs purchasing several times the doses of vaccines required for their countries—COVAX's limitations became evident.[vi] A key issue is that COVAX was unable to access enough vaccine supplies to meet target distributions for LMICs—and HICs conducted separate bilateral deals with rightsholders ensuring they would obtain access to vaccines first. Furthermore, as new strains of the virus emerged and concerns arose around whether some vaccines would be effective for specific variants, the lack of autonomy within COVAX for LMICs to choose from a range of vaccines that may best suit their needs was also exposed.[52]

Accordingly, proposals towards sustainable solutions for global vaccine equity emerged and have garnered greater support due at least in part to a recognition thatthe COVAX model cannot achieve global vaccine equity. This may explain the WHO's continued (if arguably low-key) support of C-TAP to encourage industry to act in the spirit of solidarity to bring COVID-19 under control.[53] However, over a year after C-TAP was originally launched, hope that industry will voluntarily join such mechanisms is fading.

In the absence of a voluntary coming together of HICs and pharmaceutical companies to facilitate technology transfer and enable an upscaling of vaccine manufacturing in and for LMICs, it is also unsurprising that proposals emerged for a mandatory solution leading to the TRIPS waiver proposal in October 2020. This proposal has been debated at the WTO since, and mounting public support is now in favour of the waiver. More recently, in recognition that a key issue for vaccines is how to enable greater manufacture of vaccines, there have been proposals for technology transfer hubs to expediate technology transfer.

Thus, arguably, such mechanisms have emerged organically in response to evolving public health needs and varying expectations around how governments and industry would act at differing points of the crisis. As will be discussed in the next section, some mechanisms have complementary features and if operationalised together could deliver a pathway towards *expediting* equitable access to vaccines. Yet, there is also a risk that the multiplicity of (similar) mechanisms proposed by different entities could be a factor that delays the attainment of global equitable access to COVID-19 vaccines, examined below (in the section entitled 'Institutional multiplicity: an impediment to global equitable access to vaccines?').

### Institutional multiplicity and complementariness: an aid to global access to vaccines?

Beyond mirroring an organic development of the vaccine equity debate over the past 15 months, the proliferation of arrangements has three key advantages that may help to deliver a pathway towards equitable global vaccine access. First, it offers a range of solutions, which are both voluntary and mandatory in nature. This could be used to drive change. For example, proposals like the waiver would mandatorily suspend IP rights for COVID-19 health technologies, if adopted, thereby clearing intellectual property barriers around the scale-up of manufacturing capacity for COVID-19 health-technologies.[12] However, the waiver proposal also acts a lever to encourage increased industry support for voluntary mechanisms around the sharing of IPRs, data, know-how, etc, related to health technologies[12]: when faced with a waiver of IPRs, such voluntary measures may be preferable to industry as they allow them to maintain some level of control. It is widely acknowledged in other public health contexts that, for example, the threat of compulsory licensing of patents can be used to encourage companies to voluntarily license a technology.[54] Since the news of US support for the waiver, greater spotlight has been placed on the role of industry in this context, and reports of greater numbers of voluntary licences are emerging.[55] Thus, the waiver proposal itself may spur on greater industry action and cooperation.

Second, and relatedly, the different proposals and mechanisms increase public pressure on pharmaceutical companies, and the debate around these increases public attention around how to deliver global equitable access to COVID-19 vaccines. For example, the fact that each of these instruments discusses IPRs brings much greater public attention to the role of IPRs in the access to vaccine context, including illuminating long-standing problems with current innovation models. This could act as another catalyst for industry action in the face of reputational damage.

Third, to achieve expedient global equitable access to COVID-19 health technologies, several barriers to increasing global manufacturing capacity particularly for vaccines need to be addressed. These include barriers related to IPRs, technology transfer and data sharing issues. Having a range of instruments can be useful because some mechanisms are complementary and could be employed together to address different parts of the broader access puzzle. For example, to increase vaccine production, any technology transfer hubs to scale up vaccine manufacturing would need to address how IPRs are shared/licensed with new manufacturers. Thus, technology transfer mechanisms would need to be accompanied by pathways to license/share

[vi] It has also been claimed that COVAX could be enabling the status quo and part of the problem rather than a solution: Lei Ravelo J. note 31.

relevant IPRs—involving the voluntary licensing/sharing of IP (like a C-TAP model) subject to cooperation from industry, or a mandatory suspension of IP (via the waiver).

### Institutional multiplicity: an impediment to global equitable access to vaccines?

Despite the potential benefits to the global proliferation of mechanisms that has developed around achieving vaccine equity, there are also potential risks and drawbacks arising from this multiplicity.

The most obvious concern associated with this multiplicity of mechanisms is that it may lead to a dispersal of stakeholder attention. This is particularly problematic if seeking national government support for such instruments, as the current multiplicity of proposals may create confusion at a policy or government level. For instance, the WHO sponsors C-TAP and COVAX under the ACT-A; its Director General Dr Tedros Adhanom Ghebreyesus has publicly advocated for the adoption of the proposed TRIPS waiver.[56] As outlined above, from the WHO's perspective these tools may be complementary, and advocating for all of them represents an encouragement to industry and governments to 'pull out all the stops', to quote Dr Ghebreyesus.[56] Yet this message can be a difficult one to convey beyond a highly specialised expert public. It is likely that the technical nature of the instruments leaves many with unanswered questions as to how these interact to achieve global vaccine equity.

Moreover, at times, governments have relied on support for one instrument to refute the need for governmental support or action on other mechanisms, or to avoid deviation from the status quo. For example, in response to the USA's announcement supporting the TRIPS waiver, the Irish Minister for Enterprise, Trade and Employment Leo Varadkar said: 'our strong view is that COVAX is the best way to do this.'[57] However, as demonstrated, COVAX is not an effective solution to deliver global vaccine equity but the fact that it is in operation and is providing *some* vaccines to LMICs may reduce the pressure on governments to support more systemic changes to traditional industry-controlled arrangements for vaccine procurement and to the current IP model for health-technologies, especially in countries that have strong pharmaceutical industries. It is notable that some of the countries that have pledged the greatest amounts of funding to COVAX/ACT-A are the same countries that have shown most resistance to the TRIPS waiver.[58]

In addition, it is possible that the dispersal of public and institutional attention also entails a dispersal of societal and advocacy pressure. Civil society organisations advocating for access to COVID-19 vaccines seem to variously engage in campaigns around COVAX,[59] C-TAP, the more general idea of a 'People's Vaccine', and the TRIPS waiver, dependent on their own institutional and ideological affiliations. While there is broad consensus towards the urgent need for action to facilitate either the sharing or suspension of IPRs to avoid prolonging the 'catastrophic moral failure' caused by the current vaccine inequity,[60] it seems that there is a level of uncertainty among concerned publics as to the best path to achieve this.

Moreover, by dispersing stakeholder attention, rather than increasing the overall pressure on the pharmaceutical industry to engage, keeping all instruments in play may at times muddle the playing field to such an extent that pressure for decisive action lessens. With this, industry has a choice menu of levels of engagement, and inertia can continue, allowing industry (and arguably also national governments) to effectively 'sit out' the current pandemic with traditional IP structures intact if they so choose.

Beyond lessening focused stakeholder pressure, overlapping mechanisms may also signal a dispersal of institutional efforts and financial resources. Voluntary sharing mechanisms such as C-TAP are relatively light on resource needs as they merely coordinate rather than fund licence agreements between other parties, with one estimate comparing the potential operating costs of such a facility to the US$7 million that the MPP needs to run per year.[61] Yet, these organisations still must be staffed and governed, and stakeholders need to be engaged. In a context where public health resources run thin, this may represent an operational but nonetheless significant problem and also an opportunity cost. Moreover, the donor and country funding provided to COVAX may stand in direct competition with countries subsidising licensing deals or funding technology transfer facilities.

A final issue posed by the multimechanism landscape is the potential for institutional territorial jostles. This may be seen, for instance, between the WHO and the WTO, both of whom have proposed different technology transfer hubs in addition to the WHO's C-TAP model. Arguably, this blurs the discursive landscape even further. While there are clear overlaps of competencies and responsibilities regarding pharmaceutical innovation and distribution, at the multinational level there needs to be a tighter coordination between the different bodies to achieve the aim of global equitable access for vaccines. This is particularly important given the many instances of 'going it alone' by nations or regional entities such as the EU that we have witnessed throughout the pandemic.

## CONCLUSION

The foregoing analysis has highlighted some of the likely reasons for the development and consequences of the multimechanism global landscape to achieve global equitable vaccine access, which has emerged since the beginning of the pandemic.

To increase vaccine manufacturing capacity globally, several components are necessary, including addressing intellectual property obstacles and expediating technology transfer. In our view, many current proposed instruments have the potential to be highly complementary to each other, if such instruments were sufficiently supported and used together in a targeted manner. For example, current proposals to mandate a TRIPS IP waiver, or to encourage voluntary sharing of IP via C-TAP, could be used alongside mechanisms to facilitate technology transfer via, for example, the WHO mRNA hubs, to form key elements of a broader strategy to upscale vaccine manufacturing capacity. The COVAX system used alongside such mechanisms could continue to provide a short-term vaccine distribution system for LMICs while broader systems that build sustainable solutions for increasing vaccine manufacturing are developed.

Yet, despite this potential for complementarities, the multiplicity of mechanisms, in some cases, may be slowing down decisive action. For one, as discussed, this multiplicity may be used strategically either by states, pharmaceutical firms or other actors to stall action or circumvent public pressure until they are forced to act, or to adopt a 'wait and see' attitude, letting institutional jostling play out. Moreover, proposals for new voluntary instruments such as additional voluntary licensing mechanisms when there is mounting support for the TRIPS waiver may be interpreted as a delaying tactic. Indeed, certain parties/stakeholders interested in preserving the *status quo* could be banking on the distraction caused by new proposals to dilute support for existing mechanisms.

The corollary of this, however, as discussed earlier, is that the greater the support grows for mandatory solutions like the waiver, the more likely industry may be to engage with voluntary mechanisms such as C-TAP. Thus, institutional multiplicity could, depending on the context, also be an instrument of change. Nonetheless, to date, we have not seen sufficient industry cooperation to achieve global vaccine equity—and only time will tell how the situation evolves.

To address the potential issues posed by institutional multiplicity in this context, in our view, there is a need for greater clarity by supporting institutions, in particular the WHO and the WTO, about how proposed voluntary mechanisms interlink. These institutions should also closely coordinate similar proposals, such as for technology transfer mechanisms, to address possible duplication or the potential for public confusion where overlaps are evident. There is now a clear and long overdue need for concerted global multilateral action to recognise the complementariness and the benefits or gaps/inefficiencies of individual models proposed, and to provide a pathway for collaboration in attaining global equitable access. The institutional infrastructure (or proposals) to achieve this amply exist at this point in time—but much greater cooperation from industry, or in the absence of this, decisive and coordinated action from states and international organisations in supporting mandatory solutions like the TRIPS waiver, is urgently needed.

Global equitable access to vaccines must be our priority if we are to bring COVID-19 under control, and the steps needed to achieve this must be taken as soon as possible.

**Twitter** Aisling McMahon @AislingMMcMahon

**Contributors** Both authors contributed equally to all arguments and discussions for this paper. The authors drafted the paper together, contributed to finalising the paper and both approved the final submission.

**Funding** Dr Aisling McMahon has not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors. Prof Susi Geiger gratefully acknowledges funding received from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 771217) while co-authoring this manuscript.

**Disclaimer** The views expressed here are the authors' own and are not representative of AMI.

**Competing interests** AM and SG are members of Access to Medicines Ireland (AMI), a voluntary membership group of Comhlámh. The views expressed here represent the authors' views and are not representative of AMI. AM and SG act as joint guarantors for the paper.

**Patient consent for publication** Not applicable.

**Provenance and peer review** Not commissioned; externally peer reviewed.



**ORCID iD**

Aisling McMahon http://orcid.org/0000-0002-4717-8709

## REFERENCES

1 Correct at time of writing, May 2021. Available: https://ourworldindata.org/coronavirus-data [Accessed 26 May 2021].
2 Kung S, Doppen M, Black M, *et al*. Underestimation of COVID-19 mortality during the pandemic. *ERJ Open Res* 2021;7(1):00766-2020–2020.
3 Burnett D. The mental health problems waiting at the end of Covid-19. *Irish Times* 7 March 2021. Available: https://www.irishtimes.com/life-and-style/health-family/the-mental-health-problems-waiting-at-the-end-of-covid-19-1.4501223 [Accessed 26 May 2021].
4 Jones L, Palumbo D, Brown D. Coronavirus: How the pandemic has changed the world economy. *BBC News*, 2021. Available: https://www.bbc.com/news/business-51706225 [Accessed 26 May 2021].
5 Statement Secretary-General of the United Nations, António Guterres. Quick, equal, affordable access to COVID-19 vaccine must be considered global public good, Secretary-General says in remarks to Africa dialogue series, 2020. Available: https://www.un.org/press/en/2020/sgsm20089.doc.htm [Accessed 26 May 2021].
6 Von der Leyen on coronavirus global response: world stands United against coronavirus and will WIN, 2020. Available: https://ec.europa.eu/commission/presscorner/detail/en/ac_20_811 [Accessed 26 May 2021].
7 Not enough evidence to suggest that person infected with Covid-19 becomes immune – who, 2020. Available: https://www.irishexaminer.com/news/arid-30999442.html [Accessed 26 May 2021].
8 Covax: How will Covid vaccines be shared around the world?. *BBC News*, 2021. Available: https://www.bbc.com/news/world-55795297 [Accessed 26 May 2021].
9 Dyer O. Covid-19: many poor countries will see almost no vaccine next year, aid groups warn. *BMJ* 2020;371:m4809.
10 International Chamber of Commerce. Study shows vaccine nationalism could cost rich countries US$4.5 trillion, 2021. Available: https://iccwbo.org/media-wall/news-speeches/study-shows-vaccine-nationalism-could-cost-rich-countries-us4-5-trillion/ [Accessed 26 May 2021].
11 Forman R, Anderson M, Mossialos E. Me-first vaccine nationalism makes the spread of dangerous new COVID variants more likely, 2021. Available: https://blogs.lse.ac.uk/covid19/2021/03/11/me-first-vaccine-nationalism-makes-the-spread-of-dangerous-new-covid-variants-more-likely/ [Accessed 26 May 2021].
12 For a detailed legal analysis of proposals, see: Thambisetty S., McMahon A., Kang HY., et al. The TRIPS intellectual property Waiver proposal: creating the right incentives in patent law and politics to end the COVID-19 pandemic 24 may 2021.LSE legal studies working paper no. Available: https://ssrn.com/abstract=3851737 [Accessed 31 May 2021].
13 Eccleston-Turner M, Upton H. International collaboration to ensure equitable access to vaccines for COVID-19: the ACT-Accelerator and the COVAX facility. *Milbank Q* 2021;99(2):426–49.
14 McMahon A. Global equitable access to vaccines, medicines and diagnostics for COVID-19: the role of patents as private governance. *J Med Ethics* 2021;47(3):142–8.
15 COVID-19 act accelerator Launch, 2020. Available: https://www.who.int/docs/default-source/coronaviruse/transcripts/transcript-who-actlaunch-24apr2020.pdf?sfvrsn=45977318_2 [Accessed 31 May 2021].
16 Usher AD. COVID-19 vaccines for all? *Lancet* 2020;395(10240):1822–3.
17 COVAX explained. Available: https://www.gavi.org/vaccineswork/covax-explained [Accessed 31 May 2021].
18 92 low- and middle-income economies eligible to get access to COVID-19 vaccines through Gavi COVAX AMC'. Available: https://www.gavi.org/news/media-room/92-low-middle-income-economies-eligible-access-covid-19-vaccines-gavi-covax-amc [Accessed 31 May 2021].
19 Gavi launches innovative financing mechanism for access to COVID-19 vaccines. Available: https://www.gavi.org/news/media-room/gavi-launches-innovative-financing-mechanism-access-covid-19-vaccines [Accessed 31 May 2021].
20 Safi M, Kirk A. Revealed: big shortfall in Covax Covid vaccine-sharing scheme. *The Guardian*, 2021. Available: https://www.theguardian.com/world/2021/apr/22/revealed-big-shortfall-in-covax-covid-vaccine-sharing-scheme [Accessed 26 May 2021].
21 del Rio C, Gonsalves G, Hassan F. Covid-19: a call for global vaccine equity. *The BMJ* 2021 https://blogs.bmj.com/bmj/2021/03/17/covid-19-a-call-for-global-vaccine-equity/#:~:text=One%20year%20into%20the%20covid,to%20help%20control%20the%20pandemic
22 COVAX Joint Statement. Call to action to equip COVAX to deliver 2 billion doses in 2021. Available: https://www.who.int/news/item/27-05-2021-covax-joint-statement-call-to-action-to-equip-covax-to-deliver-2-billion-doses-in-2021 [Accessed 18 Jun 2021].
23 The independent panel for pandemic preparedness and response, access to vaccines, therapeutics, and diagnostics: background paper 5, 2021. Available: https://theindependentpanel.org/wp-content/uploads/2021/05/Background-paper-5-Access-to-vaccines-Therapeutics-and-Diagnostics.pdf [Accessed 26 May 2021].
24 Coronavirus (COVID-19) vaccinations. Available: https://ourworldindata.org/covid-vaccinations [Accessed 26 May 2021].
25 Serum Institute of India public statement on Twitter, 2021. Available: https://twitter.com/SerumInstIndia/status/1394652001573629958/photo/1 [Accessed 26 May].
26 How to contribute to the act accelerator. Available: https://www.who.int/initiatives/act-accelerator/how-to-contribute [Accessed 31 May 2021].
27 Guarascio F. COVID-19 vaccine makers expect EU liability shield for unexpected side-effects. insurance Journal, 2020. Available: https://www.insurancejournal.com/news/international/2020/09/22/583555.htm [Accessed 26 May 2021].
28 Giridharadas A. Of patents and power: doses are charity. knowledge is justice, 2021. Available: https://the.ink/p/doses-are-charity-knowledge-is-justice [Accessed 26 May 2021].
29 Gonsalves G, Yamey G. The covid-19 vaccine patent waiver: a crucial step towards a "people's vaccine". *BMJ* 2021;373.
30 Statement of South Africa to the WTO Council on 23rd February 2021 in deliberations on a waiver from certain provisions of the TRIPS agreement for the prevention, containment and treatment of COVID-19 (IP/C/W/669). Available: https://www.keionline.org/35453 [Accessed 26 May 2021].
31 Lei Ravelo J. Is COVAX part of the problem or the solution? Devex, 2021. Available: https://www.devex.com/news/is-covax-part-of-the-problem-or-the-solution-99334 [Accessed 26 May 2021].

32 Letter from Carlos Andres Alvarado Quesada & Daniel Salas Peraza to Dr Tedros Adhanom Ghebreyesus (WHO), 2021. Available: https://www.keionline.org/wp-content/uploads/President-MoH-Costa-Rica-Dr-Tedros-WHO24March2020.pdf [Accessed 26 May 2021].
33 WHO. Operationalising the COVID-19 technology access pool (C-TAP) a concept paper, 2020. Available: https://cdn.who.int/media/docs/default-source/essential-medicines/intellectual-property/who-covid-19-tech-access-tool-c-tap.pdf?sfvrsn=1695cf9_36&download=true [Accessed 26 May 2021].
34 Geiger S, Gross N. Market failures and market Framings: can a market be transformed from the inside? *Organization Studies* 2018;39(10):1357–76.
35 Medicines Patent Pool. Available: https://medicinespatentpool.org/ [Accessed 26 May 2021].
36 't Hoen E. The elephant in the room at the WHO Executive Board. *Medicines Law and Policy*, 2021. Available: https://medicineslawandpolicy.org/2021/01/the-elephant-in-the-room-at-the-who-executive-board/ [Accessed 26 May 2021].
37 Endorsements of the solidarity call to action. Available: https://www.who.int/initiatives/covid-19-technology-access-pool/endorsements-of-the-solidarity-call-to-action [Accessed 26 May 2021].
38 Zaitchik A. How bill gates impeded global access to Covid vaccines. the new Republic, 2021. Available: https://newrepublic.com/article/162000/bill-gates-impeded-global-access-covid-vaccines [Accessed 26 May 2021].
39 Letter Oxfam International & Health Action International to Dr Tedros Adhanom Ghebreyesus, 2021. Available: https://medicineslawandpolicy.org/wp-content/uploads/2021/01/HE-Dr-Tedros-Letter-from-Peoples-Vaccine-Alliance-and-Health-Action-International.pdf [Accessed 26 May 2021].
40 The President of the Republic of Costa Rica and the director-general of the world Health organization call once again on all who member states to actively support the COVID-19 technology access pool (C-TAP), 2021. Available: https://www.who.int/news/item/27-05-2021-the-president-of-the-republic-of-costa-rica-and-the-director-general-of-the-world-health-organization-call-once-again-on-all-who-member-states-to-actively-support-the-covid-19-technology-access-pool-(c-tap) [Accessed 31 May 2021].
41 Statement of Director-General Elect Dr. Ngozi Okonjo-Iweala to the special session of the WTO General Council, 2021. Available: https://www.wto.org/english/news_e/news21_e/dgno_15feb21_e.pdf [Accessed 26 May 2021].
42 WHO. Call for expression of interest to: contribute to the establishment of a COVID-19 mRNA vaccine technology transfer hub, 2021. Available: https://www.who.int/news-room/articles-detail/call-for-expression-of-interest-to-contribute-to-the-establishment-of-a-covid-19-mrna-vaccine-technology-transfer-hub [Accessed 26 May 2021].
43 WHO. 'Establishment of a COVID-19 mRNA vaccine technology transfer hub to scale up global manufacturing', 2021. Available: https://www.who.int/news-room/articles-detail/establishment-of-a-covid-19-mrna-vaccine-technology-transfer-hub-to-scale-up-global-manufacturing [Accessed 26 May 2021].
44 Lerner S, Fang L. Factory owners around the world stand ready to manufacture COVID-19 vaccines. The intercept, 2021. Available: https://theintercept.com/2021/04/29/covid-vaccine-factory-production-ip/ [Accessed 31 May 2021].
45 The medicines patent pool offers its support to the who COVID-19 technology transfer hub, 2021. Available: https://medicinespatentpool.org/news-publications-post/who-covid-19-tech-transfer-hub/ [Accessed 26 May 2021].
46 Revised Waiver text, 2021. Available: https://www.keionline.org/wp-content/uploads/W669Rev1.pdf [Accessed 31 May 2021].
47 Statement from Ambassador Katherine Tai on the Covid-19 TRIPS Waiver, 2021. Available: https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/may/statement-ambassador-katherine-tai-covid-19-trips-waiver [Accessed 31 May 2021].
48 EU will über Patent-Aussetzung für Coronaimpfstoffe sprechen' Der Spiegel, 2021. Available: https://www.spiegel.de/wirtschaft/unternehmen/patente-auf-corona-impfstoffe-eu-offen-fuer-gespraeche-ueber-aussetzung-a-58de1f52-26b9-404a-a492-fe85d4c74dee [Accessed 31 May 2021].
49 Green A. TRIPS waiver tripped up in WTO by 'third way'. *Devex*, 2021. Available: https://www.devex.com/news/trips-waiver-tripped-up-in-wto-by-third-way-99329 [Accessed 26 May 2021].
50 Ex-leaders, Nobel winners urge U.S. to back COVID vaccine waiver, 2021. Available: https://www.reuters.com/world/us/ex-leaders-nobel-winners-urge-us-back-covid-vaccine-waiver-2021-04-14/ [Accessed 26 May 2021].
51 Winsor M. What is COVAX? How a global initiative is helping get COVID-19 vaccines to poorer countries. *ABC news*, 2021. Available: https://abcnews.go.com/Health/covax-global-initiative-helping-covid-19-vaccines-poorer/story?id=76106981 [Accessed 26 May 2021].
52 Godlee F. Covid 19: widening divisions will take time to heal. *BMJ* 2021;372.
53 WHO Press Release. The President of the Republic of Costa Rica and the director-general of the world Health organization call once again on all who member states to actively support the COVID-19 technology access pool (C-TAP): open letter to all who member states, 2021. Available: https://www.who.int/news/item/27-05-2021-the-president-of-the-republic-of-costa-rica-and-the-director-general-of-the-world-health-organization-call-once-again-on-all-who-member-states-to-actively-support-the-covid-19-technology-access-pool-(c-tap) [Accessed 31 May 2021].
54 Ooms G, Hanefeld J. Threat of compulsory licences could increase access to essential medicines. *BMJ* 2019;365.
55 Guarascio F.G20 leaders to back COVID-19 vaccine voluntary licensing, no patent waiver. financial post, 2021. Available: https://financialpost.com/pmn/business-pmn/g20-leaders-to-back-covid-19-vaccine-voluntary-licensing-no-patent-waiver [Accessed 26 May 2021].
56 Adhanom Ghebreyesus T. A 'me first' approach to vaccination won't defeat Covid. The Guardian, 2021. Available: https://www.theguardian.com/commentisfree/2021/mar/05/vaccination-covid-vaccines-rich-nations
57 Carswell S, O'Halloran M. Government and big pharma face clash on Covid-19 vaccine patent waiver. The Irish times, 2021. Available: https://www.irishtimes.com/news/health/government-and-big-pharma-face-clash-on-covid-19-vaccine-patent-waiver-1.4557184 [Accessed 26 May 2021].
58 Archived: ACT-Accelerator funding tracker. Available: https://www.who.int/initiatives/act-accelerator/funding-tracker [Accessed 26 May 2021].
59 el Gharib S. 5 things to know about COVAX, the Life-Saving vaccine initiative. global citizen, 2021. Available: https://www.globalcitizen.org/en/content/what-is-covax/ [Accessed 26 May 2021].
60 WHO. Call to action: vaccine equity. Available: https://www.who.int/campaigns/annual-theme/year-of-health-and-care-workers-2021/vaccine-equity-declaration [Accessed 26 May 2021].
61 WEMOS. Q&A on Pooling Patents and Knowledge for COVID-19 Vaccines. Available: https://www.wemos.nl/en/pooling/ [Accessed 26 May 2021].