

# Pandemic preparedness and response

Beyond the WHO's Access to COVID-19  
Tools Accelerator

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# Pandemic preparedness and response: Beyond the WHO's Access to COVID-19 Tools Accelerator

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## Abstract

The World Health Organization (WHO) issued a Solidarity Call to Action for equitable global access to COVID-19 health technologies by pooling data and intellectual property, with the Access to COVID-19 Tools Accelerator (ACT-A) being a primary component of the response. While innovative, this response plan is, however, inadequate. Hence, we propose a new APT-A (Access to Pandemic Tools Accelerator) that provides more funding for diagnostics, vaccines, therapeutics, equitable access, and basic health systems and includes two other pillars or workstreams—one for economic assistance in pandemic times and another to combat structural inequalities. As part of this buttressed response to adequately prepare for and respond to pandemics in our globalized world, we propose a permanent, improved version of COVAX, called POVAX (Pandemic Open Vaccine Access Accelerator), which requires 1) implementing alternative reward mechanisms for new vaccines, 2) companies to pool intellectual property and other data to speed up research and 3) allow low-cost generic production, as well as measures to 4) ensure equitable distribution of resulting products.

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# 1. Improving pandemic response plans

It is a little more than a year since the coronavirus pandemic began. As we write this, 2.6 million people have died globally and some estimates suggest it will cost the world a total of \$28 trillion. Nevertheless, in terms of the potential of what pandemics can do, this is not a major pandemic.<sup>1,2,3</sup> The 1918 flu cost 50 million lives, and AIDS and smallpox pandemics have killed over 25 and 50 million people respectively.<sup>1</sup> As COVID-19 first surged around the world, the World Health Organization (WHO) issued a Solidarity Call to Action for equitable global access to COVID-19 health technologies by pooling of knowledge, data, and intellectual property. The [WHO COVID-19 Strategic Preparedness and Response Plan](#) to guide country-response efforts and the [Access to COVID-19 Tools Accelerator](#) (ACT-A)—a platform for international support for the global response—were the other main components of the global response.<sup>4,5</sup> We argue that this global response has so far fallen short and propose a way of addressing these shortcomings to ensure adequate pandemic preparedness and response in the future.

A better plan is essential for combatting many existing pandemics beyond COVID-19, including AIDS and tuberculosis, as well as preparing to address future threats. As drug resistance and climate change threaten to increase the speed with which humanity must address global pandemics the global community must better prepare for and respond to pandemics to respect, protect, and fulfill everyone’s human right to health.

The largest component of our global response to the current pandemic is through the ACT-A, which includes three pillars for 1) vaccines 2) diagnostics, and 3) therapeutics, as well as the 4) health systems connector and 5) country Allocation & Access workstreams.<sup>6</sup> The COVID-19 Vaccines Global Access pillar (COVAX) which aims to increase manufacturing, and distribution of COVID-19 vaccines around the world has received the most funding and the biggest problem with the remaining pillars and workstreams is that they have not received adequate support.<sup>7,8</sup> But even COVAX may not have enough money to help poor countries vaccinate 20 percent of their populations (it has secured about 6 billion but needs about 2 billion more by the end of 2021) and it inequitably lets rich countries vaccinate up to 50 percent of their populations initially.<sup>7,9</sup> Moreover, once the initial support period ends, the facility has yet to establish mechanisms to ensure sustainable vaccine provision for poor countries.<sup>8</sup> Finally, the governance for the ACT-A coordination mechanism should better represent the interests of all those affected by the pandemic. Without greater cooperation, we cannot fight the pandemic quickly.<sup>10,11,12</sup>

We propose creating a better APT-A (Access to Pandemic Tools Accelerator) that provides more funding for the existing pillars and workstreams and includes two more besides—one for economic assistance in pandemic times and another for preparedness in combating structural inequalities and providing basic health services. Moreover, we argue for expanding and setting up a permanent, but also better and more sustainable, version of COVAX that we call POVAX (the Pandemic Open Vaccine Access Accelerator). Finally, we propose adopting a new governance structure to ensure decisions reflect the interests of all those affected by pandemic diseases.

### Access to Pandemic Tools Accelerator (APT-A) Pillars/Workstreams

#### Original (ACT-A) Pillars/Workstreams:

1. diagnostics
2. vaccines
3. therapeutics
4. health systems
5. country allocation & access

#### New Pillars or Workstreams:

6. economic assistance
7. preparedness

We will argue that the international community can greatly speed up research, development, and provision of new vaccines at low prices if every high-income country joins and fully supports POVAX as part of our alternative APT-A (Access to Pandemic Tools Accelerator).<sup>13</sup> POVAX requires 1) implementing alternative reward mechanisms for new vaccines, 2) companies to pool intellectual property and other data to speed up research and development and 3) allow low-cost generic production, as well as measures to 4) ensure equitable distribution of resulting products. Before discussing each component of our proposed response, we utilize game theory to explain why we require a global agreement to overcome the kind of vaccine nationalism undermining our current global response plans.

### Key provisions of the Pandemic Open Vaccine Access Accelerator (POVAX)

1. alternative reward mechanisms for new vaccines
2. requires companies to collaboratively share intellectual property and other data to speed research and development
3. requires companies to allow low-cost generic production
4. ensures equitable distribution of resulting products

## 2. The Vaccine Sharing Game

As the new INET (2021) report on the global response to the pandemic points out, “We have witnessed unseemly and unfair vaccine grabs by the governments of some advanced countries. At the current rate of distribution, some people in poor countries will not receive the vaccine until 2024, if then.”<sup>14</sup> Quite apart from the unfairness of this, this may not be in the ultimate self-interest of advanced economies. Why then is this happening and can we solve the problem through voluntary action or do we need some binding international agreement? To understand this challenge and to get a conditional answer it is important to sharpen the analysis with some elementary game theory.

Suppose there are  $n$  ( $\geq 2$ ) high-income countries that are also capable of producing or buying up vaccines for their own population. They are the “advanced economies” that the INET report talks about. Each of these nations has to decide whether to attend solely to the vaccine needs of its own citizens and residents by producing and buying up large amounts (strategy N, N for nationalist) or to buy only an essential amount for its own residents and contribute in some ways to the global effort to reach vaccines poor or low-income countries (strategy G, G for global). In order to describe this as a game, we shall use  $p_i$  to represent country  $i$ 's payoff function. The payoff earned by country  $i$  is determined by the choices made by all  $n$  nations. We shall assume that the decisions of low-income countries do not affect the high-income countries in any serious way.

Here is a partial description of each country  $i$ 's payoff function. If all nations choose G, let  $x_i$  denote country  $i$ 's payoff or well-being. If all nations choose N, let  $y_i$  denote country  $i$ 's payoff. And if country  $i$  chooses action G, while all other countries choose N, then country  $i$  gets a payoff of  $z_i$ . Further, we assume  $x_i > y_i > z_i$ , for every country  $i$ .

In essence what we are saying is that, if all advanced economies choose to share vaccines with the poorer economies, that is, choose G, each of them would be better off than if no one shared vaccines, that is, each followed the vaccine nationalism agenda, N. The reason for this is increasingly becoming clear, as the virus keeps mutating and new strains make an appearance. Short of a total travel ban that will have a devastating economic cost, this will keep happening unless we make a global effort, which basically means a concerted effort by virtually all advanced economies. As the INET (2021) report notes, “Delayed vaccination of people across the world increases possibilities of virus mutation, reducing the ability to control the virus even in rich countries that have bagged the vaccines.”<sup>14</sup> This is summed up by the inequality  $x_i > y_i$ , for every country  $i$ .

The payoff function described above also says that if every other nation is following the nationalist policy N, for one to be generous and global, that is, choosing G, is not in its self-interest. That way, this one nation will be using some of its own resources to help other poor nations. That will, of course, be good for the poor nations but that is unlikely to be enough to stop the virus surviving and possibly mutating elsewhere. You need more of a concerted effort across nations for that to happen.

Note that the above description does not fully specify nation  $i$ 's payoff function. It does not, for instance, tell us what happens to nation  $i$  if all other nations choose G and nation  $i$  chooses N, or (assuming there are 4 or more rich nations), if half or half plus one of all the nations choose N, and the remaining nations choose G. We have deliberately kept the payoff function partially defined because we simply do not, at this stage, know the outcomes of all possible scenarios. We will need much more research involving epidemiology (how easily the virus multiplies and how it affects the infected person), physics (how the aerosols carrying the virus float in the air and how likely they are to travel from one person's nostril or mouth to another person's) and economics (how people behave in terms of wearing masks and socializing and interacting with one another).

Another reason for leaving a part of the payoff function unspecified is that there will be differences between the returns and externalities of what smaller nations, such as Switzerland, Belgium, and Singapore, do and what larger nations, such as the United States, Russia, and China, do. For some of the detailed specification of a global convention we will have to take account of these size asymmetries.

In the context of the present paper what is interesting is that even with this partial specification we can begin to describe some of the implications of our vaccine policy. We can see that each nation choosing to be inward looking, that is, choosing strategy N, is a Nash equilibrium. No nation can do better by unilaterally deviating.

But is each nation taking on some global responsibility (action G) an equilibrium? From description of the partial payoff function above, we do not know. We know that everybody choosing G would make everybody better off than the case where everybody chooses N, but we do not know if that good state is sustainable as an equilibrium. If we use  $w_i$  to denote the payoff nation  $i$  earns when all other nations choose G and nation  $i$  chooses N, then all depends on the relation between  $w_i$  and  $x_i$ . If  $w_i > x_i$ , the game the nations are playing is like a Prisoner's Dilemma; and if  $w_i < x_i$ , the game is akin to what Sen (1967) had called the Assurance Game, which is a special kind of coordination game.

In either case, the nations acting in some kind of concert can deliver benefits to each one of them. This is true for a lot of fiscal and monetary policy initiatives. The effect

can be very different when nations act in concert and when they move unilaterally. This is also true for the sharing of necessities, like vaccines and medicines.<sup>15,16</sup> Hope lies in global initiatives such as the G-20's High-Level Independent Panel (HLIP) for pandemic financing, which recognize this strategic problem, and try to locate and act on the gaps in the global financial system. As Tharman Shanmugaratnam, one of the co-chairs of [HLIP argued](#), the need is for a "stronger *international* system, to avoid the immense cost of a pandemic on nations large and small."

Some of these arguments apply also to micro-level behavior. Thus, for instance, concerning socially-responsible individual-behavior during a pandemic, such as not gathering in certain kinds of venues, there can be interesting applications of the Assurance Game which show how making certain predictions concerning the spread of the virus associated with certain kinds of behavior can be self-fulfilling.<sup>17</sup>

This argument becomes more clear if we consider a special case. Suppose there are just 2 advanced economies ( $N = 2$ ), and  $x_i = 8$ ,  $y_i = 6$  and  $z_i = 4$  (so condition 2 above is satisfied). Then this game can be represented as a standard 2-by-2 payoff matrix, as shown below.

### The Vaccine Sharing Game

|   |          |          |
|---|----------|----------|
|   | N        | G        |
| N | 6, 6     | $w_2, 4$ |
| G | 4, $w_1$ | 8, 8     |

Clearly (N, N) is an equilibrium. If country 1, that is, the one choosing between the columns, shifts unilaterally to G, it will get 4 instead of 6. If country 2 chooses G it will get 4. Hence, neither will want to move, making (N, N) a Nash equilibrium. (G, G) is a superior outcome but it may or may not be an equilibrium. That depends on the value of  $w_1$  and  $w_2$ . If both of these are less than or equal to 8, then (G, G) is an equilibrium. Otherwise not. But even with this partial information, it is arguable that we should try to shift away from the 'vaccine grab equilibrium' to the 'sharing outcome' (G, G). If the sharing outcome is a Nash equilibrium, all we would need to do is to somehow get there. No further global action is needed. If, however, the 'sharing outcome' is not an equilibrium, we need some kind of multi-lateral agreement to hold countries to the vaccine sharing arrangement.

Since we do not know if (G, G) is an equilibrium but we do know it is the good outcome and it is also clear that in case it is an equilibrium, having an agreement to hold countries there will be redundant but do no harm, a multi-lateral agreement is the right strategy to use. That is what we are arguing for in this paper.

What we have not gone into here is the fact that a nation's pandemic-related interventions are invariably intertwined with economic policies.<sup>18</sup> If this inter-connection were to be modeled, the game would be more complicated but it is arguable that the case for policy coordination across nations would be even stronger.



### 3. POVAX and the APT-A

Consider each component of our proposal in turn starting with the components in the proposed POVAX agreement. First, we propose that countries embrace an agreement like the WHO's COVID-19 Technologies Access Pool (C-TAP) backed by appropriate enforcement mechanisms to require companies and other organizations to share research and development data that can greatly speed up the production of new vaccines and other essential medical technology (therapeutics and diagnostics).<sup>19</sup> They can do so partly through patent pools, though it is also important to share knowledge, technology, and data that is not under patent as trade secrets can greatly hinder the global response. Patent pools are agreements to share research and development data creating a collaborative, rather than competitive, research and development system. Historical evidence suggests that they can be quite effective. Consider the Medicine Patents Pool (MPP), for instance, that allows companies to pool patents for HIV, hepatitis C, and tuberculosis medicines. It has helped expand generic production, reduce prices, and ensure access to several essential medicines. For HIV alone, the MPP estimates that it helped countries save more than \$670 million dollars in 2016 and 2017.<sup>20,21</sup> Countries and international organizations should also streamline new drug approval processes.

Second, rather than allowing companies to compete for limited manufacturing capacity, driving up prices, and delaying production, we propose rewarding companies for new innovations perhaps through advance market commitments (like those in COVAX). It may be desirable to offer rewards that more than compensate for research and development costs to support new research and development, which is expensive. But to ensure rewards at least cover costs, we need data on research and development costs. Since companies do not normally make these available, countries should require they do so for this purpose. To provide additional funds beyond these costs, and because the proposal is intended to address many existing as well as future pandemics, we propose rewarding companies based on the global health impacts of their technologies. Good measures of new technologies' health impacts already exist and researchers can expand this evaluation to form the basis for advance market commitments for new drugs and technologies.<sup>22,23,24</sup> Rewarding companies in this way delinks companies' profits from sales volume and ties them to good health consequences instead. In brief, we are aware that in specifying an ideal outcome we have to be mindful of the incentives needed for individuals and corporations to work to produce new vaccines and drugs. But we believe that the current system of allowing companies to reap profits by holding back production and pushing up prices is not the right way to provide the necessary incentive. Holding back supplies may be fine by way

of incentives for luxury goods but not for necessities, like food and medicine. We need to devise other ways of compensating corporations and, if advanced economies were to cooperate, that is certainly feasible.

Third, we propose doing this only on the condition that generic companies can produce resulting medicines at cost as well.<sup>25</sup> About 80 percent of global manufacturing is in the generics sector and generic competition often reduces drug costs.<sup>26,27</sup> So, rather than letting patent holding companies compete for manufacturing capacity, allowing generics competition will reduce transaction costs, and may greatly reduce consumers' costs.

Finally, we propose countries commit to purchasing vaccines only through POVAX and fully funding provision of resulting products for all in a timely and equitable manner. The key to this proposal's success is for all countries to commit to fully funding the initiative and ensuring that purchases are made only through POVAX. POVAX can help coordinate global distribution and set prices sufficient to recoup investments in rich countries while subsidizing production in poorer ones.

Countries drive up prices by making bilateral deals with companies to secure scarce supply so the return to investments in health by instituting POVAX are likely significant.<sup>11</sup> Even just considering the economic costs, some estimate that the COVID-19 crisis is costing the world \$375 billion monthly and will cost the world economy \$8.5 trillion over the next two years.<sup>7,28</sup> Others suggest bilateral deals and competition for scarce vaccines alone will cost the world \$1.2 trillion.<sup>10</sup>

Speeding up the production of new vaccines even by a few months by sharing research and development data, and reducing transactions and other costs by implementing alternative reward mechanisms and collective bargaining through POVAX, likely make this global collaboration for open access research and development highly cost effective—reducing competition globally for a global public good. Adopting a human rights framework, we will conclude by arguing that our proposal is justified on moral as well as pragmatic grounds, but POVAX will likely benefit even the world's richest countries by accelerating drug development and helping people access new vaccines in a timely and equitable manner, saving millions of lives, as illustrated by the Vaccine Sharing game, above. In our globally interconnected world, our health as well as economic fortunes are deeply intertwined. With the spread of new variants, we must improve our global response even to address COVID-19, but there are many other pandemic diseases and future pandemics may be much more devastating.

Beyond POVAX countries should support the other proposed branches of the APT-A. They should provide much more support for diagnostics, therapeutics, access, and basic health systems pillars or workstreams. Each of these pillars and workstreams is

essential for combatting pandemics but basic health systems and equitable access are also important for global vaccine distribution. because it is not enough just to produce a vaccine: it has to be manufactured, distributed and consumed by around the world.<sup>29</sup> It is essential to provide sufficient funding for adequate manufacturing, transportation and distribution, health care infrastructure, and workers to administer vaccines that can prevent pandemic diseases everywhere.

Moreover, countries and their inhabitants require economic support in the interim so we propose including an economic support pillar or workstream in collaboration with international financial institutions including the International Monetary Fund, World Bank, and regional development banks. Not only should rich countries offer debt relief in pandemic times but they should provide adequate international aid perhaps supported by special drawing rights for unconditional, interest-free loans to poor countries.

Furthermore, to limit pandemics' negative consequences in the future, we need to address the social and structural determinants of health. Members of marginalized communities are often most at risk in health emergencies due to pre-existing inequalities in access to health and other resources, opportunities, and institutions and structural injustice.<sup>30</sup> So, we propose a preparation pillar or workstream to combat these inequities and otherwise prepare for the future pandemics that, with the advent of climate change and growing drug resistance, will surely come our way. As part of the preparation pillar or workstream, it is essential to engage members of underrepresented groups in implementing laws, policies, and practices to address these inequalities. Public health is a global public good and protecting it requires solidarity and international cooperation.

As the Vaccination Game, described in Section 2, illustrates, even though this public good is likely to enhance the well-being of every nation, it may not be in the interest of each nation to do its share without external compulsion, which is a classic game-theoretic problem. For that reason, we need a prior multi-lateral agreement or covenant among nations, especially the high-income ones, which commits each nation to do its share in terms of funding research and the provision of vaccines for the world, including countries that cannot afford this on their own. However, in making this covenant each nation must explicitly agree to advance the interests of all affected, not just its own citizens. Proper governance of international efforts should not give undue weight to the interests of private organizations including corporations or members of rich countries. Transparency, accountability, and community and civil society representation across all governance components are essential so that the APT-A truly represents the interests of its diverse, global constituency.

Beyond solidarity, we believe that countries should support the APT-A and POVAX to adequately prepare for and respond to new pandemics out of concern for respecting, protecting, and fulfilling human rights. The International Covenant on Economic, Social and Cultural Rights Article 12 specifies that individuals have a human right to health.<sup>31</sup> We believe everyone should have this legally secured right to the socially controllable determinants of health even though not all states have ratified the Covenant because the right protects individuals' ability to live minimally good, or dignified, lives.<sup>21</sup> The social determinants of health at least include essential medicines, vaccines, and other basic healthcare services. The United Nations Committee on Economic, Social, and Cultural Rights General Comment No. 14 details some of the right's corresponding obligations and supports this interpretation of the right.<sup>31</sup> Moreover, the ICESCR's Article 2(1) specifies that rich states must assist poor ones in securing the right.<sup>32</sup> Individuals, corporations, and other organizations also have duties to help fulfill the right when poor states are unable or unwilling to fulfill their obligations as articulated, for instance, in the Declaration on the Right and Responsibility of Individuals, Groups and Organs of Society to Promote and Protect Universally Recognized Human Rights and Fundamental Freedoms and the Human Rights Guidelines for Pharmaceutical Companies in Relation to Access to Medicines.<sup>33,34,35</sup>

## 4. Conclusion

Wealthy nations have bought most of the world's COVID-19 vaccine supply despite having a small proportion of the global population leaving many countries without access to any vaccines at all and even those who can access the vaccines often lack other things they need to effectively combat the virus.<sup>36</sup> Future pandemics may prove much more devastating without global cooperation. We have argued that we can greatly speed up research, development, and provision of new vaccines at low prices if every high-income country joins, and fully supports, an enhanced version of the WHO's Access to COVID-19 Tools Accelerator (ACT-A) that we call the APT-A (Access to Pandemic Tools Accelerator) to address structural inequalities and expand economic support for poor countries as well as provide more funding for vaccines, diagnostics, treatments, access, and basic health systems. The proposal does not necessarily have to be instituted through existing ACT-A architecture but, however it is implemented, we believe it is essential to create truly transparent, and accountable, governance structure. This requires adequate community and civil society participation from a diverse, global constituency so that the APT-A truly represents the interests of all those affected by pandemic diseases. Part of our proposal is a permanent but also better, and more sustainable, version of COVAX which we call POVAX (the Pandemic Open Vaccine Access Accelerator). POVAX requires 1) implementing alternative reward mechanisms for new vaccines, 2) companies to pool intellectual property and other data to speed up research and 3) allow low-cost generic production, as well as measures to 4) ensure equitable distribution of resulting products. Only by working together to overcome the kind of vaccine nationalism undermining our current global response plans can we hope to adequately address and prevent future pandemics.

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