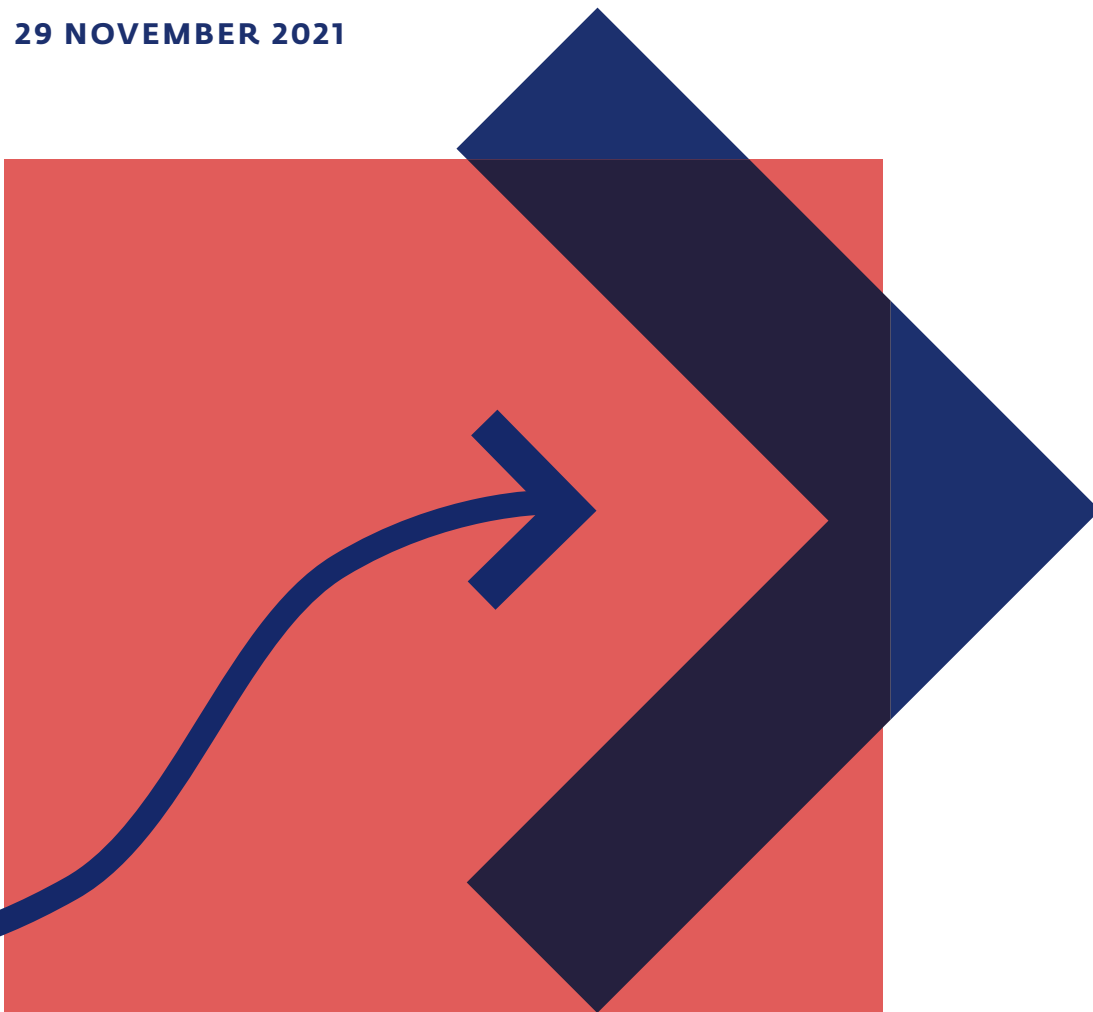




The WHO Council  
on the Economics of  
Health for All

# Governing health innovation for the common good

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The development of multiple coronavirus disease 2019 (COVID-19) vaccines in less than a year shows how much can be accomplished when human ingenuity and solid medical research and development capabilities are given extensive public support. However, this experience also demonstrates that unless innovation is governed for the common good, many people remain excluded from its benefits, limiting the positive impact of health interventions, and creating unacceptable inequities that potentially exacerbate the health needs that it is supposed to address.

Governing health innovation for the common good is a key element towards creating a new political economy for Health for All, one that has the ambition of shaping the economy with the objective of building healthy societies that are just, inclusive, equitable and sustainable.

This is the vision behind the recently created World Health Organization (WHO) Council on the Economics of Health for All comprised of economists and experts in health and development that seek to develop a new understanding and a new narrative about the deep interconnectedness between health and the economy with a focus on the intertwined core themes which follow.

➤ **MEASUREMENT:**

Valuing and measuring Health for All.

➤ **CAPACITY:**

Strengthening public sector leadership in building resilient capacity and creating partnerships to deliver Health for All.

➤ **FINANCE:**

Providing strategic, long-term, and transformative finance for Health for All.

➤ **INNOVATION:**

Governing innovation towards Health for All.

The Council has written this brief to focus on the governance of innovation, a critical building block of healthy economies, and lays out the key problems with the health innovation ecosystem and why radical changes are needed to ensure it delivers Health for All. In future briefs, the

Council will look at how to measure and value Health for All in ways that are informed by common good principles, how to finance Health for All with new purpose-driven public and private partnerships, and how to build strong collective capacities able to deliver Health for All. These different dimensions are interrelated and connected. For instance, the way the financing of health innovation is structured must reflect its purpose (common good), value and governance, and be connected to building capacities to deliver it in equitable ways.

At multiple high-level policy forums such as the G7, G20, United Nations General Assembly, World Trade Organization and World Health Assembly, political leaders and financial institutions are discussing solutions to address the COVID-19 vaccine inequity and the need for “building forward better” including financing pandemic preparedness and response as a matter of health and economic security and resilience. But mobilizing money to throw at solutions that fail to address the underlying causes of longstanding structural problems will not be sufficient. We all must look forward towards re-imagining health innovation as part of a new economic ecosystem that can deliver Health for All. The Council believes that the way to do so is to focus on the underlying business models and governance of both public and private actors.

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# SUMMARY OF KEY PRINCIPLES

The Council's proposals address deep structural flaws in the current health innovation ecosystem, which require both immediate and long-term changes.

## LONG-TERM VISION

The long-term vision must be one that guides the establishment of a new, end-to-end health innovation ecosystem that shapes the way in which public and private sectors work together throughout the innovation chain to deliver equitable access to needed vaccines, therapeutics, diagnostics and other essential health supplies. The system should be underlined by the building blocks of a health innovation ecosystem governed towards the common good, including:

- creating purpose-driven innovation through a mission-oriented approach;
- reshaping knowledge governance for the **common good**;
- reforming **corporate governance** to better reflect stakeholder value in the long term;
- building **resilient and diverse manufacturing capacity** and infrastructure;
- introducing **conditionalities** for public investments to build **symbiotic public-private partnerships**;
- strengthening the **capacity of the public sector** in health innovation.

## SHORT-TERM ACTIONS

In the short term, urgent action must be taken to remedy the extreme inequities in access to vaccines and other critical health technologies. Rather than reinforcing approaches aimed merely at fixing market failures in the health innovation ecosystem, actions must be adopted as a starting point to change and reform the ecosystem oriented towards the common good.

- Available vaccine doses should be redistributed immediately, not as acts of charity, but as a shared imperative for pandemic control and inclusive, equitable and sustainable access.
- Technology transfer and building manufacturing capacity must be supported and financed, not as the responsibility or property of any single actor, but as a collective responsibility towards building greater health security, and resilience in all regions, governed as common goods.
- Knowledge should not be kept as privatized intellectual property (IP) under monopoly control, but considered as collective rewards from a collective value creation process, to be openly shared and exchanged.
- Existing mechanisms set up to address the above aspects, including the Access to COVID-19 Tools Accelerator (ACT-A) and its vaccine pillar the COVID-19 Vaccine Global Access Facility (COVAX), and the COVID-19 Technology Access Pool (C-TAP), should be utilized and strengthened, not as an approach to fix market failures, but as turning points for creating market-shaping approaches designed for the common good.

# 1. Rethinking health innovation in light of COVID-19

The rapid development of COVID-19 vaccines is a triumph for science, but their availability and deployment have so far been highly uneven and suboptimal. While nearly 2.06 billion vaccine doses have been administered in the world just 18 months into the pandemic,<sup>1</sup> 75% have gone to just 10 countries.<sup>2,3</sup>

As of 4 June 2021, fewer than 32 million vaccine doses have been administered in the whole African continent, for a total population of 1.36 billion<sup>4</sup> — creating what some have called a “necropolitics” of COVID-19.<sup>5,6</sup>

## Vaccine inequity and injustice is not just a moral failure. It is also a health and economic catastrophe.

Vaccine inequity and injustice is not just a moral failure. It is also a health and economic catastrophe. Indeed existing inequities before COVID-19 only became worse during the pandemic: precarious contracts with no income security during bad times, the digital divide allowing only some to prosper in the digital age and underfunded stretched health systems.<sup>7</sup> The key failures in the health innovation ecosystem in effectively addressing people's health globally and making products available and

accessible equitably were widely described and analysed before the COVID-19 pandemic, including by the 2016 UN High-Level Panel on Access to Medicines and Innovation.<sup>8</sup> Specifically for medical innovation to respond to epidemics, the Global Preparedness Monitoring Board and the Independent Panel for Pandemic Preparedness and Response (IPPPR) highlight the additional challenges for ensuring medical innovation to protect against unpredictable health threats.<sup>9–11</sup>

Commercial imperatives and charitable efforts are clearly insufficient to deliver vaccine equity. In providing solutions merely to fix market failures, they also reinforce the problems of the existing ecosystem. Despite calls for considering COVID-19 vaccines as People's Vaccines or global health commons,<sup>12,13</sup> these vaccines have largely remained under the exclusive control of private companies through intellectual property and manufacturing capacity monopolies, resulting in deadly vaccine inequity.<sup>14</sup> The fierce competition by wealthy countries to buy up the vaccines even before they were produced through advance purchasing agreements has exacerbated the access crisis.

By now, the economic case for COVID-19 health equity is well recognized. For example, the International Monetary Fund estimates that US\$ 50 billion from donors and national governments to strengthen existing mechanisms, in particular, the ACT-A and including the vaccine purchase and distribution facility COVAX, could generate US\$ 9 trillion of additional global output by 2025, of which 60% of gains would benefit developing countries.<sup>15</sup>



But investing in health for the long-term resilience of economies is not the main reason for action. The objective of Health for All is an end in itself, an intrinsic element of human welfare. Given this aim for public policy, the instruments to achieve it can then be developed by reviewing the design of economic policies and approaches, including financial institutions, innovation incentives, budgets, tax regimes, procurement contracts and public-private partnerships such as ACT-A.

### The need for a new narrative for health innovation

Health and the economy are deeply intertwined. Yet, for too long, the world has accepted economic and industrial policies that are blind, if not detrimental, to the collective health needs of society. This is why people-centred and sustainable economic policies are needed that can deliver Health for All. It means changing the rules by which the industry is playing, and shaping health and industrial policies with a clear purpose and mission to deliver needed health innovation in a timely and equitable way to people everywhere.<sup>16,17</sup>

Strong public health infrastructure, adequate testing capacity and safe and effective treatment options and vaccines are key to protecting societies from COVID-19. The ambition of Health for All requires unprecedented collective investment and adequate financing, and a globally coordinated innovation ecosystem that can deliver the needed technologies and ensure their wider availability and equitable access.<sup>11,18</sup>

However, it is clear that when it comes to addressing societal challenges such as those posed by the COVID-19 pandemic, governments have ceded much of their leverage as active market and health innovation ecosystem shapers. This is especially problematic given the very large sums of public money that are spent every year on health innovation. In the United States of America (USA), for example, the government invests over US\$ 40 billion per year on health-related research and development (R&D), and yet the prices of the drugs do not reflect that, and neither does the governance of intellectual property rights.<sup>19</sup> The initial price setting does not take into account the substantial public investment. For example, sofosbuvir was the product of over 10 years of research funded by the United States Department of Veterans Affairs and National Institutes of Health (NIH)-funded research at Emory University as well as NIH small business innovation grants.<sup>20</sup> Gilead Sciences acquired the company that developed the product, Pharmasset, and proceeded to market the drug at the monopoly price of US\$ 84 000 in the USA at launch for a 12-week course at 1 pill a day.<sup>20</sup> Even though subsequent price reduction was achieved (under US\$ 100 per course in eligible countries),

the key question remains: How was an innovative treatment that has benefited from significant public investment, priced out of reach at the beginning?

COVID-19 vaccine development has benefited from unprecedented public support, from massive investments in infectious disease research and vaccine platforms prior to the pandemic, to direct subsidies to accelerate vaccine development during 2020 and advance purchase commitments to further de-risk the industry.<sup>14</sup> Still, as the ongoing discussions around a possible IP waiver and the C-TAP show, this contribution is yet to result in knowledge or ownership sharing.

Public investment should not come with zero strings attached. In both of the cases above, it seems clear that while risks are socialized, profits are privatized. A purpose-oriented system, driven by true stakeholder value must begin by debunking the old narrative that value is created only in business and redistributed by the state.<sup>21</sup> Indeed, health innovation is a key area where both the state and business, and other entities — for example, philanthropies, the global research community including the health facilities that host the clinical trials, and the many clinical trial participants that share risks — co-create value. How to govern that collective value creation for the common good is the focus of our brief.

## 2. Problems in the pharmaceutical innovation ecosystem

Innovation in the health sector is a result of the collective efforts of many actors, from basic research to product development and manufacturing to deployment. However, it is not enough to “partner” in innovation: it is crucial to build the right partnership. The prevailing narrative is one that sees the role of the state as solely “fixing market failures”, bandaging up missing investments and de-risking private investments by market “push and pull” approaches. In this approach, the “public good” is seen as something that fills the gap for what is not being done by the private sector. While this approach is important for justifying public sector investment in R&D, it is not enough to address key structural problems and societal challenges. For this reason, the Council makes use of the broader, more ambitious notion of the “common good”, driven by envisioning what type of system we want to build. That is, the common good is an objective, while the public good tends to be framed as a correction.

Redesigning the health innovation ecosystem for the common good thus requires a major shift from a model where innovation is seen as being driven by market forces, to a model that is collectively governed in the public interest.<sup>22</sup> This fundamentally requires changing the narrative about value creation in the health-economic ecosystem and how medical technologies are discovered, made, sold and deployed.

The current pandemic exposes how governance affects the direction and pace of innovation. The Council summarizes five major problems in the pharmaceutical innovation ecosystem below.<sup>16</sup>

### Misaligned directionality and priority-setting

Many public health needs are unmet and remain under-researched. While public and academic research typically focus on high-risk areas of research, industry will only invest in the commercialization of the most financially interesting projects. Diseases relevant to high-income countries are seven to eight times more likely to be investigated than those that mainly affect low- and middle-income countries.<sup>23</sup>

**»Redesigning the health innovation ecosystem for the common good requires a major shift from a model where innovation is seen as being driven by market forces, to a model that is collectively governed in the public interest.«**

For example, due to the success of prevention of mother-to-child transmission of HIV in high-income countries, the paediatric formulations of antiretrovirals have limited commercial market and appeal for R&D investment, despite their significant potential for many other countries, including low-income settings.<sup>24</sup> This reality reflects the interests and priorities of the pharmaceutical industry, responding to shareholder expectations rather than health needs. This imbalance even applies to major health and security threats, such as the rise of antimicrobial resistance (AMR) for which the development of novel antibiotics has remained largely neglected.<sup>25</sup> The lack of innovation into vaccines to prevent infectious disease epidemics – exemplified by coronaviruses or Ebola – follows this trend. Poverty-related diseases, such as tuberculosis, are also largely overlooked. Instead,

companies target lucrative pockets where they can sell “niche busters” – treatments for rare diseases for which they can charge extortionately high prices – or pursue low-risk strategies that can more easily yield commercial success, yet with little added therapeutic value.<sup>26</sup> This dynamic of eschewing early-stage and riskier research results in major unmet needs unless the public sector steps in.

### Knowledge and access barriers

Knowledge generation and sharing are critical for medical research and public health. But stringent IP protections and corporate secrecy restrict the availability and use of vital health technologies and data, hamper follow-on innovation, and preclude the widest possible use to improve health outcomes. The current system incentivizes innovation through monopolies, in which governments allow the privatization of biomedical knowledge through granting patent protections.



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While patents — and the promise of future profits derived from simply owning patents — serve as a lure for capital, growing evidence indicates that such a system impairs crucial steps along the innovation process.<sup>27,28</sup>

It is often argued that patents are essential for medical innovation, yet some of the most impactful products, such as polio and smallpox vaccines, penicillin and insulin, had been developed without patents. The human genome project is an example of a highly successful international collaboration driven by the need to produce collective intelligence for the common good.<sup>29,30</sup>

Patents in the pharmaceutical industry have become increasingly upstream, too wide, and too strong, presenting a barrier to productive innovation and technology diffusion,<sup>31</sup> and leading to what Baumol called “unproductive entrepreneurship”.<sup>32</sup> Instead of creating

new drugs, the pharmaceutical industry extends existing patents beyond the initial 20-year protection and creates patent “thickets” around biopharmaceutical products, which have resulted in increasingly strong and lengthy monopolies – 53 patents have been granted to the cancer drug pembrolizumab alone.<sup>33</sup> An effective patent system would eliminate such rent-seeking and foster productive follow-on innovation and the collective intelligence effort needed to allow scientists all over the world to create a diverse and innovative portfolio of medical innovation – including for COVID-19.<sup>34,35</sup>

A further barrier to knowledge and access is the preference for secrecy over transparency around critical aspects of the R&D value chain, including clinical trial and other research data, patent information and R&D expenditures and pricing.<sup>36</sup> Their importance for health innovation was recognized by the World Health Assembly when it passed a potentially game-changing resolution to improve transparency in 2019.<sup>37</sup>

As it stands, current policy fails to adequately promote knowledge sharing or foster the technology transfer needed to effectively diffuse know-how among research scientists and, for instance, rapidly expand manufacturing capacity in public health emergencies like the COVID-19 pandemic. Vaccine producers can stand behind trade secrets to slow down and prevent manufacturing scale-up by other willing and capable producers.

### Extensive financialization and de-industrialization

Pharmaceutical companies have become highly financialized, limiting reinvestment into production and innovation, and focusing instead on short-term profit. From 2009 to 2018, the top 18 biopharmaceutical firms spent US\$ 335 billion repurchasing their own shares, which is 114% of their R&D expenditures during that period.<sup>38,39</sup> Large biopharmaceutical firms increasingly disinvest from riskier early-stage research, and instead focus on acquiring products from biotech companies that are already in later clinical trial stages.<sup>40</sup> As biotech start-up companies seek to boost market valuation, the possibility of charging increasingly high prices (including in third-party-payer markets with little or no price regulation) becomes an essential strategy for seeking higher profitability. Current government policies fail to regulate biopharmaceutical companies profiting from R&D heavily funded by the public purse. During the COVID-19 pandemic, a number of biopharmaceutical firms have profited richly, thanks to weak regulatory regimes, with some seeing their share prices more than quadruple on COVID-19 expectations and executives cashing in stock awards in 2020 and 2021.<sup>41,42</sup>

### Lack of resilience and limited geographic spread of manufacturing infrastructure

Before the pandemic, 90% of all vaccine production by value was concentrated with four companies: GSK, Pfizer, Merck and Sanofi.<sup>43</sup> By volume, the Serum Institute of India (SII) alone was the largest producer, with 28% of the estimated 5.5 billion vaccines produced in 2020.<sup>43</sup> The enormous surge needed in vaccine manufacturing capacity for COVID-19 vaccines has shown the limitations of the highly concentrated global manufacturing infrastructure, with relatively little vaccine capacity able to produce at a large scale outside of the major vaccine corporations and SII, and a high dependency on a very limited number of producers. Africa, for instance, imports 99% of the vaccine it uses for routine immunizations from abroad, making it highly vulnerable to supply shortages or global scarcity as in the case of COVID-19.<sup>44</sup> At the same time, new global players are emerging in the vaccine innovation landscape, such as Chinese and Russian producers, which can be expected to help diversify the global manufacturing supply.

To respond to the unprecedented need for COVID-19 vaccines, major efforts are under way to build new and expand existing vaccine manufacturing capacity, balancing speed with the aspiration to build greater resilience by ensuring all regions develop their own capacity for greater self-sufficiency (particularly in the face of COVID-19 vaccine nationalism). Establishing vaccine manufacturing capacity is complex, and requires technology transfer and knowledge sharing. This is especially important for mRNA vaccines, which represent a novel technology with great promise that can be rapidly adapted to new COVID-19 variants, or possibly other diseases, and are relatively easy to produce in large quantities as the rapid scale-up by Pfizer/BioNTech and Moderna shows. However, these companies have been reluctant to share technology outside the networks under their control.

So far, investments into scaling up manufacturing capacity for the COVID-19 vaccine candidates have primarily benefited private firms under licence from the “originator” companies. This is a missed opportunity for the global health community and its aspirations to build greater pandemic preparedness: this crisis should instead be used to expand technological capacity to produce vaccines as common goods, and challenge the oligopoly of major vaccine producers.

## Lack of public stewardship for access

Health innovation is a highly complex process that requires a long-term financial commitment and efficient collaboration between public and private sectors along the R&D value chain. Although the public sector makes huge investments in health innovation,<sup>39,44</sup> it fails to ensure that the resulting medical technologies will be available and accessible to those in need. Examples of high pricing of medicines that have received public investment are myriad, as noted hepatitis treatment sofosbuvir and others, such as CAR T-cell cancer therapy, key HIV/AIDS drug emtricitabine and rheumatoid arthritis medicine infliximab.<sup>20</sup>

The development of COVID-19 vaccines puts the criticality of public investment in sharp relief. Governments are major investors in vaccines, from early-stage science through to manufacturing. The underlying technology of Moderna’s and Pfizer/BioNTech’s mRNA vaccines has benefited from more than 20 years of publicly funded scientific research,<sup>45</sup> and the development of both COVID-19 vaccine candidates has been further supported by governments. The United States’ Operation Warp Speed alone has invested over US\$ 10 billion in the R&D of six promising vaccines, including US\$ 2.5 billion for Moderna and US\$ 1.5 billion for Johnson & Johnson.<sup>46</sup> The German government provided nearly US\$ 450 million to BioNTech.<sup>47</sup> It is estimated that 97% of the financing to develop the AstraZeneca/Oxford vaccine came from public funds, including from the European Union and the government of the United Kingdom of Great Britain and Northern Ireland.<sup>48</sup>

Additionally, the development of COVID-19 vaccines was further de-risked by large advance market commitments, which was the main strategy used by certain governments to secure priority access to the new vaccines (often in combination with significant investments in R&D and even manufacturing) at the expense of global equitable distribution.

Meanwhile, current practices in pharmaceutical price regulation, financing and public procurement all fail to account for the contribution of these public investments to value creation. Pricing and sales practices exerted by companies, and their reluctance to share knowledge and transfer technology, continue to ignore the collective nature of value creation.<sup>48-50</sup> The lack of transparency about R&D contributions (directly and indirectly by different actors) and pricing information also preclude constructive discussions about fair pricing.<sup>51,52</sup> As the imbalance in monopoly control over the technology including its price-setting and bargaining power remains unchanged, the public continues to either pay multiple times for health innovation or is restricted in accessing it or being able to produce it themselves. In a scenario where the public often makes significant investments in the most uncertain stages of research, it means the risks of innovation are largely socialized – taken on by the public – but the rewards (ownership and profits) are privatized.<sup>53,54</sup>

**TABLE 1. Rethinking the health innovation ecosystem for the common good – from market fixing to co-shaping and co-creating**

	<b>STATUS QUO:</b> Public sector as a repairer of market failures	<b>NEW ECOSYSTEM:</b> Public sector as a co-shaper and co-creator
<b>➤ Directionality towards public health problems</b>	Misaligned directionality and priority-setting	Creating purpose-driven innovation through a mission-oriented approach
<b>➤ Governance of knowledge and access</b>	Barriers to knowledge and access	Reshaping knowledge governance for the common good
<b>➤ Financing of innovation</b>	Extensive financialization and de-industrialization	Reforming corporate governance to better reflect stakeholder value in the long term
<b>➤ Resilience and manufacturing capacity</b>	Lack of resilience and limited geographic spread of manufacturing infrastructure	Building resilient and diverse manufacturing capacity and infrastructure
<b>➤ Public stewardship for the resultant innovations from partnerships</b>	Lack of public stewardship for access	Introducing conditionalities for public investments to build symbiotic public-private partnerships  Strengthening the capacity of the public sector in health innovation

Source: Adapted, with permission of the publisher.<sup>16</sup>



### 3. Governing health innovation for the common good

A key lesson from the COVID-19 pandemic is that the objective of health innovation must be Health for All. To deliver this objective health innovation must be governed in such a way to deliver benefit to the most people possible globally. This is not about government versus business but rather designing partnerships that are truly symbiotic. It is also not about charity but must go to the heart of the business model itself. This includes making sure that IP rights are not too upstream, wide, and hard to licence, as this harms collective intelligence and knowledge diffusion. It means making sure the price of medical technologies reflects collective investments. Moreover, it means fostering global solidarity and equity so that the hoarding of technologies by a few countries is avoided.

Recognizing and asserting the contributions of all actors involved in health innovation have critical implications for valuing and attributing the risks and rewards throughout the process. It requires a new understanding of the role of the state as a co-creator and co-shaper of the health innovation ecosystem, not just a repairer of market failures.<sup>55</sup>

**Table 1** highlights key features of the current ecosystem (discussed in the previous section), and what is needed going forward in a new ecosystem (to be discussed below in this section).

#### Creating purpose-driven innovation

To direct health innovation towards public health priorities and ensure availability and access, health and innovation policies can be guided by a mission-oriented framework.<sup>19</sup> COVID-19 has demonstrated that mission-oriented innovation agencies, such as the United States Defense Advanced Research Projects Agency (DARPA), can enhance the role of the state in coordinating public and private sectors.<sup>16</sup> In health, the recently proposed Health Advanced Research Projects Agency (HARPA) offers a feasible model for lean and autonomous bureaucratic structures that provide freedom to pursue any and all innovations (and in the process lead to a significant spillover effect on other sectors) while also being driven by outcomes towards specific missions. The United States Biomedical Advanced Research and Development Authority (BARDA) demonstrates another key attribute of mission-oriented agencies in public procurement: when missions create innovative solutions, they also directly create market demand that self-enforces the need for further innovations.<sup>56</sup>

However, the USA has been reluctant to implement fair pricing or access policies for these strategic innovation initiatives.



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There is growing interest in some countries to adopt similar programmes to channel public investments in health needs-driven innovation; it will be critical that they are designed with clear goals of equitable access and improving health outcomes in the context of local health systems, and ideally also from a global access perspective. This means ensuring broader access to technology for follow-on innovation; lower pricing that reflects the respective contributions; enhanced knowledge transfer to promote local manufacturing as needed; and connection to strategic procurement where relevant.

In order to ensure an inclusive health innovation research agenda towards Health for All, a health needs-driven, end-to-end innovation ecosystem must be established, in which health priorities from all regions of the world get adequate attention. This will require building and fostering local and regional innovation networks and capacity across different actors, especially in low- and middle-income countries. A holistic global approach with the goal of delivering timely and equitable access to vaccines, therapeutics, diagnostics, and essential supplies everywhere is particularly important for epidemic preparedness and response, as emphasized by the IPPPR recommendations.<sup>11</sup>

## Reshaping knowledge governance for the common good

Knowledge is an essential common resource. The case for privatizing knowledge should be considered only if it is absolutely necessary to ensure product development and availability. Even then, such considerations must be counterbalanced by the global common good. Patents must be seen through a knowledge governance perspective, not just an innovation incentive perspective. If monopoly profit is made by a company during the patent term, it should be governed to ensure that the granted monopoly effectively stimulates productive entrepreneurship and further innovation. It also means that patentability criteria should be made more stringent. If used to incentivize innovation, patents should cover only the area that is fundamentally new and inventive, and be focused on downstream inventions to avoid the privatization of research tools, processes and technology platforms. This calls for a thorough revision of patent law and the way it is being applied. In addition, technology licensing and diffusion must be encouraged and protected.<sup>31</sup>

## There is a strong case for a public option in pharmaceuticals: government-provided, quality-assured medicines or vaccines that are universally available at a reasonable and fixed price, which coexist with products from the private sector.

Precisely because health innovation is backed by deep public investments, it is critical to make sure that the public actually benefits. To this end, existing policy instruments designed to uphold equitable knowledge governance, safeguard open science and collective intelligence, and improve access to medical technologies must be promoted, especially during a pandemic response.<sup>3,4,57,58</sup> Furthermore, transparency and sharing of know-how, technologies, and platforms for the common good must be adopted and rewarded. There is a strong case to be made that technologies that come from a collective effort should not be under the control of relatively few private companies, but be considered as part of a global health commons, available and accessible to all those needing them. The current debate about the COVID-19 vaccine IP waiver must be seen in light of this broader point.<sup>14,59,60</sup>

## Reforming corporate governance

The pharmaceutical sector is a highly financialized industry. As noted, this is reflected by the proportion of share buybacks and dividend payouts as a percentage of net income.<sup>61</sup> In recent years, the corporate community has admitted that this has hurt the focus on long-term planning, and called for the obsession to maximize profits and share prices to be changed into one that is driven by the maximization of stakeholder value, not just shareholder value.<sup>21</sup> Such calls have increased the role of environmental, social and corporate governance (ESG) metrics.<sup>62</sup> While such calls are important, reforms to corporate governance must apply to the economy as a whole, putting purpose and stakeholder value at the centre of public-private partnerships.<sup>63</sup> Active measures can be taken to promote corporate governance models that share value fairly between all stakeholders, not just shareholders; and that share a common purpose – **in this case, the principle of Health for All could be used to govern the nature of public-private partnerships.** This could translate into a limitation of share buybacks, especially for firms that have benefited from publicly funded research.<sup>62,64</sup> It could also shift managerial incentives away from the company's share price to incentives that serve all value creators, including workers, local communities and public entities, and increase equitable global access.

Reforms geared towards increasing productive investments are a vital first step in reversing the vicious cycle caused by financialization and moving to a mutually beneficial relationship between government, finance, industry, scientists and citizens. This is especially critical in the pharmaceutical sector where the fragilities in the innovation and supply chains tend to create inequities in access to life-saving products.<sup>17</sup> As a result, long-overdue discussions about how to strengthen local public and private innovation and manufacturing capacities in all regions, and how to build greater resilience and health security are starting.

## Building resilient and diverse manufacturing capacity and infrastructure

Moving away from the existing innovation and manufacturing capacity concentrated in a small number of countries towards decentralization in multiple countries will be vital for alleviating systemic risks and building resilience.<sup>65</sup> This requires the mobilization of finance to assist countries and regions willing to set up proper manufacturing capacity, and ensuring timely access to intellectual property (flexible licensing or a waiver) and technology transfer (including know-how) to enable qualified producers to get up to speed.

COVID-19 has also shown the importance of unused manufacturing capacity and strategic stockpiles of critical products from personal protective equipment (PPE) to essential medicines, raw materials or pieces of manufacturing equipment and consumables. This means that the classic market logic of efficiency (e.g. just-in-time supply chains, full utilization of capacity, etc.) must be replaced by a health resilience and preparedness logic that allows for redundancy, stockpiles and surge capacity.

Building resilience through widely distributed local manufacturing may come at an additional cost, which must be considered an investment in health: it is likely that product prices from local production cannot compete with large-scale manufacturing that is optimized for economies of scale. Therefore, strategic procurement that takes a comprehensive approach to produce value including health security, is important, not just the lowest price.

**Building resilience through widely distributed local manufacturing may come at an additional cost, which must be considered an investment in health.**

## Introducing conditionalities for public investments to build symbiotic public-private partnerships

Public-private partnerships are strong when they are based on symbiosis, and share a truly common purpose that goes beyond a win-win discourse. Too often, they tend to be more parasitic, with large amounts of public funding that are not governed by conditions that align with the public interest.<sup>62</sup> When government support is provided to meet a public health purpose, there must be a much stronger emphasis on demonstrably meeting public health needs.

To ensure that the public contribution to health R&D is taken into account in guaranteeing wide availability and fair prices ex-ante, conditions on affordability and access must be attached to public funding. Commitment to ensuring public return in particular from a health perspective must be made and agreed to by all actors in the innovation ecosystem. Conditions can also include a commitment for reinvestment of a portion of the company's profits into productive health innovation activities or a public innovation fund, and for intellectual property rights to be structured properly, easily licensable and not too long or narrow.<sup>31</sup>

## Strengthening the capacity of the public sector in health innovation

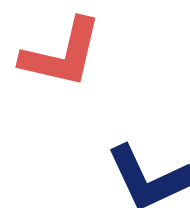
The measures required in the areas above are far-reaching; they involve the deep restructuring of the relationships between finance, productive activities, and labour,<sup>66</sup> and their governance for public interest not just in vaccines, but in the biopharmaceutical sector in general. There is a strong case for a public option in pharmaceuticals: government-provided, quality-assured medicines or vaccines that are universally available at a reasonable and fixed price, which coexist with products from the private sector.<sup>67,68</sup> This can range from the creation of a new business model dedicated to creating a functional, competitive market for pharmaceuticals suffering shortages (e.g. Civica Rx),<sup>69</sup> subsidized non-profit-making endeavours where market forces cannot suffice (e.g. the Drugs for Neglected Diseases initiative (DNDi)),<sup>70</sup> to the state becoming directly involved in – and taking a substantial stake in – coordinating and executing the full range of activities in drug innovation and manufacturing.<sup>71</sup> In all these cases, the state would exert sufficient levels of control over the direction of innovation, i.e. that optimal products are developed according to needs, availability and access.

## 4. Next steps

To deliver the objective of health innovation for the common good, the health innovation ecosystem must be reformed and governed with the explicit goal of delivering benefits to the most people possible globally. To this end, governments must collectively take on an **active health innovation co-shaping and co-creating role**, shifting from a model where the steering of innovation is left to market forces to a model for public, private and community actors to work together for the shared purpose of delivering health innovation for the common good. This means shaping truly symbiotic partnerships between governments, businesses, financial institutions, philanthropic donors, the scientific community and health systems towards a shared purpose. Governance addressing pricing and availability must recognize the public sector's risk-taking, scientific and technological contributions, and financing. Value that is collectively created must be collectively shared.

This brief makes the case for an inclusive and equitable end-to-end health innovation ecosystem able to deliver the appropriate medical technologies required to achieve Health for All, and outlines the key principles for pivoting towards the new ecosystem. In the long term, the six building blocks highlighted in section 3 are critical to overcoming deep-seated structural problems. In the short term, while building this new ecosystem and starting to adapt health and economic policies towards this common purpose, there is an urgent need to remedy the current inequities in access to COVID-19 innovation by already starting to govern them for the common good.

In implementing these long-term building blocks and urgent actions, governments and multilateral actors should strongly caution against quick fixes for the current gaps, and instead, use them as starting points for a new health innovation ecosystem for the common good. This requires moving beyond cutting and pasting any particular solution, to build on the principles put forward in this brief and to expand the horizon of what is possible with a new ecosystem. Given this goal, there needs to be less ideology in approaches, and much more urgency to build forward better, as COVID-19 has demonstrated that business-as-usual is no longer a viable option. In its role as an independent advisory body to WHO and its Director-General, the Council will continue to provide a strong and progressive voice in rethinking the existing narrative and reshaping the economy with the objective of Health for All. This includes exploring further considerations for health innovation as well as its other three streams of work – measurement and value, capacity and finance – going forward.



**“It is with profound sadness that we learnt the tragic news that one of our Council members, Linah Mohohlo, the former Governor of the Bank of Botswana (1999–2016), passed away on 1 June 2021. We were so lucky to have Linah with us for a short time. Her passing is a huge loss to all of us, and to society for which she did so much. We dedicate this first Council brief to Linah.”**

– Professor Mariana Mazzucato, Chair, WHO Council on the Economics of Health for All

The WHO Council on the Economics of Health for All was established on 13 November 2020 to provide guidance on the economics and health agenda of WHO. It is an independent council convened by **Dr Tedros Adhanom Ghebreyesus**, WHO Director-General

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## References

- Bloomberg. More Than 1.74 Billion Shots Given: Covid-19 Vaccine Tracker. Covid-19 Tracker. Published May 27, 2021. Accessed May 27, 2021. <https://www.bloomberg.com/graphics/covid-vaccine-tracker-global-distribution/>
- University of Oxford. COVID-19 vaccine doses administered. Our World in Data. Published 2021. Accessed May 26, 2021. <https://ourworldindata.org/grapher/cumulative-covid-vaccinations>
- World Health Organization. Establishment of a COVID-19 mRNA vaccine technology transfer hub to scale up global manufacturing. WHO News Room. Published April 16, 2021. Accessed May 28, 2021. <https://www.who.int/news-room/articles-detail/establishment-of-a-covid-19-mrna-vaccine-technology-transfer-hub-to-scale-up-global-manufacturing>
- World Health Organization. WHO Coronavirus (COVID-19) Dashboard. World Health Organization. Published 2021. Accessed June 4, 2021. <https://covid19.who.int/info/>
- Robertson H, Travaglia J. The Necropolitics of COVID-19: Will the COVID-19 pandemic reshape national healthcare systems? *The London School of Economics Impact of Social Sciences*. Published May 18, 2020. Accessed May 26, 2021. <https://blogs.lse.ac.uk/impactofsocialsciences/2020/05/18/the-necropolitics-of-covid-19-will-the-covid-19-pandemic-reshape-national-healthcare-systems/>
- Sandset T. The necropolitics of COVID-19: Race, class and slow death in an ongoing pandemic. *Glob Public Health*. Published online March 24, 2021:1-13. doi:10.1080/17441692.2021.1906927
- UCL Institute for Innovation and Public Purpose. Inequality, Unemployment and Precarity. UCL Institute for Innovation and Public Purpose; 2020:1-7. Accessed June 4, 2021. <https://www.ucl.ac.uk/bartlett/public-purpose/publications/2020/may/inequality-unemployment-and-precarity>
- United Nations. United Nations Secretary-General's High-Level Panel on Access to Medicines: Promoting Innovation and Access to Health Technologies. United Nations Secretary-General; 2016:1-70. Accessed May 26, 2021. <http://www.unsgaccessmeds.org/>
- Global Preparedness Monitoring Board. A World at Risk: Annual Report on Global Preparedness for Health Emergencies. World Health Organization; 2019:1-48. Accessed May 28, 2021. [https://apps.who.int/gpmb/assets/annual\\_report/GPMB\\_Annual\\_Report\\_English.pdf](https://apps.who.int/gpmb/assets/annual_report/GPMB_Annual_Report_English.pdf)
- Global Preparedness Monitoring Board. A World in Disorder: Global Preparedness Monitoring Board. World Health Organization; 2020:1-52. Accessed May 28, 2021. [https://apps.who.int/gpmb/assets/annual\\_report/2020/GPMB\\_2020\\_AR\\_EN\\_WEB.pdf](https://apps.who.int/gpmb/assets/annual_report/2020/GPMB_2020_AR_EN_WEB.pdf)
- Independent Panel on Pandemic Preparedness and Response. COVID-19: Make It the Last Pandemic. Independent Panel on Pandemic Preparedness and Response; 2021:86. [https://theindependentpanel.org/wp-content/uploads/2021/05/COVID-19-Make-it-the-Last-Pandemic\\_final.pdf](https://theindependentpanel.org/wp-content/uploads/2021/05/COVID-19-Make-it-the-Last-Pandemic_final.pdf)
- Oxfam. COVID vaccines create 9 new billionaires with combined wealth greater than cost of vaccinating world's poorest countries. Oxfam International. Published May 20, 2021. Accessed May 28, 2021. <https://www.oxfam.org/en/press-releases/covid-vaccines-create-9-new-billionaires-combined-wealth-greater-cost-vaccinating>
- Yamey G, Jamison D, Hanssen O, Soucat A. Financing Global Common Goods for Health: When the World is a Country. *Health Syst Reform*. 2019;5(4):334-349. doi:10.1080/23288604.2019.1663118
- Mazzucato M, Ghosh J, Torreele E, Mariana Mazzucato, Jayati Ghosh and Els Torreele on waiving covid patents. *The Economist*. Published online April 20, 2021. Accessed May 27, 2021. <https://www.economist.com/by-invitation/2021/04/20/mariana-mazzucato-jayati-ghosh-and-els-torreele-on-waiving-covid-patents>
- Agarwal R, Gopinath G. A Proposal to End the COVID-19 Pandemic. *IMF*; 2021:53. Accessed June 4, 2021. <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2021/05/19/A-Proposal-to-End-the-COVID-19-Pandemic-460263>
- UCL Institute for Innovation and Public Purpose. The People's Prescription: Re-Imagining Health Innovation to Deliver Public Value. UCL Institute for Innovation and Public Purpose, Global Justice Now, Just Treatment, and STOPAIDS; 2018:60. Accessed June 4, 2021. <https://www.ucl.ac.uk/bartlett/public-purpose/publications/2018/oct/peoples-prescription>
- Torreele E, Kazatchkine M, Mazzucato M. Preparing for the next pandemic requires public health focused industrial policy. *The BMJ Opinion*. Published April 1, 2021. Accessed June 4, 2021. <https://blogs.bmj.com/bmj/2021/04/01/preparing-for-the-next-pandemic-requires-public-health-focused-industrial-policy/>
- Lurie N, Keusch GT, Dzau VJ. Urgent lessons from COVID 19: why the world needs a standing, coordinated system and sustainable financing for global research and development. *The Lancet*. 2021;397(10280):1229-1236. doi:10.1016/S0140-6736(21)00503-1
- Mazzucato M. *Mission Economy: A Moonshot Guide to Changing Capitalism*. Penguin Books Ltd; 2021. Accessed May 27, 2021. / books/315191/mission-economy/9780241419731
- Mazzucato M, Roy V. Rethinking Value in Health Innovation: From Mystifications towards Prescriptions. UCL Institute for Innovation and Public Purpose; 2017:1-34. Accessed June 4, 2021. [https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/iipp\\_working\\_paper\\_rethinking\\_value\\_in\\_health\\_innovation\\_1.pdf](https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/iipp_working_paper_rethinking_value_in_health_innovation_1.pdf)
- Business Roundtable. Business Roundtable Redefines the Purpose of a Corporation to Promote 'An Economy That Serves All Americans.' *Business Roundtable Corporate Governance*. Published August 19, 2019. Accessed June 4, 2021. <https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans>
- Torreele E. Business-as-Usual will not Deliver the COVID-19 Vaccines We Need. *Dev*. 2020:1-9. doi:10.1057/s41301-020-00261-1
- Röttingen J-A, Regmi S, Eide M, et al. Mapping of available health research and development data: what's there, what's missing, and what role is there for a global observatory? *Lancet Lond Engl*. 2013;382(9900):1286-1307. doi:10.1016/S0140-6736(13)61046-6
- Moran M. Debating the scope of a health research and development convention. *Bull World Health Organ*. 2013;91(8):618-620. doi:10.2471/BLT.12.110486.
- Singer AC, Kirchhelle C, Roberts AP. (Inter)nationalising the antibiotic research and development pipeline. *Lancet Infect Dis*. 2020;20(2):e54-e62. doi:10.1016/S1473-3099(19)30552-3
- Marselis D, Hordijk L. From blockbuster to "nichebuster": how a flawed legislation helped create a new profit model for the drug industry. *BMJ*. 2020;370:m2983. doi:10.1136/bmj.m2983
- Baker D. *Rigged: How Globalization and the Rules of the Modern Economy Were Structured to Make the Rich Richer*. Center for Economic and Policy Research; 2017.
- Baker D, Jayadev A, Stiglitz JE. *Innovation, Intellectual Property, and Development: A Better Set of Approaches for the 21st Century*. Published online 2017:1-89. doi:10.7916/d8-xg80-ct59
- International Human Genome Sequencing Consortium WIFBR Center For Genome Research, Lander, Eric S, Linton LM, Birren B, et al. Initial sequencing and analysis of the human genome. *Nature*. 2001;409(6822):860-921. doi:10.1038/35057062
- Sulston J, Ferry G. *The Common Thread: A Story of Science, Politics, Ethics and the Human Genome*. Random House; 2003.
- Mazzoleni R, Nelson RR. Economic Theories about the Benefits and Costs of Patents. *J Econ Issues*. 1998;32(4):1031-1052. Accessed May 27, 2021. <https://www.jstor.org/stable/4227385>
- Baumol WJ. *Entrepreneurship: Productive, Unproductive, and Destructive*. *J Polit Econ*. 1990;98(5):893-921. Accessed June 4, 2021. <https://www.jstor.org/stable/2937617>
- I MAK. Overpatented, Overpriced Keytruda's Patent Wall. I MAK; 2021:1-7. Accessed May 30, 2021. <https://www.i-mak.org/wp-content/uploads/2021/05/i-mak.keytruda.report-2021-05-06F.pdf>
- Krishtel P, Malpani R. Suspend intellectual property rights for covid-19 vaccines. *BMJ*. 2021;373:n1344. doi:10.1136/bmj.n1344
- Torreele E. Collective intelligence will deliver the best Covid-19 vaccine. *STAT*. Published June 10, 2020. Accessed May 30, 2021. <https://www.statnews.com/2020/06/10/collective-intelligence-not-market-competition-deliver-best-covid-19-vaccine/>
- Reichman J. Rethinking the Role of Clinical Trial Data in International Intellectual Property Law: The case for a public goods approach. *Marquette Intellect Prop Law Rev*. 2009;13(1):1-68. Accessed June 4, 2021. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2860741/>
- World Health Assembly. *Improving the Transparency of Markets for Medicines, Vaccines, and Other Health Products*; 2019:3. [https://apps.who.int/gb/ebwha/pdf\\_files/WHA72/A72\\_R8-en.pdf](https://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_R8-en.pdf)

38. Lazonick W, Tulum Ö, Hopkins M, Sakinç ME, Jacobson K. Financialization of the U.S. Pharmaceutical Industry. *Inst New Econ Think*. Published online December 2, 2019. Accessed May 27, 2021. <https://www.ineteconomics.org/perspectives/blog/financialization-us-pharma-industry>
39. Lazonick W, Mazzucato M. The Risk-reward Nexus in the Innovation-inequality Relationship: who takes the risks? Who gets the rewards? *Ind Corp Change*. 2013;22(4):1093-1128. doi:10.1093/icc/dtt019
40. Arora A, Belenzon S, Pataconi A. Killing the Golden Goose? The Decline of Science in Corporate R&D. *National Bureau of Economic Research*; 2015. doi:10.3386/w20902
41. Pacheco I. Insiders at Covid-19 Vaccine Makers Sold Nearly \$500 Million of Stock Last Year. *Wall Street Journal*. <https://www.wsj.com/articles/insiders-at-covid-19-vaccine-makers-sold-nearly-500-million-of-stock-last-year-11613557801>. Published February 17, 2021. Accessed May 27, 2021.
42. Whitfill T. Pharma companies should prioritize innovation, not shareholders. *STAT*. Published April 23, 2021. Accessed May 27, 2021. <https://www.statnews.com/2021/04/23/create-value-shareholders-pharma-companies-prioritize-innovation/>
43. World Health Organization. *Global Vaccine Market Report*. World Health Organization; 2020:14. Accessed May 27, 2021. [https://www.who.int/immunization/programmes\\_systems/procurement/mi4a/platform/module2/2020\\_Global\\_Vaccine\\_Market\\_Report.pdf?ua=1](https://www.who.int/immunization/programmes_systems/procurement/mi4a/platform/module2/2020_Global_Vaccine_Market_Report.pdf?ua=1)
44. Nayak RK, Avorn J, Kesselheim AS. Public sector financial support for late stage discovery of new drugs in the United States: cohort study. *BMJ*. 2019;367:l5766. doi:10.1136/bmj.l5766
45. Allen A. For Billion-Dollar COVID Vaccines, Basic Government-Funded Science Laid the Groundwork. *Scientific American*. Published November 18, 2020. Accessed May 27, 2021. <https://www.scientificamerican.com/article/for-billion-dollar-covid-vaccines-basic-government-funded-science-laid-the-groundwork/>
46. Baker S, Koons C. Inside Operation Warp Speed's \$18 Billion Sprint for a Vaccine. *Bloomberg Business Week*. <https://www.bloomberg.com/news/features/2020-10-29/inside-operation-warp-speed-s-18-billion-sprint-for-a-vaccine>. Published October 29, 2020. Accessed May 27, 2021.
47. Reuters. BioNTech wins \$445 million German grant for COVID-19 vaccine. *Reuters*. <https://www.reuters.com/article/health-coronavirus-germany-vaccine-idUSKBN2661KP>. Published September 15, 2020. Accessed May 27, 2021.
48. Cross S, Rho Y, Reddy H, et al. Who funded the research behind the Oxford-AstraZeneca COVID-19 vaccine? Approximating the funding to the University of Oxford for the research and development of the ChAdOx vaccine technology. *medRxiv*. Published online April 10, 2021:2021.04.08.21255103. doi:10.1101/2021.04.08.21255103
49. Mazzucato M, Momenghalibaf A. Drug Companies Will Make a Killing From Coronavirus. *New York Times*. <https://www.nytimes.com/2020/03/18/opinion/coronavirus-vaccine-cost.html?partner=IFTTT>. Published March 18, 2020. Accessed May 27, 2021.
50. Mazzucato M, Roy V. Rethinking Value in Health Innovation: From mystifications towards prescriptions. *J Econ Policy Reform*. 2018;22(2):101-119. doi:10.1080/17487870.2018.1509712
51. Hill A, Barber M, Gotham D. Estimated costs of production and potential prices for the WHO Essential Medicines List. *Br Med J Glob Health*. 2018;3. doi:10.1136/bmjgh-2017-000571
52. Moon S, Stephanie Mariat, Kamae I, Pedersen HB. Defining the concept of fair pricing for medicines. *BMJ*. 2020;368:l4726. doi:10.1136/bmj.l4726
53. Mazzucato M. *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. Penguin; 2018.
54. Lazonick W, Mazzucato M. The Risk-Reward: Innovation, Finance and Inclusive Growth. *Policy Network*; 2012:30. <http://www.theairnet.org/files/research/mazzucato/Risk-Reward%20Nexus%20.pdf>
55. Mazzucato M, Li HL. A Market Shaping Approach for the Biopharmaceutical Industry: Governing Innovation Towards the Public Interest. *J Law Med Ethics*. 2021;49(1):39-49. doi:10.1017/jme.2021.8
56. U.S. Department of Health and Human Services. HHS Launches First Venture Capital Partnership to Develop Transformative Technologies to Combat Future Pandemics, Other Health Emergencies. *HHS.gov*. Published June 1, 2021. Accessed June 4, 2021. <https://www.hhs.gov/about/news/2021/06/01/hhs-launches-first-venture-capital-partnership-develop-transformative-technologies-combat-future-pandemic.html>
57. World Health Organization. The Access to COVID-19 Tools (ACT) Accelerator. *World Health Organization:Newsroom*. Published 2021. Accessed June 4, 2021. <https://www.who.int/initiatives/act-accelerator>
58. World Health Organization. WHO COVID-19 Technology Access Pool. *WHO Initiatives*. Published 2021. Accessed May 28, 2021. <https://www.who.int/initiatives/covid-19-technology-access-pool>
59. Nature. A patent waiver on COVID vaccines is right and fair. *Nature*. 2021;593(7860):478-478. doi:10.1038/d41586-021-01242-1
60. Thambisetty S, McMahon A, McDonagh L, Kang HY, Duffield G. The TRIPS Intellectual Property Waiver Proposal: Creating the Right Incentives in Patent Law and Politics to End the COVID-19 Pandemic. *Social Science Research Network*; 2021. doi:10.2139/ssrn.3851737
61. Tulum Ö, Lazonick W. Financialized Corporations in a National Innovation System: The U.S. Pharmaceutical Industry. *Int J Polit Econ*. 2018;47(3-4):281-316. doi:10.1080/08911916.2018.1549842
62. World Economic Forum. Building Back Broader: Policy Pathways for an Economic Transformation. *Centre for the New Economy and Society, World Economic Forum*; 2021:1-77. Accessed June 4, 2021. [http://www3.weforum.org/docs/WEF\\_GFC\\_NES\\_Policy\\_Pathways\\_for\\_an\\_Economic\\_Transformation\\_2021.pdf](http://www3.weforum.org/docs/WEF_GFC_NES_Policy_Pathways_for_an_Economic_Transformation_2021.pdf)
63. Mazzucato M. Let's Get Real About Purpose | by Mariana Mazzucato. *Project Syndicate*. Published January 14, 2019. Accessed June 4, 2021. <https://www.project-syndicate.org/commentary/capitalism-should-focus-on-purpose-not-price-by-mariana-mazzucato-2019-01>
64. Lazonick W. Profits Without Prosperity: How Stock Buy-backs Manipulate the Market and Leave Most Americans Worse Off. In: ; 2014. Accessed May 28, 2021. [https://www.ineteconomics.org/uploads/papers/LAZONICK\\_William\\_Profits-without-Prosperity-20140406.pdf](https://www.ineteconomics.org/uploads/papers/LAZONICK_William_Profits-without-Prosperity-20140406.pdf)
65. Africa Centres for Disease Control and Prevention, African Union. African Union and Africa CDC launches Partnerships for African Vaccine Manufacturing (PAVM), framework to achieve it and signs 2 MoUs. *Africa CDC*. Published April 2021. Accessed June 4, 2021. <https://africacdc.org/news-item/african-union-and-africa-cdc-launches-partnerships-for-african-vaccine-manufacturing-pavm-framework-to-achieve-it-and-signs-2-mous/>
66. Chang H-J, Andreoni A. Industrial Policy in the 21st Century. *Dev Change*. 2020;51(2):324-351. doi:https://doi.org/10.1111/dech.12570
67. Brown D. Medicine For All: The Case for a Public Option in the Pharmaceutical Industry. *Democracy Collaborative*; 2019:1-92. Accessed May 28, 2021. <https://thenextsystem.org/medicinesforall>
68. Mazzucato M, Li HL. The Entrepreneurial State and Public Options: Socialising Risks and Rewards. *UCL Institute for Innovation and Public Purpose*; 2020:1-30. Accessed June 4, 2021. <https://www.ucl.ac.uk/bartlett/public-purpose/publications/2020/dec/entrepreneurial-state-and-public-options-socialising-risks-and-rewards>
69. Roehr B. US hospitals launch non-profit generic drug producer to counter rising prices. *BMJ*. 2018;362:k3840. doi:10.1136/bmj.k3840
70. Darrow JJ, Sinha MS, Kesselheim AS. When Markets Fail: Patents and Infectious Disease Products. *Food Drug Law J*. 2018;73(3):361-382. Accessed May 28, 2021. <https://www.jstor.org/stable/26661184>
71. Sarpatwari A, Brown D, Kesselheim AS. Development of a National Public Pharmaceutical Research and Development Institute. *J Law Med Ethics*. 2020;48(1):225-227. doi:10.1177/1073110520917023

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