Speaking Out

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Tech sharing, not tech hoarding: Covid-19, global solidarity, and the failed responsibility of the pharmaceutical industry

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Abstract

The Covid-19 pandemic has highlighted the importance of health technologies to mitigate against the spread of the disease and improve care, dominantly including life-saving vaccines. But the pandemic has also highlighted that the current biopharmaceutical business model, based on the enclosure of these technologies and on the immense accumulation of capital it enables, leads to vast inequalities in healthcare particularly in low and middle-income countries. We believe that the pharmaceutical industry has a moral duty to enable and enact global solidarity through tech sharing instead of tech hoarding, but judging by current technology transfer practices we question their willingness to assume their role in organizing healthcare markets through solidaristic principles. In the absence of a voluntary adoption of solidaristic principles and practices by biopharmaceutical firms, the institutionalization of global solidarity as a fundamental organizing principle for healthcare markets is necessary to strengthen resilience and know-how globally. With this call, we add to existing conceptualizations of solidarity by (a) introducing a global level of solidarity and (b) thinking through the concept not as an abstract humanistic stance but as a concrete organizing principle for global healthcare markets.

Keywords

Covid-19 pandemic, global solidarity, low and middle-income countries, pharmaceutical industry, technology transfer

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Introduction

In mid-February 2022, the President of the African Union, Ghana's and Rwanda's Presidents, the WHO's Director-General, and the German Minister for Development all joined a press conference from a manufacturing site belonging to the German biopharmaceutical firm BioNtech. During this press conference, BioNTech announced that they would ship so-called "BioNTainers" to several sites in Africa—containers that house a modular mRNA vaccine manufacturing assembly line.[1] This, it was proudly stated, would be the first node in a "decentralized and robust African end-to-end [vaccine] manufacturing network."[2] Yet, global justice campaigners derided the move as a "neo-colonial (publicity) stunt" (Global Justice for Now, 2022). What is worse, reports emerged that BioNTech might have strategically thwarted efforts to sustainably scale up global vaccine production through the commissioning of a report that sought to undermine a World Health Organization (WHO)-supported African mRNA technology transfer hub (Davies, 2022).

Such behaviors would in fact be well in keeping with Covid-19 vaccine manufacturers' 2-year track record of stalling efforts at opening up vaccine patents and know-how to other global manufacturers. Indeed, judging by the stark inequalities in Covid-19 vaccine distribution and severe supply chain shortages during the pandemic, these pharmaceutical firms have clearly failed to move beyond a narrow profit focus toward enabling a more solidaristic way of organizing pharmaceutical manufacturing and distribution globally. In early 2022, while 63% of the world's population were fully vaccinated, vaccination rates in many lower-income countries (LMICs) remained extremely low. Burundi, Congo, Haiti, Chad, and Yemen had first-time vaccination rates of less than 1.5% (Holden, 2022), and in most African countries the rate was well below 15% (Zakiyah, 2022). Even when accounting for other factors such as health systems readiness, it is now clear that vaccine supply shortages and manufacturing concentration cost millions of lives during the pandemic (Watson et al., 2022). Africa, for instance, currently imports 99% of its vaccine consumption (Ekström et al., 2021), and many African countries simply could not compete with the EU or North American countries in the race for vaccine supplies. Against claims from vaccine producers that they would be unable to find suitable manufacturing partners, civil society organizations repeatedly highlighted that there were enough vaccine-ready manufacturers in LMICs to alleviate supply shortages: there were at least seven factories in Africa and as many as 100 in LMICs worldwide that could be upskilled to ramp up vaccine production at short notice—if only vaccine manufacturers were willing to share their vaccine patents and know-how (Human Rights Watch, 2021; Nolan, 2021).

This abysmal failure of assuming global responsibility for vaccine coverage stands in stark contrast to vaccine manufacturers' financial performance, which has been likened to wartime profiteering (Kollewe, 2022): Pfizer and BioNTech have reportedly earned a pre-tax profit of around US$37 billion from the sale of their Covid-19 vaccine in 2021,[3] and Moderna reported pre-tax profits of another US$12 billion (Murphy, 2022), creating nine new "Covid pharma billionaires" (Ziady, 2021). Yet, the current Covid-19 mRNA vaccines were developed through considerable public funding—in the case of the Moderna vaccine this amounted to US$2.5 billion at least (Lalani et al., 2022). Clearly, it is the pharmaceutical companies' duty to share the resulting intellectual property rights (IRPs), know-how, and technical expertise as a global public good (Medecins Sans Frontiers [MSF], 2021); but in a context where global vaccine supply remained substantially smaller than demand, LMICs in particular have been left behind.

For many access to medicines campaigners, this failure has engendered not just outrage, but also an overwhelming sense of déjà-vu: they had already fought against a profit-hungry industry refusing to share patents with generics manufacturers in the Global South in the HIV/AIDS crisis in the early 2000s (Mbali, 2013). And campaigners have continued to fight against precipitous

medicines price hikes and patent enclosures by a highly financialized and powerful industry ever since, including, since the 2010s, in high-income countries (Bourgeron and Geiger, 2022a). Yet, while arguments and oppositional stances between activists and the pharma industry might be similar to previous confrontations, we believe the Covid-19 outbreak shifted the basis of this discussion: Covid-19 showed global health equality *not simply* to be an issue of pitching profits against human lives (which may always remain a matter of perspective), but a matter of global solidarity and, ultimately, common sense. After all, in a pandemic, "no-one is safe until everyone is safe," in the now-famous words of the WHO's Dr. Mike Ryan.[4]

With this "Speaking out" piece, we thus wish to shift the conversation on pharmaceutical firms' moral responsibility, which has previously been tackled from the perspectives of global corporate social responsibility (Flanagan and Whiteman, 2007), Rawlsian justice theory (Amado and Gewertz, 2004), and ethical cost-benefit analysis (Oppenheimer et al., 2015). These analyses typically conclude with mixed views on whether or not pharmaceutical firms carry responsibilities above and beyond those toward their shareholders and immediate stakeholders. We argue that this inconclusiveness is at least partly related to the level of analysis taken in previous studies, which often compare (measurable and specific) industry interests to a relatively abstract moral or common good. This paper aims to deploy and update the concept of solidarity—defined as an "enacted commitment to carry costs to assist others who are in some respect similar to oneself" (Prainsack and Buyx, 2017: 52)—as a principle of organizing for mutual advantage, rather than a subjective humanistic stance, which in the case of vaccines may be concretized through the build-up of a polycentric global manufacturing and supply chain ecosystem (Paiva and Miguel, 2022). In a world that is utterly interdependent, solidarity seen as an organizing principle may help transform health systems globally through guiding concrete collective action.

We focus particularly on the role that technology transfers could play as a mechanism to relieve manufacturing and supply chain pressures (Geiger and McMahon, 2021). Technology transfers are defined as "a process by which commercial technology is disseminated" (Sampath and Roffe, 2012: 14). By making available intellectual property rights (IRPs), manufacturing know-how and technical expertise (World Intellectual Property Organization, 2021), technology transfers can hold significant potential to strengthen the scientific and technological capabilities of many LMICs (UNCTAD, 1996), bringing the world a step closer toward global solidarity. Technology transfers are admittedly often complex and costly for pharmaceutical firms (Van Arnum, 2014). Accordingly, our analysis of current tech transfer practices shows that they remain fragmented, with solidaristic motives often completely absent. Yet, we argue that these costs are necessary to be carried in order to enable and enact global solidarity. In the absence of meaningful voluntary engagement by big pharma, we conclude that the institutionalization and enforcement of solidarity at a global level is the only viable path to building up pharmaceutical know-how globally and to help prevent the world from ever falling hostage to a handful of pharmaceutical manufacturers again.

We focus our inquiry on mRNA vaccines. Not only does this technology hold the key to global vaccination success against Covid-19, but it is also a highly promising future technology for diseases that thus far were considered impossible to vaccinate against, including HIV/AIDS and selected cancers. Scientists have predicted that mRNA technology could be a particularly important technology for local production in LMICs (Ekström et al., 2021). We understand that not all manufacturers in LMICs are equally production-ready in the short run (Alam et al., 2021; Sell et al., 2021). Yet, in the longer term, all global regions need to be enabled to develop local vaccine manufacturing ecosystems and capabilities to prevent dependencies in the future. Until such regional R&D knowledge ecosystems emerge organically (Alam et al., 2021), technology transfer seems to be the most direct path to achieving this goal. The Covid-19 pandemic has starkly put into relief the vast inequalities in healthcare worldwide, many of which are remnants of centuries of

colonial exploitation and injustices (Geiger and Conlan, 2022; Oldekop et al., 2020). Despite the presence of global supply chains (Gereffi, 2020; Oldekop et al., 2020), the poorest countries are still in a position where their economic, political, social, and environmental development hinges on the collective efforts, actions, and policies of the global citizenry. Stakeholders including civic society, local governments, non-profit institutions, private industry, and international aid organizations now need to urgently work together to strengthen healthcare systems and sustainability everywhere.

Solidarity and global health

The Oxford Learner's Dictionary (2022: n.p.) describes solidarity as the "support by one person or group of people for another because they share feelings, opinions, aims, etc." As mentioned before, solidarity rests on the principle of similarity and recognition—of seeing a common humanity and a shared destiny in others. Durkheim (1964) described it as a state of mutual dependence through common adversity, goals, or the sharing of situations. This sense of sharedness or similarity-in-difference ties people, organizations, or even nations together and enables a "commitment to carry costs" for the benefit of others (Prainsack and Buyx, 2017). Adding to this "solidarity as beneficence" conception, Horne (2023: forthcoming) has suggested that "solidarity as mutual advantage" may be a more actionable principle for solidaristic institution-building in healthcare, particularly in situations where "there is some plausible need to 'stand together' in order to achieve [a] shared goal" (n.p.). In the pandemic, this mutual dependence and enlightened self-interest became plainly visible: the Coronavirus is unlikely to disappear until everyone on the planet is vaccinated or otherwise immune, and until such time global economies are likely to suffer too (Jordà et al., 2020).

Prainsack and Buyx (2012) posit that solidarity can exist across three different tiers. Tier-1, the *interpersonal level*, relies on the individuals "standing with and up for each other"; a pandemic example at this tier may be the UNICEF "buy one give one" campaign where individuals could donate money for vaccines in countries of need (UNICEF, 2022). Tier-2, the *group level*, hinges on a shared and agreed-upon commitment to carry costs at a group level; in the pandemic, societal agreement that the elderly and healthcare workers should be vaccinated first could slot into this level. Prainsack and Buyx's tier-3, the *contractual/legal level*, is related to policy-led arrangements or institutionalized assistance; a state's solidaristic health insurance system may fall into this category. While Prainsack and Buyx (2017) note that solidarity is primarily a voluntary interpersonal act, they thus also argue that it ought to be imprinted into the DNA of modern social and political institutions.

We note three issues with Prainsack and Buyx's definition of solidarity: first, while solidarity is seen as an interpersonal concept driven by the sense of "sameness" in some vital respect, the framework seems to jump from a conception of solidarity as enacted personal or interpersonal practice (tiers 1 and 2) to the institutional level without much consideration as to the influence of stakeholders situated "between" citizens and the state (civil society, industry, interest groups etc.). Second, the framework does not engage in the question of how solidarity may be used as an organizing principle when moving from one level to the next. And third, their institutional tier 3 is thought out at the level of the nation-state; the fact that solidaristic organizing may be needed beyond this national level is not mentioned in their framework (though see West-Oram and Buyx, 2017). With our pandemic reflections below, we thus update their notion of solidary three-fold: we apply the solidarity concept to the "intermediate" level of institutional (non-state) stakeholders to highlight firms' responsibilities as drivers or blockers of global solidarity; we consider how using solidarity as an organizational principle rather than (inter)personal practice would influence the attainment of health as a human right (UN, 2014, 2015); and most importantly, we add a "tier 4,"

of institutionalized global solidarity, to Prainsack and Buyx's conceptualization (see also Tosam et al., 2018). The next sections will discuss technology transfers as one way of solidaristic organizing across Prainsack and Buyx's (2017) three tiers, highlighting the value of "tech sharing instead of tech hoarding" (Gitahi and Byanyima, 2022) but also outlining the present challenges that have caused the three "lower" tiers to fail in this regard—including the presence of asymmetric power relationships and unwillingness by big pharma to move beyond tokenistic approaches. We then move on to sketch a "tier 4": embedding solidarity as an organizing principle into a considerably strengthened supranational level of governance.

Global healthcare inequalities and technology transfers

In contrast with the proverbial act of "giving someone a fish"—or donating vaccines to countries in need, as was often the practice during the pandemic—pharmaceutical technology transfers could be equated to "teaching the person how to fish" (Geiger and Conlan, 2022): building up regional capacity for pharmaceutical production and consequently making supply chains shorter and more resilient (Paiva and Miguel, 2022). In theory at least, technology transfers satisfy multiple elements of solidarity: as enacted commitments of a "collective conscience" (Durkheim, 1964), tech transfers hinge on the definition of common goals, increase social connections, and contain elements of mutual learning (Prainsack and Buyx, 2017). Their solidaristic potential was recognized as far back as the 1980s when the transfer of technology models was suggested by the United Nations (UN) to improve access to medicines issues (Krugman, 1979; Sampath and Roffe, 2012). Building on the ideal of a scientific and medical knowledge commons (Contreras, 2018), the UN had set an expectation that commercial companies would transfer forms of know-how and intellectual property to LMICs, including scientific studies, formulas, ingredients, equipment, training, information about installation, and equipment functioning or cooperation arrangements (UNCTAD, 1996). To provide normative guidance, an "International Code of Conduct on the Transfer of Technology" was drafted in the mid-1980s (Roffe, 1985). The code highlighted virtues such as solidarity, equity, fairness, humanity, and ethical cooperation. What is more, it was a public acknowledgment that patents—the quintessential "anticommons" (Contreras, 2018; Heller, 1998)—are fundamental barriers to achieving sustainable global health (Sampath and Roffe, 2012). Yet, the code was never formally accepted by industry parties, and technology transfers have remained a voluntary practice ever since—much in keeping with a broader reliance on voluntary and self-regulation in pharmaceutical capitalism (Bünder et al., 2022). Against this backdrop, we will briefly put different existing tech transfer practices at each of Prainsack and Buyx' three tiers to the "solidarity" test.

Tier 1: Unilateral or bilateral tech transfer

While Prainsack and Buyx's "tier 1" solidarity describes person-to-person solidaristic acts such as the "Buy one give one" vaccine donation campaign by UNICEF, we use their framework at the organizational level to categorize as tier-1 any unilateral or bilateral voluntary initiatives by individual pharmaceutical firms to transfer their technology, IP, and/or know-how to partners of their choosing. Prior to Covid-19, only a handful of pharmaceutical companies had engaged in not-for-profit technology transfers, and Eli Lilly's multidrug-resistant tuberculosis (TB) program is often seen as an exemplar (Van Arnum, 2014). This technology transfer program succeeded by sharing licenses and knowledge to assist TB research in selected LMICs as well as providing training programs and community support (Lilly, 2011). In an interview with the World Intellectual Property Organization, a Lilly spokesperson stated that while the local production did represent

a breakthrough for patients in these LMICs, the technology transfer process was "complex, resource-intensive and time-consuming" (Jewell, 2015: n.p.), at an estimated cost of US$170 million over 12 years. Not all LMICs have the necessary technical or operating capacity to receive the technology, and suitable partners needed to be found. Other challenges included compliance with international quality assurance schemes, and that transfers only made sense for receiving firms if the local market was big enough to be economically viable. Importantly, the company found that transferring expertise and know-how was much more valuable than transferring a patent alone. Lilly admitted that technology transfers are an important solution but that regulatory processes make it very difficult for pharmaceutical companies to engage. Finally, technology transfers hinge on local pharmaceutical firms' ability to run a sustainable business model, and despite multidrug-resistant tuberculosis continuing to be a significant global problem, Lilly ended up pulling out of this philanthropic effort after 12 years at a time when their share price plateaued and nervous shareholders needed to be assuaged (Google Finance, 2022).

Despite the precedent set by this and a handful of other successful bilateral pharmaceutical technology transfers, voluntary solidaristic (i.e. not primarily profit-oriented) bilateral technology transfer initiatives around Covid-19 vaccines have been extremely slow in coming. Both Moderna and Pfizer/BioNTech have repeatedly stated that manufacturing the mRNA vaccines was "too complex, that it would be too time- and labor-intensive to establish facilities that could do it, and that they cannot spare the staff because of the urgent need to maximize production at their own network of facilities" (Nolan, 2021: np.). Yet, numerous public health experts have pointed out that mRNA vaccine manufacturing is much simpler than the manufacture of traditional vaccines (Nolan, 2021). Eventually, under ever-mounting pressure from global civil society and some politicians, pharma companies did admit that they had staff and resources to set up projects to improve vaccine supply in selective geographies. Moderna stated that it would spend € 437 million to build its vaccine plant in Africa, aiming to fill doses there in 2023 (Davies, 2022). Through the BioNTainer container initiative mentioned at the beginning of this paper, BioNTech, in turn, has promised to set up "turnkey" mRNA manufacturing facilities (BioNTech, 2022).

Such announcements could easily give the impression that vaccine tech transfers at tier-1 (voluntary, bilateral practices) are working just fine. However, these initiatives are focused on selected LMICs only whilst leaving out many others. What is more, while such contract manufacturing (so-called "fill and finish") works to increase vaccine availability in LMICs in the short run, little meaningful long-term transfer of knowledge occurs as a result (Paiva and Miguel, 2022). The voluntary tier 1 (firm-to-firm) approach toward healthcare solidarity is thus deeply problematic: technology transfers are at the complete discretion of the individual pharmaceutical company, which has the power to decide not only if they want to share their technology at all, but also with whom they want to share it, when, and under what conditions.

Tier 2—The "group" level: Multilateral technology transfer

At Prainsack and Buyx's "tier 2" or group level of solidarity, we consider technology transfer programs at the inter-organizational level, including technology access pools and technology transfer hubs, which rely on multilateral agreement and coordination. Access pools represent multiparty public-private partnerships, which manage intellectual property from multiple originator firms and make it available to generic manufacturers in LMICs for free or in return for modest royalties. These pools work by encouraging commercial companies to engage in non-exclusive voluntary licensing of their pharmaceutical patents, which are then pooled with other firms' IP, representing a one-stop shop for generic manufacturers in LIMCs. Prior to Covid-19, the potential of this type of technology transfer to embed solidaristic principles in global health has been demonstrated

through the United Nations-backed Medicines Patent Pool (MPP, 2022). The MPP works by negotiating licenses with patent holders, for instance for HIV/AIDS or TB medicines, which are mostly big pharmaceutical companies or public bodies (Cox, 2012; Geiger and Gross, 2018). It then bundles these patents and licenses them out to local manufacturers who develop a generic version of the licensed medicines, but also at times develop new and locally adjusted drug combinations. The treatments are then made available through the generic manufacturers to a defined set of LMICs. It should be noted, though, that middle-income countries—especially those considered as "viable" markets from a pharmaceutical perspective—are often excluded from the license agreements, thus keeping the actual costs of the arrangement relatively low for pharmaceutical firms, particularly considering the potential public relations "wins" (Geiger and Gross, 2018).

During the pandemic, a Covid-19 Technology Access Pool (C-TAP) was launched in May 2020 in collaboration with the WHO, modeled on the MPP. Explicitly described as a "solidarity call for action," C-TAP aimed to "facilitate timely, equitable, and affordable access" of Covid-19 health technologies to LMICs (World Health Organization [WHO], 2022: n.p.) Importantly, because they are multilateral—that is, patent holders license their patents to the pool rather than to individual manufacturers—access pools have the capacity to alleviate access to medicines issues sustainably through centrally organized pooling, knowledge transfer, and licensing. However, the voluntary nature of industry collaboration remains a significant issue: industry engagement in the pool cannot be enforced, and many pharmaceutical companies outright refuse to contribute intellectual property, data, technology, or know-how. The MPP itself was very slow to take off (Geiger and Gross, 2018), and only recently did it succeed in licensing two Covid-19 treatments for a limited set of countries. For C-TAP, the situation is even worse: no mRNA vaccine manufacturer has expressed willingness to share their patents through this facility: as Geiger and McMahon (2021: n.p.) noted, the pool has remained essentially "empty."

One of the issues highlighted over and over again in relation to Covid-19 vaccines is that the transfer or licensing of IP on its own will not suffice—the transfer of manufacturing know-how is just as important. Similar to technology access pools, technology transfer hubs are examples of solidaristic organizing because they facilitate tech transfers through the sharing or non-exclusive licensing of intellectual property, but they also have a specific mandate of training and transfer of know-how, thus over time contributing to health system strength. Most notable here is Africa's mRNA hub mentioned in the introduction, which was augurated in January 2022 with strong support by the WHO. For the African hub, a collective commitment was made to bring together local businesses (Afrigen Biologics and the Biovac Institute), global organizations (the UN and the MPP) and local policymakers. As part of the efforts around this African mRNA hub, the South African firm Afrigen used publicly available information to reverse-engineer Moderna's Covid-19 vaccine (Davies, 2022), a practice permitted under South African law. However, since the announcement of the hub in mid-2021 neither Moderna nor any other vaccine manufacturer in control of relevant patents, technology, and know-how has agreed to share or collaborate. While Moderna has indicated that they would not legally enforce their patents for the duration of the pandemic, without the active support of mRNA manufacturers, reverse-engineering and manufacturing Covid-19 vaccine is likely to take at least three times as long as it would have taken with manufacturers' support (Nolan, 2021).

In comparison to tier 1 approaches, the multilateral organizational approach at tier 2 manages many aspects of complexity, resources, and time, yet for Covid-19 this tier has also failed to make a significant impact. Vaccine manufacturers have not been moved either through appeals around the public good or through public pressure to become part of the C-TAP facility or the WHO mRNA hub. Their arguments remain the same as for tier-1: technology transfers are too much of a distraction from the profit-making parts of their businesses, and they are too costly. More

concerning though, big pharma has been found to actively work against solidaristic organizations such as pools and hubs. An investigative report published in the BMJ (Davies, 2022) suggests that BioNTech has ramped up its PR machine to work against the hub by hiring a consultancy company, which reportedly told African governments that the WHO project was "doomed" while heavily promoting BioNTech turnkey' mRNA manufacturing facility instead.

Multilateral solidaristic organizing provides sensible logistical solutions to build up a sustainable pharmaceutical manufacturing infrastructure in LMICs, yet asymmetric power relationships between LMIC governments and big pharma allow the latter to dismiss or even work actively against the former. The experience with C-TAP and the WHO mRNA hub has evidenced the results of a voluntary, solidarity-driven mechanism that no multinational company deems necessary to join.

Tier 3: The (national) institutional level of solidarity

The institutional or legal level of solidarity, as suggested by Prainsack and Buyx (2012), is where the "voluntariness" of solidarity slides into a mandatory commitment on the basis of institutional or societal agreement. With regard to technology transfers, two mechanisms could be located at this level: compulsory licensing through so-called TRIPS flexibilities, which would involve individual governments temporarily removing patent exclusivities from vaccine manufacturers to enable generic production in their countries, and the introduction of conditionalities by governments in high-income countries (HICs) in return for public funding and support for national pharmaceutical manufacturers.

TRIPS, the Agreement on Trade-Related Aspects of Intellectual Property Rights implemented by the World Trade Organization in 1995, legislates global rights over trademarks, copyrights, patents, information, and designs and imposes enforcement and dispute resolution procedures (World Trad Organization [WTO], 2022a, 2022b). Simply put, it mandates a uniform IP system globally, and it is arguably the main reason why technology transfer is necessary in the first place. Prior to TRIPS, many countries had their own intellectual property regulations, with some excluding pharmaceuticals from patenting altogether. However, the TRIPS agreement meant that countries had to accept patents as a global institutionalized mechanism, modeled on the interests of HIC governments eager to fortify their innovative industries (Hoen et al., 2011). The TRIPS agreement gave commercial firms the right to carefully define their products' regional and global circulation and defend those rights locally and globally. TRIPS forced many LMICs to come to grips with the issue of intellectual property, setting up laws, boundaries, and controls, though often in an incomplete and dislocated manner (Cloatre, 2013). The sheer absence of IP expertise and institutions in many LMICs, and the chilling effects TRIPS had on indigenous generic manufacturers afraid to be sued by Western pharmaceutical giants, meant that many LMICs have become ever more dependent on pharmaceutical manufacturers in HICs (Cimoli et al., 2009).

The first test of the new TRIPS regime came shortly after its adoption in the shape of the global HIV/AIDS crisis. Patents on high-priced HIV/AIDS medicines in the late 1990s contributed to an estimated 12 million avoidable deaths in LMICs—avoidable if the IP regime had allowed for local manufacturing of cheaper generic alternatives (Gitahi and Byanyima, 2022). A concerted global protest eventually led to the international community responding in 2001 with the Doha Declaration, which could be understood as a nod toward solidarity at tier-3. The Declaration reinforces the idea that intellectual property contributes to "economic growth, development, and employment" and that economic growth plays a major role in the "alleviation of poverty" (Part 2), but it also recognizes the "vulnerability of the least-developed countries" (Part 3) (WTO, 2001: n.p.). The Doha Declaration emphasizes the so-called "Flexibilities" in Article 31 of TRIPS, which states that

individual member states have the right to seek compulsory licenses from IP holders on specific grounds, but leaves it up to governments to determine those grounds (Correa, 2002).

In the context of Covid-19, compulsory licensing would mean that individual governments could take legal measures to force vaccine manufacturers to share their IP for reasons of *ordre public*. However, as previous compulsory licensing cases in the context of HIV/AIDS poignantly illustrate (MSF, 2009), this type of (involuntary) technology transfer has to be enforced through lengthy and legal procedures, often against threats of retaliation by originator manufacturers' home governments, and one nation and one patent at a time. It is thus impractical for global health emergencies and has not been invoked in the context of Covid-19 technologies (which are often protected by multiple patents), demonstrating its near-ineffectiveness in health emergencies.

As existing "TRIPS flexibilities" proved too unwieldy to help solve Covid-19 vaccination inequity, many legal commentators and civil society organizations started to support a blanket TRIPS waiver for health technologies related to Covid-19 (Thambisetty et al., 2021). Through this waiver, intellectual property rights would temporarily be removed for all Covid-19 related health technologies, paving the way for LMICs to gain access to lifesaving medical technologies. The original waiver proposal has been explicitly linked to global solidarity and equity (MSF, 2021). Yet, whilst the WTO, after long negotiations, agreed to a "compromise" text focused on better use of compulsory licensing in mid-2022, the original waiver's main points and solidaristic principles were not maintained (Thambisetty et al., 2022).

Given these issues, one alternative raised by access to medicines activists to institutionalize solidaristic principles into national-level (tier-3) legislation would be the introduction of so-called "conditionalities" into public R&D subsidies (Krikorian and Torreele, 2022). As mentioned before, most pharmaceutical R&D relies heavily on fundamental research conducted in the knowledge commons, for instance through universities or national institutes of science; it also heavily relies on national subsidies such as tax breaks and investment incentives. In the case of mRNA Covid-19 vaccines, public subsidies and research funding amounted to billions of dollars, which meant that the public essentially paid twice for their vaccines—once during development and once when governments bought the final products. And yet, this same public had no way of pushing vaccine manufacturers to be more concerned with global solidarity. R&D conditionalities would either make it a legal duty for pharma companies in receipt of public R&D subsidies to license out the ensuing IP to generic manufacturers or alternatively to sell medicines below an agreed-upon price ceiling, setting clear limits to the prices the industry can charge for new drugs. However, while thinkable at the tier-3 level of national legislation, the extent to which such conditionalities could be enforced across global markets is unclear.

Strengthening "tier-4" for global solidarity

Evidently, the current efforts to organize healthcare solidarity through technology transfer across tiers 1, 2, and 3 have yielded little tangible improvement to Covid-19 vaccine inequity, which does not bode well for future health emergencies. Tier 1 fails because of its reliance on voluntary solidaristic gestures of individual pharmaceutical companies, which are highly selective, often covertly profit-oriented, and neither scalable nor equitable. Even if big pharma engages in technology transfers with production-ready firms in LMICs, they can choose what to share, when and with whom, and prior experience has shown that firms will make these decisions to maximize public relations "wins" while typically minimizing economic costs. Tier 2 encompasses technology transfer at the interorganizational level through solidaristic organizations such as patent pools or hubs. It makes tech transfer cheaper and less complex for originator companies. However, because it remains purely voluntary, it has received apathetic and in some cases even hostile responses from

vaccine manufacturers during the pandemic (Davies, 2022). At tier 3, voluntariness and reciprocity are replaced by institutional enforcement at the national or regional level, in theory at least. However, entangled networks of power between HIC governments and pharma firms as well as self-interest by rich governments have resulted in egregious cases of vaccine nationalism during Covid-19 and economic protectionism. As current capitalist accumulation regimes are cemented in place, institutionalized solidaristic mechanisms such as TRIPS Flexibilities become rarely activated at a national level, and global inequalities fail to get addressed.

To truly reorient the system toward the "global public interest" (Swaminathan et al., 2022), we propose to add a fourth one to Prainsack and Buyx's (2017) three solidarity tiers: the global level. We believe that only solidarity that is organized and harmonized at a *global* level, with equal voices by all concerned, would be able to overcome the power positions of Big Pharma manufacturers and their protectionist governments. Tier-4 global solidarity would be globally organized and governed by strong supranational institutions, for instance a much-strengthened WHO, replacing what Kickbusch and Holzscheiter (2021: n.p.) have diagnosed as a "highly fragmented and often poorly synchronized [global] institutional patchwork." We admit that post-Covid, this suggestion may appear more utopian than ever, given the powerful after-effects of vaccine nationalism, the dominance of private governance regimes, and the weakness of the WHO as a decision-making organ relative to the WTO. Entrenched power relationships produce lasting effects, and it will take a concerted effort by the global community to shift the global pharmaceutical industrial complex from profit maximization toward global solidarity (Katz et al., 2021; Kayo, 2020). Yet, we believe that an important window of opportunity has just opened to cement global solidarity as one organizing principle for the global pharmaceutical industry: the WHO Pandemic Treaty negotiations.

The negotiations for a Pandemic Treaty commenced at the United Nations in March 2022, with a view toward adopting a text by 2024 (EU, 2022). Recognizing the simple fact that "viruses do not recognize borders,"[5] the treaty's aim is a much tighter international cooperation around a "One Health" approach in times of crisis. In keeping with our focus on tech transfers, the Treaty foresees the "sharing of monitoring data, genetic data, samples, technology and their associated benefits" (EU, 2022). Explicitly guided by a "spirit of collective solidarity," universal access to essential supplies, medicines, diagnostics, and highly resilient manufacturing chains stand at the center of this proposal (EU, 2022). Importantly, many of the voices calling for and leading into the treaty negotiations stem from LMICs and thus bring global solidarity and equity into its core (Olatunbosun-Alakija, 2021). In addition, voices both from LMICs and some HICs emphasize how critical it is that the treaty should be legally binding on all signatories to prevent future opt outs by rich governments and to ensure an "all-of-government and all-of-society approach" (Ministers for Health, 2021).

While the likely lengthy negotiations may yet water down the solidaristic spirit of the initial proposal (McMahon and Geiger, 2022), there are precedents to such a powerful shift toward an internationally binding convention. For one, the TRIPS agreement too is legally binding on all WTO signatories, so why would the Treaty not be able to attain the same status? TRIPS has harmonized the global IP regime in a matter of a decade—though with opposite effects on global health equity than those the Treaty is hoping to achieve. Second, there are a number of existing legally binding international conventions, particularly in the environmental realm, that have caused considerable shifts in industry-level practices. One may think of the banning of the pesticide DDT (or Dichlorodiphenyltrichloroethane) through the Stockholm Convention on Persistent Organic Pollutants (Maguire and Hardy, 2009) or the Montreal Protocol on Ozone Depleting Substances, which led to a phasing-out of Chlorofluorocarbons (CFCs) (Maxwell and Briscoe, 1998). Interestingly, in the latter case, negotiators made use of those industry forces ready to gain from the

ban (Maxwell and Briscoe, 1998). This reminds us of the fact that the pharmaceutical industry is not a homogeneous block either, with generic firms for instance having more to gain than to lose from the Treaty.

Kickbusch and Holzscheiter (2021) argue that these conventions could represent a very valuable template for formulating a legally binding Pandemic Treaty text. Experience with environmental treaties demonstrates that agreement is most easily found in "situations of extreme global interdependency" (Kickbusch and Holzscheiter, 2021: 2), which a pandemic clearly represents. And as Donnelly (2021) points out, to overcome implementation and financing obstacles, LMIC governments could be supported by innovative funding mechanisms. One such funding mechanism with a truly solidaristic character could be a windfall tax on pandemic profiteering; another could be a global health "insurance" fund based on the principle of generalized global solidarity.

We are clear that to both achieve a meaningful treaty promoting global solidarity and ensure its enforcement in a health crisis, global institutions such as the WHO would have to be empowered significantly. In particular, a rebalancing of power between the WHO and WTO, at least in times of global health emergencies, will be required. Further, detailed text negotiations will be crucial for the eventual strength this treaty may have (McMahon and Geiger, 2022). Global activism is therefore urgently needed to keep reminding negotiators of the importance and urgency of global health solidarity. Activism can be a powerful force in healthcare markets, addressing and redressing their failures toward a collective good (Geiger, 2021). At the peak of the HIV pandemic, global civil society came together to make a forceful plea for more accessible medicines, led by campaigners in the Global South (Mbali, 2013). And during the pandemic, global access to medicines groups and activist physicians have worked tirelessly in a concerted "people's vaccine" campaign to increase awareness in HICs on vaccine inequity and lobby their governments to support these efforts.[6] Civil society cannot afford to take a backseat now when it comes to treaty negotiations. Clearly, light-touch, voluntary approaches can no longer be relied on when it comes to organizing and coordinating action for global health solidarity. This is a fight worth fighting for to bake global solidaristic principles into pharmaceutical markets, at least in times of crisis.

Concluding remarks

This paper is a call for "tech sharing instead of tech hoarding," in the words of UNAIDS Executive Director Winnie Byanyima (Gitahi and Byanyima, 2022): embedding global solidarity as a core organizing principle into international pharmaceutical legislation and institutions. Reviewing the near-complete lack of solidaristic concern of mRNA vaccine manufacturers and their unwillingness to "carry costs" to enable vaccine equity during Covid-19, we argued that existing calls for vaccines to be a global public good on the basis of global solidarity have proven woefully inadequate. We thus call for societal agreement by the global citizenry and its politicians to institutionalize global solidarity as an organizing principle for global health and to compel pharmaceutical firms to share medical technologies and knowledge with regional partners in LMICs in order to build up local manufacturing ecosystems.

We are aware that we have taken some liberties with Prainsack and Buyx's (2012, 2017) original conceptualization of solidarity, which they see predominantly as an interpersonal practice. However, when it comes to healthcare, it is primarily organizations, and often large privately owned ones, that make decisions over the lives of large parts of the global citizenry and that reap the benefits from a globally marketized system. Thus, we believe that it is crucial to remind these firms of their obligations to "carry costs" to facilitate global solidarity, even when this detracts from their economic gains. Equally, we believe it is vital to extend the solidarity concept to a global level. As Tosam et al. (2018: 246) pointed out before the pandemic, "our equal vulnerability and

global interdependence give reason for a broader conception of solidarity beyond its historic understanding." Their argument, that such a broader conception must centrally include strong cooperation between HICs and LMICs as equal partners, has been proven to be more vital than ever by the pandemic.

With our focus on tech transfer, we have deliberately remained within the imaginaries of the current capitalist regime. We fully admit that while pharmaceutical technology transfer may help alleviate some of the most deleterious effects of the global pharmaceutical system, it will not stop the broad trajectory of capital accumulation that the biopharmaceutical industry has been pursuing for decades (Bourgeron and Geiger, 2022a, 2022b; Sunder Rajan, 2017)—and which the Covid pandemic has arguably only accelerated. For this trajectory to shift, more dramatic steps would need to be taken to re-orient the pharmaceutical system from capital accumulation toward human rights and the global public good, for instance through a decoupling of R&D and downstream pharmaceutical markets and/or through excluding pharmaceutical production from the global IP regime altogether. For now, the goal for the global community must be to help fund and build a globally decentralized, robust pharmaceutical innovation system, based on principles of global solidarity and equity. As Zanoni et al. (2017) remind us, as organizational researchers, we can and should join in to fundamentally reimagine the ground for more globally sustainable approaches to governing our society. Using the current crisis as a way to help build new imaginaries of the possible in our global political health economy, we see this paper's conceptualization of global solidarity, which must centrally hold private industry to account, as but the first step to fundamentally reimagining our marketized global health system.

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Notes

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4. For example, https://www.unicef.org/press-releases/no-one-safe-until-everyone-safe-why-we-need-global-response-covid-19 (accessed Feb 28 2022)
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