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RESEARCH ARTICLE

Vaccine politics: Law and inequality in the pandemic response to COVID-19

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Abstract

International mechanisms failed to achieve equitable distribution of COVID-19 vaccines—prolonging and deepening the pandemic. To understand why, we conduct process tracing of the first year of international policymaking on vaccine equity. We find that, in the absence of a single venue for global negotiation, two competing law and policy paradigms emerged. One focused on demand and voluntary action by states and firms, while the alternative focused on opening knowledge and expanding production through national and international law. While these could have been complementary, power inequalities between key actors kept the second paradigm from gaining traction on the global agenda. The failure of the prevailing policy paradigm to secure equity is explained, not by unforeseen technical and financing challenges as some suggest, but by a fundamental misalignment with the political environment. While norm entrepreneurs encouraged sharing, political incentives pushed governments towards securing and hoarding doses. Firms responded to the latter. Mechanisms like COVAX proved incapable of countering these predictable international and domestic political forces. Earlier funding would not likely have changed the behaviour of states or firms in the absence of legal commitment. Barring significant geopolitical changes, a shift to include open/supply-focused policies will be necessary to achieve equity in future pandemics.

1 | A POLITICALLY UNSOUND APPROACH TO EQUITY

Within weeks of the first reported cases of SARS-CoV-2, scientists were already working on a vaccine for the virus that would rapidly trigger the COVID-19 pandemic. High-profile efforts to ensure equitable distribution of those vaccines to the world were announced not long after—with political and global health leaders setting out plans to ensure equity well before any effective vaccine was available. Not only was equity seen to be an important moral objective of global vaccination efforts, but it was also considered to be an instrumentally useful goal for mitigating the negative impacts of the pandemic (von der Leyen & Ghebreyesus, 2020). Yet while the global scientific effort to create COVID-19 vaccines was a remarkable success, global efforts failed to achieve equitable distribution.

A year after the first vaccines were registered, 9 billion doses had been administered, but just 1% of them were delivered in low-income countries (Our World in Data, 2022). Seventy-two per cent of the population in Western Europe had been fully vaccinated, but just 4% in Western Africa had been (Schellekens, 2022b). The highest-profile global vaccine equity effort, the COVID-19 Vaccine Global Access Facility (COVAX), reached less than half of its goal of distributing 2 billion doses in 2021 (UNICEF, 2022). As the share of COVID-19 deaths fell in highly vaccinated countries and grew where vaccination was rare, insufficient vaccination led to the rise of viral variants and prolonged the pandemic, disrupting life and economies in even the wealthiest countries. While global governance efforts may yet achieve wide vaccination coverage, they did not achieve their stated goal of equitable distribution.

Why did vaccine equity efforts, with the backing of many of the world's most powerful governments and

philanthropies, and with a clear head start before vaccines were even developed, fail to achieve vaccine equity? To answer this puzzle, we trace policy development and political processes through the first year of global vaccine distribution. At the heart of this failure, we argue, lies a policy paradigm poorly matched to the global political environment and a global health policy agenda that excluded key measures *more aligned with political realities*.

Some have suggested the model behind the dominant approach to global vaccine equity was sound and should be replicated in the future. The primary challenges, they argue, are lack of a permanent, rapid funding mechanism (Berkley, 2022; Open Consultants, 2022) and ‘entirely unexpected’ behaviours by states and companies (Mancini, 2022). We do not find support for this. Failure to achieve vaccine equity is explained, not by unforeseen technical challenges in a largely effective approach, but by the fundamental misalignment between the dominant policy paradigm pursued for vaccine equity and the international and domestic politics of 2020–2021. Several approaches might theoretically have achieved equity, and a wide literature has debated the value of specific policies (de Bengy Puyvallée & Storeng, 2022; Geiger & McMahon, 2021; Thambisetty et al., 2021). But, success depended on deployment in an actual crisis and political reality. Our primary contribution here is a social science and political analysis that explores the context and the development of policy paradigms within it. We find that, ultimately, the dominant approach required actions from powerful states that were clearly politically untenable, making its failure predictable. As the world considers future pandemic preparedness efforts in a global political context that has not shifted radically, it is important to understand why so we can design approaches capable of addressing political barriers.

1.1 | Our analysis centres on three findings

First, we describe the emergence of two policy paradigms for achieving vaccine equity. A demand-focused/voluntary action paradigm accepted artificial scarcity and depended on voluntary action by states and vaccine manufacturers to distribute vaccines equitably through market mechanisms like pooling purchases. The alternative supply-focused/openness paradigm, supported largely by low- and middle-income (LMIC) governments and civil society organisations, proposed greater use of legal authority and sharing of vaccine knowledge and open production to counter vaccine nationalism.

Second, we show that, while these policy approaches could have been complementary (e.g. pooling procurement while compelling the sharing of technology), in

Policy Implications

- States currently negotiating new pandemic agreements and financing mechanisms should avoid replicating a policy approach to equity that proved incapable of overcoming political challenges. Solutions focused on financing alone will not address the core problems encountered by international vaccine allocation efforts.
- An international agreement that commits states to share technology and support distributed manufacturing, rather than a focus on sharing doses, could address the predictable domestic and international political forces during a pandemic that undermine equitable access among countries.
- States should agree on an authoritative venue for negotiating equitable distribution policies that include representation of all states (perhaps under the World Health Assembly or UNGA's authority) to counter power dynamics within global health that undermined effective policymaking.
- Global health institutions designing pandemic response policies should conduct rigorous political analysis to understand and articulate real-world feasibility of policies that must be implemented in a non-ideal context.

the absence of a single venue for policymaking and negotiation, the interests of powerful global health actors put them in competition. These interests ultimately kept the supply/openness paradigm from gaining political traction on the global health policy agenda.

Third, we conduct a political analysis of the two-level game (Putnam, 1988) at play in the politics of COVID-19 vaccines. Domestic political forces in most states pushed prioritising vaccines for their whole populations as quickly as possible. Despite public pledges to equity and shared access, states early on signalled their unwillingness to delegate authority (Bradley & Kelley, 2008) necessary to do so and no legal measures bound either states or companies to allocate limited doses ethically. Reliant on weak international norms incapable of countering intractable domestic political pressures towards vaccine nationalism, the policy tools deployed under the voluntary approach were simply not set up to successfully achieve equity. The viable alternative, in which global health governance focused on sharing of vaccine technology so that countries and regions could produce vaccines for their own populations, did not require countering broad state

self-interest and might well have achieved a more equitable outcome.

As leaders debate changes to the global health governance architecture and new treaties to govern state behaviour during pandemics, we suggest that international institutions need greater capacity for political analysis. To achieve equitable access to pandemic-fighting health commodities, far greater emphasis will be needed on technology-sharing—not just for normative reasons of justice but for the practical crafting of approaches capable of achieving equitable outcomes in the current geopolitical context.

2 | METHODS

Following Davies and Wenham's exhortations for an 'assessment of the international relations environment in which collective action is more likely to overcome domestic conditions of resistance' during COVID-19 (2020, p. 1234), we conduct a political and policy analysis of vaccine equity efforts. Using process tracing (Collier, 2011), we explore how vaccine equity efforts were debated, structured and governed during the first year of COVID-19 vaccine distribution between when vaccines first became widely available in January 2021 and January 2022. We choose this time period specifically because it provides a clear window to understand the efficacy of international vaccine equity efforts: during what WHO has called the 'acute phase of the pandemic' (Ghebreyesus, 2022) vaccines were in short supply, their distribution was a global focus to stop the virus and mortality, vaccine access was tracked closely, and initiatives like COVAX had set clear goals.

Our inquiry is focused tightly on the question of international distribution/allocation of vaccines during the acute phase of the pandemic. There are, of course, many aspects beyond the distribution or availability of vaccines that dictated vaccination rates. The number of shots into arms depends on a multitude of factors ranging from health system strength to vaccine hesitancy to policy choices in vaccination strategy, which in turn are dictated by various social, economic and political drivers (Kieslich, 2018; Solís Arce et al., 2021; Uwaezuoke, 2020). The ultimate impact of vaccines is also affected by the efficacy of vaccines and roll-out strategies. These are beyond our scope. We aim to answer a more parsimonious but important question: once vaccines became available, why were the doses of those vaccines distributed so inequitably between countries despite a significant, high-profile international effort with the stated aim of achieving equitable distribution?

We do so through process tracing of the relevant policy documents produced during this period by the World Health Organization, Gavi and the ACT-A

consortium (described below) alongside media coverage during the period. We analyse the course of debate and policymaking in the international arena and focus on its outcomes.

3 | COVID-19 VACCINE DEVELOPMENT AND INEQUITABLE DISTRIBUTION

In December 2020, the United States, United Kingdom and European Union all approved key vaccines for SARS-CoV-2, and they began deploying these vaccines in large numbers to halt high levels of COVID-19 cases and deaths. This was the culmination of remarkable efforts and public investments to harness new and existing vaccine technologies and to compress the time between development and deployment through rapid clinical trials assessing efficacy and safety. China and India also quickly approved domestically developed vaccines, following Russia, which had been the first country to do so. Efficacy varies between vaccines, which has become increasingly important in the face of emerging variants. In particular, mRNA vaccines have shown the highest efficacy rates including in real-world settings (Abu-Raddad et al., 2021).

In this context, it is fair to ask how success in international vaccine equity should be defined.

Equity is debatable in a context of a rapidly changing pandemic and unreliable data for cross-national comparison on cases or deaths (Sharma et al., 2022). The World Health Organization offered a specific definition for this period 'that once a vaccine(s) is shown to be safe and effective, and authorized for use, all countries receive doses in proportion to their population size, albeit initially in reduced quantities. This will enable every country to start by immunizing the highest priority populations' (WHO, 2020b).

On this basis, though even on the basis of alternative definitions, the world failed to come close to achieving equity in vaccine distribution.

By the end of June 2021, 6 months into vaccine roll-out, the United States had enough vaccines to cover all its priority populations of health workers and people over 65. High-income countries (HICs) had 90% of what they needed (Schellekens, 2022c). Low-income countries, on the contrary, had received only enough vaccines to cover 12% of their highest-priority populations.

This had real health impact. While there is a moral reason to desire greater equity (Sharma et al., 2022), studies have shown the clear health impact. For example, Watson et al. (2022) modelled the impact of vaccines and find, 'In low-income countries, we estimated that an additional 45% of deaths could have been averted had the 20% vaccination coverage target set by COVAX been met by each country, and that an

additional 111% of deaths could have been averted had the 40% target set by WHO been met by each country by the end of 2021¹.

While official mortality figures imply that the majority of COVID-19 deaths occurred in HICs—which might make vaccine inequity more justifiable or less harmful—mortality data are highly underreported from LMICs (Kavanagh et al., 2020). Indeed, the majority of cases and deaths in LMICs have likely gone unreported. An analysis of ‘excess deaths’, accounting for this underreporting shows that, once vaccines began rolling out, the share of excess deaths in HICs fell and the vast majority of COVID-19 deaths were occurring in LMICs by early 2021 (Schellekens, 2022a). As vaccine coverage rose and cases fell, HICs lifted restrictions and moved to resume normal life. On 4 July, US President Joe Biden declared that ‘we’re closer than ever to declaring our independence from a deadly virus’ (President Joe Biden, 2021).

Vaccine inequity likely harmed everyone, not just those in regions of low vaccination. As many had predicted, leaving large portions of the world unvaccinated led to several variants as the virus mutated. The Delta variant arose in India in mid-March, which at the time had 2% vaccine coverage. Later, the Omicron variant arose—likely in Southern Africa where vaccine coverage rates remained below 25% and high levels of immunocompromised individuals are suffering from HIV, cancer and other diseases (BBC News, 2021). Multiple modelling studies show an empirical link between inequitable vaccination and a prolonged pandemic with more variants (Moore et al., 2022; Ye et al., 2022). ‘Sharper disparities in vaccine allocation between HICs and LMICs lead to earlier and larger outbreaks of new waves. Equitable vaccine allocation strategies, in contrast, substantially curb the spread of new strains’ (Watson et al., 2022).

These variants led to a push for boosters throughout HICs—re-exerting pressure on vaccine supply in LMICs (Erondy & Singh, 2021). Throughout this period, HICs focused first and foremost on covering their entire populations.

By the end of 2021, vaccine inequity had continued unabated by many measures (Figures 1 and 2). More booster shots had been administered in HICs than first shots in LMICs. The World Health Organization (WHO) reported that just one in four African health workers received a full course of vaccine (WHO, 2021). HICs with 15% of the population had received 21% of the vaccines while LICs that are home to 9% of the world’s population had received just 1% of supply. While hundreds of millions of vaccines had been distributed to LMICs through direct purchase and through international vaccine initiatives, saving many lives, as described below those efforts failed to meet the targets they had set for themselves. Efforts to achieve vaccine equity failed in 2021.

4 | COMPETING PARADIGMS IN THE GLOBAL VACCINE EQUITY POLITICAL AGENDA

This inequity arose despite high-profile efforts in global public health to achieve equity that began long before vaccines were available and followed a particular policy prescription. Researchers have long studied the generation of political priority for global initiatives and policy efforts (Fukuda-Parr & Hulme, 2011; Shiffman & Smith, 2007). In global health, some legal and policy approaches to problems are placed firmly on the global political agenda while others never achieve prominence (Cueto, 2004; Smith et al., 2021). Key determinants of what makes it onto the agenda include the strength of

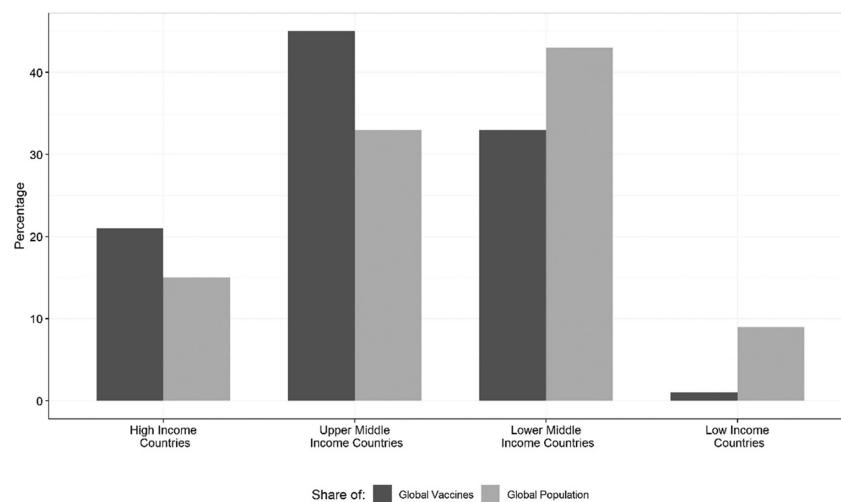


FIGURE 1 Global distribution of vaccines vs. population as of January 2022. Sources: Our World in Data, Schellekens, Pandem-IC, World Health Organization.

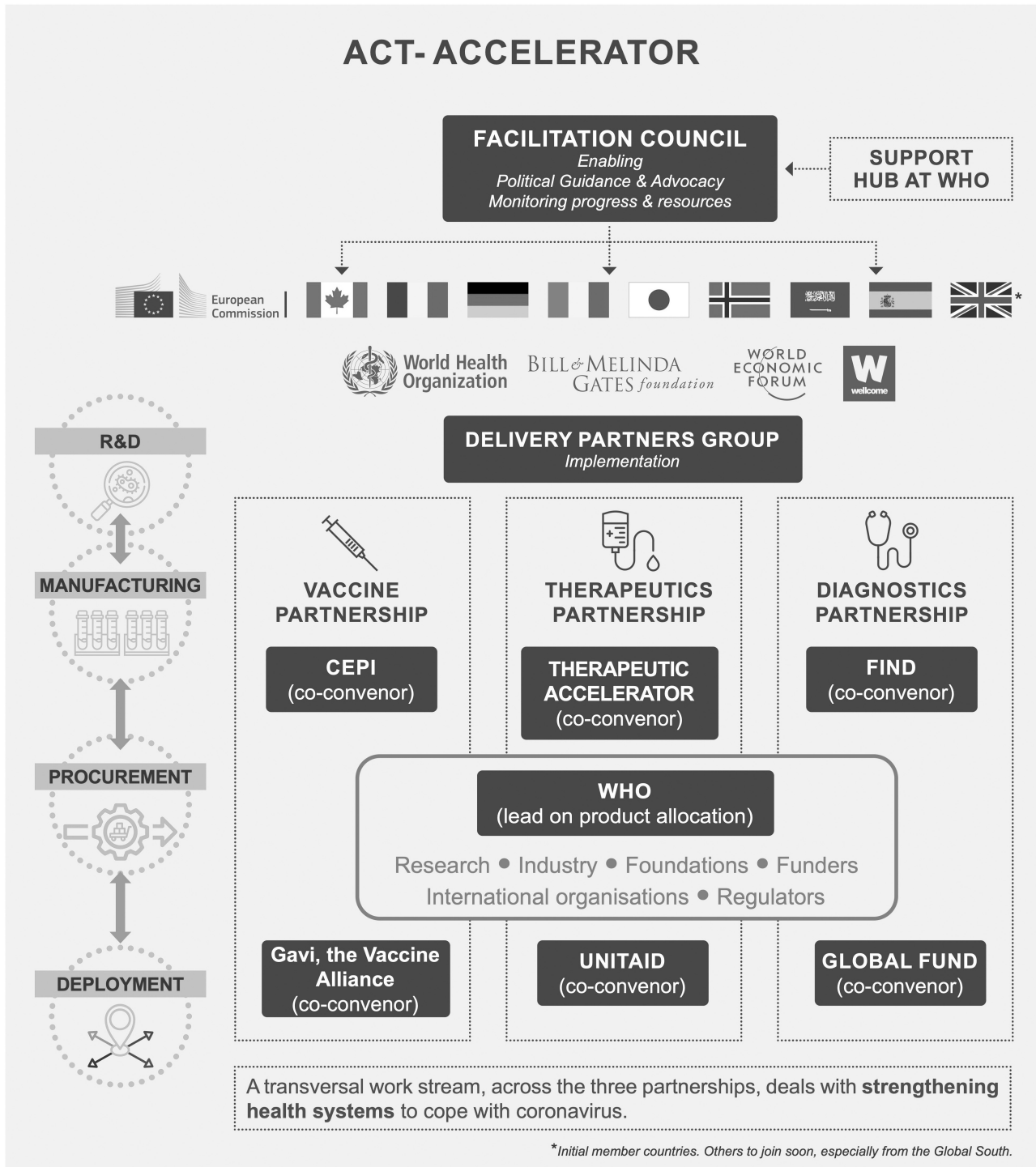


FIGURE 2 ACT Accelerator Governance Structure, 20 June 2020. Source: European Union, Coronavirus Global Response, June 2020. https://global-response.europa.eu/system/files/2020-06/CGRS_United_final.pdf

the actors involved, ideas used to portray the issue and the political context.

In this case, there was no single organisation or venue for global health policymaking. Neither the UN's core bodies nor the World Health Assembly were able to exercise clear authority on the vaccine issue, while domestic and international political factors left the US and China largely absent from global

coordination efforts (Norrlöt, 2020; Özler, 2020). In this context, there was little political negotiation between higher- and lower-income countries over the equity approach. International deliberation dispersed instead to groupings of states and international organisations, where vaccine equity efforts fell into what we characterise as two competing policy paradigms (Hall, 1993). A demand-focused/voluntary paradigm, centred on

pooled procurement, aid and voluntary cooperation, was first advanced by a coalition of European governments, foundations, global health organisations and industry associations. Another grouping of leaders from LMICs and civil society coalesced around the need to increase supply through sharing of know-how and argued for greater use of national and international law. While there is much that is synergistic about the approaches, the actors, ideas and context of global public health in 2020 resulted in framing these as different and opposing paradigms. A handful of actors, notably WHO, unsuccessfully sought to advance both approaches. This division is at the heart of the limited equity achieved to date.

4.1 | Demand-focused/voluntary action paradigm

The dominant vaccine equity agenda grew from the G20 meeting in March 2020—9 months before the first vaccines would be approved. The communique called for equitable access to be secured by voluntary group of ‘countries, international organizations, the private sector, [and] philanthropies’. (G20, 2020). The Access to COVID-19 Tools Accelerator (ACT-A) was launched at an event a month later, co-hosted by the leaders of France, the European Commission, WHO and Bill & Melinda Gates Foundation. ACT-A set up a time-limited collaboration focused on cooperation between existing global public health actors (Gavi, CEPI, Global Fund, UNITAID and WHO) (European Union, 2020). Its initial governance centred 10 HIC governments along with key private foundations and WHO (see Figure 2). Representatives of the pharmaceutical industry were key players involved from the start, with LMIC governments appearing in its governance only at a later stage (Moon et al., 2021).

COVAX, housed at the Gavi alliance, became the vaccine pillar of ACT-A. Its goal was to bring the acute phase of the pandemic to a swift end by guaranteeing ‘rapid, fair and equitable access’ to vaccines—aiming to ‘ensure that people in all corners of the world will get access to COVID-19 vaccines once they are available, regardless of their wealth’ (Gavi, 2020a).

The law and policy agenda behind COVAX was based on the preferences of its main political sponsors—governments, companies and foundations based in HICs. It was grounded in voluntary interventions by companies and donor governments meant to organise the demand side of vaccine production. It focused on the creation of advanced purchase agreements to incentivise development, pooling demand through centralised procurement to increase purchasing power, negotiations with companies making vaccines and clear demand-signalling that would act as a market-based incentive for producers to expand their capacity.

‘Self-financing’ upper- and upper-middle-income countries were to pay in advance for the option to buy vaccines for their own populations while also financing the purchase of vaccines for LMICs. The primary incentive for HICs to procure their vaccines through COVAX was that it would serve as a de-risking mechanism and ‘insurance policy’—limiting the need to invest in multiple vaccine candidates (some of which would fail) and ensuring that they would have access to whichever vaccines proved successful without having to gamble their investments on the right vaccines (McAdams et al., 2020). Countries, however, still had the option to negotiate bilateral deals with vaccine makers. LMICs, meanwhile, would have access to doses through the advanced market commitment, financed by donations from philanthropy and governments, as well as the contributions of self-financing countries. By pooling procurement, all countries would benefit from economies of scale and improved buying power.

Equity was to be achieved through two phases—first by procuring and allocating at least 2 billion doses by the end of 2021—enough to equally cover 20% of all participating country’s populations, protecting the individuals at highest risk everywhere (Usher, 2021). Afterwards, additional doses would be allocated in response to epidemiological conditions, according to a threat and vulnerability formula developed by a joint taskforce of WHO and Gavi (World Health Organization, 2020).

COVAX’s focus was on procuring and delivering the vaccine doses, and on assisting LMICs to ensure that they had logistical frameworks needed to deliver the vaccine to people. By November 2020, COVAX had raised \$2 billion, meeting its 2020 goal (Gavi, 2020b). That was augmented by a US pledge shortly after President Biden’s inauguration along with other funders such that by April 2021 \$6.3 billion had been pledged and by June COVAX exceeded its’ goal with \$9.6 billion pledged (Gavi, 2021c, 2021d). Funding, however, was slow to arrive as HICs focused more on financing their own purchases first.

This approach did not seek to reach enforceable agreements among states or to place legal obligations on either states or vaccine manufacturing companies. States did not require companies that received research funding to share technology or agree to COVAX allocations in advance. Companies maintained monopoly control over the production of each vaccine, including intellectual property (IP) rights, and it was up to each company to decide whether to sell doses to COVAX (or to LMICs directly), in what quantity, and on what timeline. Neither states nor companies were compelled to prioritise COVAX orders, though companies were urged to voluntarily sell to COVAX and countries to share ‘surplus’ doses from their bilateral negotiations (Wellcome, 2021).

From the start, many leaders in the Global South expressed concern about this approach. African leaders,

for example, said their goals were to vaccinate far more than 20% of their populations and complained they were scarcely consulted in mid-2020 when the programme set that target (Mueller & Robbins, 2021). They questioned why COVAX was based on a model that included no obligations of companies to fulfil African orders nor sharing of technology so African companies could make vaccines for their own populations (Anna, 2021; Nkengasong et al., 2020).

These measures could be complementary. But, the agenda of the initiative was narrowed to fit the policy preferences of key members of the coalition backing it, including HIC governments and companies. Pooled demand, for example, could be complementary to an open approach that compelled sharing of knowledge and IP. Ironically, HICs pursued at least limited use of legal mechanisms domestically. US President Joe Biden, for example, has used the Defense Production Act to compel companies to collaborate on expanding vaccine production. WHO and many LMIC leaders have also advocated for an integrated strategy (Ghebreyesus, 2021). But, the ACT-A paradigm explicitly excluded calls for more compulsory legal efforts at a national or international level or for a focus on sharing technology.

While political leaders like EU President von der Leyen spoke about the ‘global public good’ (European Commission, 2020)—such an approach to shared know-how and public production, aligned with economic understandings of a ‘public good’ (Kaul et al., 1999), was not on the agenda.

4.2 | Struggling for doses amidst vaccine nationalism

Ultimately, vaccine nationalism—the prioritisation by leaders of securing as many doses as possible and covering their own populations over stopping the spread of COVID-19 elsewhere or covering all health workers and vulnerable populations worldwide—undermined the demand-focused approach (Abbas, 2020; Bollyky & Bown, 2020). As described in a later section, this was unfortunately predictable.

During the first year of vaccine delivery, the demand-focused/voluntary mechanisms were unable to secure anywhere near the doses needed to achieve equity—even at the levels that some criticised as insufficient. In April, COVAX’s forecast was that it would have 835 million doses to distribute by August, 1.4 billion by October and 2.2 billion by the end of 2021 (Gavi, 2021a). But, it immediately ran into trouble as major producers refused to commit to selling doses to it. Pfizer, for example agreed to sell less than 2% of its supplies to COVAX; by November, Moderna had promised just 34 million doses and delivered none (Ribbons & Goodman, 2021). Instead, these companies prioritised delivery to HICs.

Initially, COVAX depended on major deliveries of the vaccine developed by Oxford/AstraZeneca and produced by the Serum Institute of India (SII). However, when there was a major surge of the virus in March, the Indian government put a halt on vaccine exports, much as the EU had done previously (Ghosal, 2021). COVAX ultimately reached half its 2021 goal of 2 million doses in January 2022.

Governments in Africa, Asia and Latin America that tried to obtain access to vaccines directly had the same problem. South Africa bilaterally and the African Union as a block both deployed emissaries to try to secure supplies from major producers, and only after many months did they finally begin receiving supplies towards the end of 2021 (Anna, 2021). Drug companies dragged out negotiations and demanded that governments absolve them of all liability and promise sovereign assets as collateral (Cowan, 2021). It was even revealed that millions of COVID-19 vaccines being produced at a Johnson & Johnson-contracted factory in South Africa were being shipped to Europe and North America instead of filling African orders (Robbins & Mueller, 2021).

Meanwhile, HICs used their economic and political power to secure first access to doses in excess of what was needed for their priority populations—in many cases enough to vaccinate their entire populations many times over. The EU, for example, ordered 1.75 billion doses from Pfizer/BioNTech, 300 million from AstraZeneca, 310 million from Moderna and 240 million from Johnson & Johnson to cover a population of 447 million people (Duke, 2022). The UK, the United States, Canada and Israel ordered doses enough to cover their entire populations between 2.5 and 5 times. In total, HICs, home to 1.2 billion people, placed orders for over 7 billion vaccine doses. Leaders applied a range of tactics to ensure they were at the front of the line—from export controls to personal contact from presidents asking CEOs to put their orders at the top of the list (Stavis-Gridneff, 2021; TOI Staff, 2020). While wealthy governments ordered based on uncertainty of which vaccines would prove effective early on, laying bets on all products to cover their risk, by mid-2021, multiple effective vaccines were approved in Europe and North America, yet there were few moves to release ordered doses so that high-risk populations in LMICs could get access before young, healthy populations in the Global North.

Amidst scarce vaccine supply, doses became a diplomatic front. The US and ‘Team Europe’ distributed hundreds of millions of vaccines bilaterally and through COVAX. China and Russia moved even earlier to promise their vaccines to dozens of Latin American, Asian and African countries (Allen-Ebrahimian, 2021). Many of these promises came with subtle or not-so-subtle strings. Danish journalists, for example, reported that Rwanda rejected 250,000 doses when it became clear

they were meant to help persuade Rwanda to host asylum seekers externalised from Denmark (Broberg & Redder, 2022).

4.3 | Supply-focused/openness paradigm alternative

An alternative policy paradigm focused on a more open 'public goods' approach—on the sharing of technology and worldwide expansion of production. The key idea of this paradigm was to focus more on supply than on demand—achieving equity not by sharing of doses or by signalling demand to originator companies, but by removing monopolies over knowledge and using state power to spur production of effective vaccines by multiple manufacturers throughout the world. In this way, the subject of the policy paradigm was not limited doses but knowledge. The transfer of technology from a handful of originator companies to public- and private-sector producers, particularly in the Global South, was the goal to maximise supply.

These ideas draw in part from experience with the global AIDS response (Byanyima, 2022). Millions died of AIDS in Africa, Asia and Latin America long after effective treatment programmes were available because of high prices and limited supply (UNAIDS, 2021). Worldwide access was finally secured only after a shift from distributing a limited supply of high-priced, brand-name medicines to licensing of technologies, production in LMICs and a supply focus that reduced the price of AIDS drugs by 99% (MSF Access Campaign, 2012). Coming via pressure from global social movements, the focus on open, affordable supply was key to progress on AIDS alongside increased aid and pooled procurement (Kapstein & Busby, 2013). New institutions like the Medicines Patent Pool were set up to facilitate sharing of technology—institutions that were available when COVID-19 hit but went largely unused. Many of the same transnational HIV advocacy networks of physicians, lawyers, activists and Global South governments advanced this alternative paradigm during COVID-19.

This alternative legal and policy approach was articulated by a set of political leaders from the Global South at the same time the voluntary/demand paradigm was being advanced by leaders based largely in the Global North. On 23 March 2020, the President of Costa Rica, Carlos Alvarado Quesada, proposed a memorandum of understanding among states to share rights in technologies funded by the public sector among all member countries of WHO. This included pooling patent rights and designs as well as 'regulatory test data, know-how, cell lines, copyrights and blueprints for manufacturing diagnostic tests, devices, drugs, or vaccines' (Quesada, 2020). The Presidents of South Africa and Senegal and the Prime Minister of Pakistan expanded on this idea in May 2020 in an

open letter, joined by dozens of former heads of state and international leaders (Pilling & Jack, 2020). They called for a global agreement implemented under the authority of WHO that ensured mandatory sharing of COVID-19-related knowledge, data and technologies; the pooling of intellectual property; coordinated expansion of manufacturing capacity; and a commitment to make COVID-19 vaccines free at the point of service.

In many ways, the vaccines developed by US, EU and UK sources are good candidates for a public goods approach that focuses on the sharing of technologies. The Moderna vaccine was developed by the US National Institutes of Health and supported by \$2.5 billion in public funding from the United States for development, clinical trials and production (Grady, 2020). The EU was a major contributor to BioNTech's work developing their vaccine through the European Investment Bank and multiple EU R&D programmes (European Commission, 2019). And, the Oxford Vaccine was made possible by major public support from both EU and UK governments.

Under the open paradigm, it was proposed that the know-how behind the vaccines resulting from these public investments would be shared widely. Several models were proposed including licensing by originator companies to multiple other manufacturers, pooling of knowledge and IP, open-source sharing of vaccine know-how, creation of technology transfer hubs, etc (Amin, 2021; Quesada, 2020; Stiglitz et al., 2020; WHO, 2020d). In addition, a major focus was to be placed on expanding manufacturing capacity, particularly in LMICs to make the vaccines (Africa, 2020; Nkengasong et al., 2020).

Key to this would be the effective use of legal and policy tools and state power to incentivise action by companies, create structures for cross-national sharing, overcome IP barriers and, where necessary, compel sharing (Kavanagh, Gostin, & Sunder, 2021). Various enforceable global legal frameworks have been proposed to ensure these rights and tackle vaccine nationalism (Abbott & Reichman, 2020).

In May 2020, a month after the launch of ACT-A, WHO and several national leaders launched the COVID-19 Technology Access Pool (C-TAP). This followed a resolution by states at the World Health Assembly calling for the pooling of technology and recognising of COVID-19 vaccinations as a global public good (WHO, 2020a, p. 1). Thirty countries and several international organisations supported the launch of the pool, but there was very little overlap between the coalition of HICs, foundations and industry groups backing ACT-A and the primarily Global South countries backing C-TAP (WHO, 2020c). Under C-TAP, partners including Unitaid, the UN Technology Bank, Medicines Patent Pool, UNDP and UNAIDS would support technology transfer and voluntary licensing of COVID-19 vaccines along with capacity-building efforts so that

companies primarily in Africa, Asia and Latin America could make COVID-19 vaccines.

Apart from WHO, few of the ACT-A political backers and no G7 countries joined the C-TAP effort. By the end of 2021, no major company had agreed to licence its technology through the voluntary C-TAP mechanism, and no country had tied its research and development funding to the sharing of technologies globally. There was also no move towards a global agreement on the sharing of COVID-19 vaccine doses or technologies between HICs and LMICs.

In October 2020, South Africa and India proposed a third element to the openness paradigm—waiving states' obligations under the World Trade Organization to recognise IP protections on COVID-19-related technologies (India & South Africa, 2020). This proposal would return national legal prerogative to governments to decide the level of IP protection for COVID-19 vaccines and technologies without facing sanction under WTO TRIPS rules (Eccleston-Turner & Upton, 2021). This would allow governments to provide legal certainty to those considering investment in new and retrofitted factories to produce vaccines in LMICs, similar or identical to those approved globally, even without full permission of originator companies (Dhar & Gopakumar, 2020; Thambisetty et al., 2021). It would also remove legal barriers to coordinated multi-country production and approaches since TRIPS provisions for countries without manufacturing capacity are cumbersome and have only been used once—by Rwanda and Canada in a complex process that took years (Correa, 2021). Producers would still have to secure the know-how—either from existing producers, from others who know-how these vaccines are produced, or from their own research, but surely they would not face IP lawsuits or prosecution is important for spurring global production.

The proposal was, in many ways, a very limited one—it did nothing to change patent status in any country that did not wish to act, and it was only temporary. Nonetheless, it came up against fierce opposition from industry, governments with significant originator pharmaceutical industries and IP maximalists who said it would undermine innovation, among other claims (Balasubramaniam, 2020). The proposal ultimately gained the support of over 100 countries, but WTO's norms of operating by consensus allowed a handful of countries including the United States, several in Europe and Japan to block full negotiations on text of any waiver.

The Biden Administration reversed the US position shortly after taking office—announcing on 5 May that it would back a waiver and support moving to text-based negotiation (Tai, 2021). This shifted the international politics of the question significantly, pushing other holdouts to agree to serious negotiations. However, this shift had little immediate effect, as the focus of

opposition simply changed to within-negotiation stalling. The EU, for example, put out its own alternative proposal which many saw as a tactic to distract (Health Action International, 2021). By the end of 2021—a year after vaccine approvals—a waiver had still not been authorised by the TRIPS council.

4.4 | Blocking manufacturing in Africa, Asia and Latin America

Industry and some HIC governments claimed that manufacturing in LMICs, particularly for the most effective mRNA vaccines, was not feasible and could not be started soon enough to matter (Baker & Silver, 2021). They claimed LMIC producers lacked capacity, financing and technical acumen, and that originator producers like Pfizer, Moderna and Johnson & Johnson were the only feasible solution to expand production.

4.5 | Supply-focused proponents showed that each of these barriers could be overcome

First, rapid expansion of manufacturing was feasible in theory and in the real world. Before COVID-19, one of the original selling points of mRNA vaccines was the 'relatively simple' production process (Versteeg et al., 2019) and the 'the potential for generic, low-cost manufacturing' (Maruggi et al., 2019). Indeed, once COVID-19 hit and a handful of manufacturers produced successful mRNA vaccines, they showed how quickly new production could be set up in another country. The Swiss company Lonza, for example, had never produced mRNA vaccines before receiving technology transferred from Moderna and was producing millions of doses a few months later (Kresge, 2020). This same type of technology transfer could have taken place for companies and government agencies around the world in 2020—removing the monopoly over production and letting countries or regions produce vaccines for themselves to boost supply. However, Moderna and BioNTech/Pfizer refused and governments in the United States and Europe made no moves to compel them to do so.

Untapped vaccine production capacity was identified in a wide range of countries of the Global South including Bangladesh, South Africa, Senegal, Egypt, India, Brazil and Thailand (Kavanagh et al., 2021). And, funding to expand manufacturing became available even before vaccines were approved—with \$4 billion announced by the World Bank in October 2020 (World Bank, 2020). The African Union launched the Partnership for African Vaccine Manufacturing in April and secured a major commitment from the Africa Export-Import Bank and African Finance Corporation.

The capacity to produce mRNA vaccines was shown in the Global South. After repeated attempts to secure cooperation from companies, for example, the South African government and WHO created an independent mRNA vaccine production hub with all the necessary pieces—the South African company Biovac acted as manufacturer, Afrigen Biologics as developer, a consortium of universities provided know-how and Africa CDC provided technical support (Davies, 2022). What was missing, however, was the ‘recipe’ for an approved vaccine—which neither Moderna nor BioNTech/Pfizer was willing to share. Instead, the effort has had to reverse engineer its own version of an mRNA vaccine and get it trialled and tested—which the hub showed it could do, but which delayed production beyond the point of viability for this pandemic (Jerving, 2022). Thailand similarly built a partnership between the University of Pennsylvania researchers—who had done much of the original research behind the mRNA vaccines—and the Ministry of Health’s pharmaceutical production company to set up mRNA production but it too stalled without shared technology (Sullivan, 2022).

These efforts failed to produce vaccines in the acute phase of the pandemic, not because it was impossible but because they were too small scale without fulsome global support and they lacked access to the technology, which was held in monopoly by Moderna and Pfizer.

AstraZeneca made some partial moves, striking a deal with the Global South’s biggest producer of vaccines, the SII, to make hundreds of millions of doses on its behalf for sale to COVAX and directly to countries in the Global South. This deal, however, did not approach the kind of open sharing advocated by the supply/open paradigm’s proponents—using an exclusive licensing agreement for certain territories to simply expand the SII’s monopoly over production. As a result, in March 2021 when India was hit by a second wave, the government’s ban on exports shut down supplies for much of the world. COVAX at this point was largely dependent on SII—which was to produce a majority of its planned supplies for the first half of 2021—and had no alternative in a context of constrained supplies and monopoly production (Hollingsworth, 2021).

A set of vaccines from China, Russia and Cuba were shared with slightly greater openness, but in the context of vaccine diplomacy, however, supplies were negotiated country by country and their efficacy was questioned compared with the more desired mRNA vaccines (Kiernan et al., 2020).

HIC governments do have the legal authority to compel sharing of vaccine know-how (Kavanagh, Gostin, & Sunder, 2021). In the United States, for example, the Defense Production Act gives the government wide authority to compel actions from companies during crises. Title 1 gives the government explicit

power to allocate ‘technical information’ needed to secure ‘national public health’—which clearly covers know-how to produce vaccines (Kapczynski & Ravinthiran, 2021). The government could, for example, compel sharing of vaccine production know-how with a government agency like the Biomedical Advanced Research and Development Authority, which could then train producers around the world to make vaccines. Having invested heavily in the development of these vaccines, authorities like the US Bayh-Dole Act give governments the ability to compel sharing of government-funded know-how for the public good. The US National Institutes of Health even hold a patent on key mRNA technologies and could demand broader access to know-how in exchange for licensing their patented technology currently being infringed on by the leading vaccine companies (Mancini & Stacey, 2021).

By the end of 2021, however, despite multiple opportunities and backing from NGOs, LMIC governments and international public health authorities, the supply-focused/openness paradigm had failed to garner sufficient political support to advance significantly.

5 | MISSING POLITICAL ANALYSIS TO SECURE VACCINE EQUITY

Both policy approaches could theoretically deliver vaccine equity. Real-world success, however, depended on the global and domestic political contexts in 2020 and 2021, which were characterised by inequality in power between actors that proved decisive. In international politics, states make a wide variety of international commitments—whether, and under what conditions, they are likely to keep them has been widely studied (Simmons, 1998). Even in the absence of formal treaties, international norms play a key role in motivating state behaviour, including the area of health, but compliance is based in part on the strength and socialisation of a given international norm (Davies et al., 2015; Finnemore & Sikkink, 1998). Compliance with international commitments also depends deeply on domestic politics and the political attributes of ‘competing interests’ (Dai, 2007, p. 40).

In this case, failure of the demand-focused/voluntary paradigm to secure equity was foreseeable and foreseen. Achieving equity under this paradigm, which preserved production monopolies and placed allocation in the hands of vaccine manufacturers, required that pooled procurement mechanisms like COVAX would be able to get equal access to vaccine doses, that companies would fill orders based on a framework of equity, and that powerful states would refrain from monopolising doses so that vulnerable groups in all countries could be vaccinated before turning to young, healthy people.

Yet, the norms supporting equitable shared access between countries to a limited pool of vaccine doses were remarkably weak. Meanwhile, dominant political forces were lined up in the most powerful states to drive vaccine nationalism. Indeed, leaders' own statements and actions revealed, early on, that their 'two-level game' (Putnam, 1988) involved ambiguous commitments to equity alongside simultaneous actions to secure enough doses to cover their entire populations as quickly as possible (often several times over). A global health approach dependent on avoiding vaccine nationalism was, from the start, set against political forces it was unlikely to overcome.

Indeed, HIC governments responded by putting coverage of their entire adult populations as their top priority, and they secured preferential access to the vast majority of supplies available through HIC-based producers, leaving little supply for the rest of the world. Even as inequity prolonged the pandemic and gave rise to variants that disrupted life worldwide, throughout the first year of global distribution of COVID-19 vaccines, access for LMICs was primarily dictated not by globally coordinated efforts but by the relative scarcity of doses and the location of the manufacturers.

In prioritising sharing of vaccine know-how so that production could take place in Africa, Asia and Latin America, the supply/openness paradigm explicitly recognised and sought to accommodate the effects of vaccine nationalism and weak international norms by shifting the actors involved (Kavanagh et al., 2021). Even if this was theoretically not the fastest route to deliver doses, expanding the number and geographic location of producers would have shifted the incentives—allowing HIC-based companies to serve 'their' markets first while Asian, Latin American and African producers served theirs. This aligned with political forces of the time, but remained low in the global health agenda, allowing inequity to thrive.

5.1 | Weak norm building and soft international commitment

The primary mechanism to secure state compliance under the demand-focused/voluntary paradigm was the building of international norms of shared allocation by HICs, appeals to enlightened self-interest, and a project designed to 'de-risk' investment. In this sense, global health actors worked as norm entrepreneurs—a familiar role for global health institutions (Aginam, 2014)—trying to cascade and encourage internalisation of the idea that equitable sharing of limited supplies was in the enlightened self-interest of all countries.

A series of global public events, largely virtual due to the pandemic, were created to give governments

and global health leaders a platform for norm building. The launch of ACT-A and COVAX in April 2020 was co-hosted by the French and EU Presidents, Bill Gates and WHO Director-General Tedros Adhanom Ghebreyesus. President von der Leyen promised the EU's commitment to develop a vaccine 'produce it and to deploy it to every single corner of the world' (von der Leyen & Ghebreyesus, 2020). This was followed in September 2020 by a high-level event that featured heads of state 'to build stronger political consensus for a coordinated global response to COVID-19, and champion the importance and urgency of equitable access to new tools, especially effective vaccines' (United Nations, 2020). Speakers included heads of state from Germany, UK, Canada, Norway, South Africa and Sweden as well as executives from Johnson & Johnson, AstraZeneca, and various UN agencies and NGOs.

Pledging sessions and political events aimed to raise funding for COVAX, secure donated doses from HICs and build norms that appealed to the enlightened self-interest of HICs. In one official's words, '...no nation can act alone in a global pandemic. Vaccinating as many people as possible, as quickly as possible, is the only way to reduce the tragic loss of life, end the pandemic, and move us toward economic and social recovery' (Gavi, 2021b). Special envoys were appointed to lead this norm-building work—Ngozi Okonjo-Iweala, former Nigerian Finance Minister (before her election to lead the WTO); Andrew Witty, former CEO of GlaxoSmithKline; and later Carl Bildt, former Prime Minister of Sweden. These efforts, however, built only very weak normative infrastructure, with commitments to funding but little that would constrain powerful states from acting in their self-interest.

Meanwhile, the international context of rising populism and nationalism was hardly conducive to norm building. Governments from the world's two largest economies, the United States and China, did not meaningfully participate in ACT-A. The Trump administration's 'America First' foreign policy was driving withdrawal from WHO and disengagement from international efforts, while the US and Europe's increasingly aggressive stance towards China on COVID-19 undermined trust. Even in Europe, much of the political energy was taken up negotiating Brexit, pushing vaccine equity low on the agenda.

There was no use of formal mechanisms, legal or political, to achieve compliance with actions to promote equity. International instruments for ensuring state compliance range from 'hard' binding international law with precise commitments, obligations to act, sanctions for non-compliance and a third party delegated to implement (e.g. WTO rules and UN Security Council Resolutions) to 'soft' commitments between states that lack these characteristics (Abbott & Snidal, 2000; Sekalala, 2017). Despite the urgency of the situation, there were not obvious binding mechanisms available.

Interestingly, the issues at hand were the international trade in vaccines and specifically government procurement—issues that, in a broad sense, are the subject of binding international agreements (e.g. World Trade Organization, 2012). But, WTO law does not address the behaviour of states in procuring access to a limited supply of health commodities and there was no realistic process that this would change or change quickly enough to matter during the acute phase of the pandemic.

In this case, commitments were even softer than past political declarations on global health from the UN General Assembly, which have at times included specific commitments albeit without hard compliance mechanisms (e.g. United Nations General Assembly, 2021). The UK, for example, promoted an ‘unprecedented global agreement’ called the COV-Access Agreement ‘to give everyone equal access to new coronavirus vaccines and treatments around the world’ (UK Government, 2020b). However, the document bore none of the hallmarks of a significant international agreement. It was signed by 20 countries, almost all HICs, and included only vague promises, such as ‘commit to the shared aim of equitable global access to innovative tools for COVID-19 for all’. It did not give any international institution (e.g. WHO) power to control global allocation, and it established no firm commitments or definition of equity. For example, it did not commit HICs to prioritise the vaccination of vulnerable people in LMICs before young, healthy people in their own countries or even to share excess vaccine doses.

Our point is not that harder, binding commitments to share access to limited vaccine doses should have been used—but instead that the architects of the global policy response should have recognised that in the absence of such mechanisms a demand-focused approach was unlikely to work.

Indeed, with little firm commitment and no significant stick to ensure compliance, the carrot offered under this paradigm to induce participation also proved quite weak. COVAX sought to incentivise HICs to participate in the pool, which would enable COVAX to allocate ethically among all countries. They framed COVAX as ‘a critical insurance policy that will significantly increase their chances of securing vaccines, even if their own bilateral deals fail’ (Gavi, 2020a). The risk of making advanced financial commitments to vaccines with unknown efficacy would be spread across countries. COVAX would guarantee the ability to cover up to 50% of the population, though without a specific timeline (COVAX, 2020). But, most powerful countries did not actually see these issues as a major risk. They made deals for all or most viable candidates and, with a desire to cover 100% of their populations, had every incentive to defect even if they participated in COVAX.

5.2 | Domestic political incentives make demand-side paradigm untenable

Political leaders in most countries have relatively short time horizons, particularly those facing an election in the near term (Dionne, 2010). In a context of weak international norms and political agendas dominated by COVID-19, leaders prioritised the threat of their own citizens having to wait for their vaccines over the injustice of highly unequal vaccine distribution or even over the threat of a long, continuingly disruptive pandemic. Even as global health plans focused on vaccinating vulnerable people and health workers worldwide first and HIC leaders were promising to share, they were signalling a very different intention domestically (Eccleston-Turner & Upton, 2021). None made real plans to slow vaccine access for their populations to make supplies accessible to those most in need in LMICs. Efforts were on full display to use political, economic and strategic power to secure doses for their entire populations as rapidly as possible to the exclusion of others. This was clear long before the first vaccines were available (Kupferschmidt, 2020). Key leaders in LICs voiced their concern that this meant voluntary mechanisms would not work, yet gained little traction.

In the UK, for example, Prime Minister Boris Johnson came under significant pressure domestically to address the failed British response and remove unpopular lockdown orders like the much criticised 10 pm pub curfew. Promising everyone in the UK would get rapid COVID-19 vaccine access became a clear political priority for a threatened government. Trying to stave off a revolt within the Tory party, a government source was quoted promising, ‘There is a possibility that one day soon we will wake up and Brexit will be done and we’ll have the Oxford vaccine’ (Wilcock & Mikhailova, 2020). In May 2020, the UK inked a £84 million deal with AstraZeneca, giving it priority access to 100 million doses. Business Secretary Alok Sharma said, ‘[t] his deal with AstraZeneca means that if the Oxford University vaccine works, people in the UK will get the first access to it’ (UK Government, 2020a). By August, the government has secured preferential access to 340 million doses from Pfizer, Johnson & Johnson, and Novavax—enough for five doses per person in the UK (Saigol, 2020).

In the United States, the Trump administration failed to respond effectively to the start of the pandemic and was already facing a political crisis in a presidential election year. This dramatically increased the stakes for providing a safe and effective vaccine as soon as possible—and ideally before the November election as Trump himself said (Timm, 2020). Indeed, a major point of contention in the campaign became whether Trump was putting undue pressure on regulators to approve a vaccine in time to help him politically (Rucker et al., 2020). Operation

Warp Speed (OWS), a public-private partnership initiated in May 2020, aimed to have ‘substantial quantities of a safe and effective vaccine available for all Americans by January 2021’ (DHHS Press Office, 2020). By October 2020, OWS had spent at least \$12 billion on COVID-19 vaccine contracts to ensure US priority access (Baker & Koons, 2020). Facing pressure from Congress at the time, Dr. Anthony Fauci predicted the United States could secure enough doses for all Americans by April 2021 (Reuters, 2020). Senator Tom Tillis also introduced the America First Vaccine Act, which would have required that any vaccine developed with US funding go first to Americans ‘before it goes to other countries’ (Office of Thom Tillis, 2020). Trump agreed, saying ‘Day 1 that it’s approved, it’ll be available to the American people immediately’ (Silver, 2020), and issuing an executive order stating that sharing could only happen after all Americans had access. Even after the Biden administration took charge, powerful domestic political actors pushed for faster roll-out to all Americans. Congressional committees investigated what more companies and the government could do to procure more supplies ‘as quickly as possible so we can get them into the arms of more Americans’ (Office of Diana DeGette, 2021).

In the EU, President von der Leyen faced pressure from member states frustrated that there was no unified plan to purchase enough COVID-19 vaccines to rapidly vaccinate all of Europe. A letter from six member states warned, ‘[t]he present situation has raised questions about Europe’s preparedness for pandemics’ (Momtaz, 2020). This came after a ‘traumatic event’ in which the Trump administration was rumoured to have tried to buy up preferential access to the German company CureVac’s vaccine—resulting in an emergency meeting and announcement of an €80 million plan to help Curevac test and manufacture its vaccine in the EU (Deutsch & Wheaton, 2021). France, Germany, Italy and the Netherlands joined together to create the ‘Inclusive Vaccine Alliance’, which aimed to ensure vaccines would be produced ‘on European soil’ to secure preferential access for European populations—threatening EU cohesion. von der Leyen, a leading voice for COVAX, responded to this pressure by working to secure any available vaccines, not for COVAX, but for the EU—texting and calling company CEOs herself to secure doses (Stevis-Gridneff, 2021). The eventual European plan that emerged focused on getting 70% of Europeans vaccinated as rapidly as possible, with no provision to delay roll-out to young, healthy people in favour of the most vulnerable in LMICs (European Commission, 2022).

Facing election, Israel’s then-Prime Minister Netanyahu also made securing COVID-19 vaccines for the entire population a centre of his campaign—even negotiating directly with Pfizer’s CEO and paying top

dollar to receive mRNA vaccines enough to vaccinate the entire population in a matter of months (TOI Staff, 2020). Canada’s Minister of Public Services and Procurement, announcing a major vaccine deal in August 2020, said ‘[g]iven intense global competition, we are taking an aggressive approach to secure access to the most promising candidates so that we will be ready to vaccinate all Canadians as quickly as possible’ (Government of Canada, 2020).

In this context, political analysis shows that an approach based on pooled procurement and voluntary action by high-income governments and pharmaceutical companies was always unlikely to secure vaccine equity.

6 | CONCLUSION

The COVID-19 pandemic has taken millions of lives—including many which might have been saved by a more equitable global distribution of vaccines. While in past pandemic crises like HIV inequity was largely the result of slow international action, during COVID-19, efforts to secure access for people in LMICs began well before a vaccine ever reached approval. Our process tracing of global vaccine equity efforts find that, in the absence of an authoritative venue for international deliberation and decision-making, duelling policy paradigms arose. The paradigm that achieved dominance in the first year of the pandemic, based on a consensus of largely HIC-based actors, favoured a focus on voluntary measures—organising demand and pooling donations to procure vaccine doses.

We argue the primary driver of vaccine inequity in the first year of COVID-19 vaccines lay in misalignment between the dominant demand-focused international policy response and the overall political context. This misalignment of paradigm and context has raised difficult questions about the current state and future of health security and cooperation in international policy-making. Vaccine nationalism was predictable in a global context of rising populism. The world’s biggest economies were led by the Trump and Xi administrations, and even those states promising cooperation and shared access signalled their intention to prioritise vaccines for their populations. No significant agreement between states bound governments or companies to prioritise vaccines for priority populations in LMICs before shipping enough to HICs to vaccinate, and even boost, their entire populations. In this context, the choice to exclude supply-focused, open-access measures—legal or diplomatic—compelling companies to share technology and facilitate vaccine production in Africa, Asia or Latin America, doomed equity efforts. Domestic political pressures trumped weak international norms in ways predicted by international relations literature (Davies & Wenham, 2020).

In addressing pandemic preparedness in the years to come, global health actors will need to grapple with how institutions can be built with sufficient political, not just technical, capabilities. In a context of weak international cooperation, fragmentation of global health governance institutions is a problem. It is notable that the WHO sought to bring these paradigms together but lacked the power to do so authoritatively. Rethinking the policy paradigm for access to medical technologies in a pandemic as well as reorganising power in global health will both be needed to prevent pandemic inequalities of the future.

CONFLICT OF INTEREST STATEMENT

Matthew Kavanagh is a special advisor to the United Nations Joint Programme on HIV/AIDS which has taken policy positions in support of a waiver on WTO rules for COVID vaccines. Renu Singh declares no conflicts.

DATA AVAILABILITY STATEMENT

No datasets were used in this publication.

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