

# **The Politics Fueling Global Vaccine Distribution Inequality**

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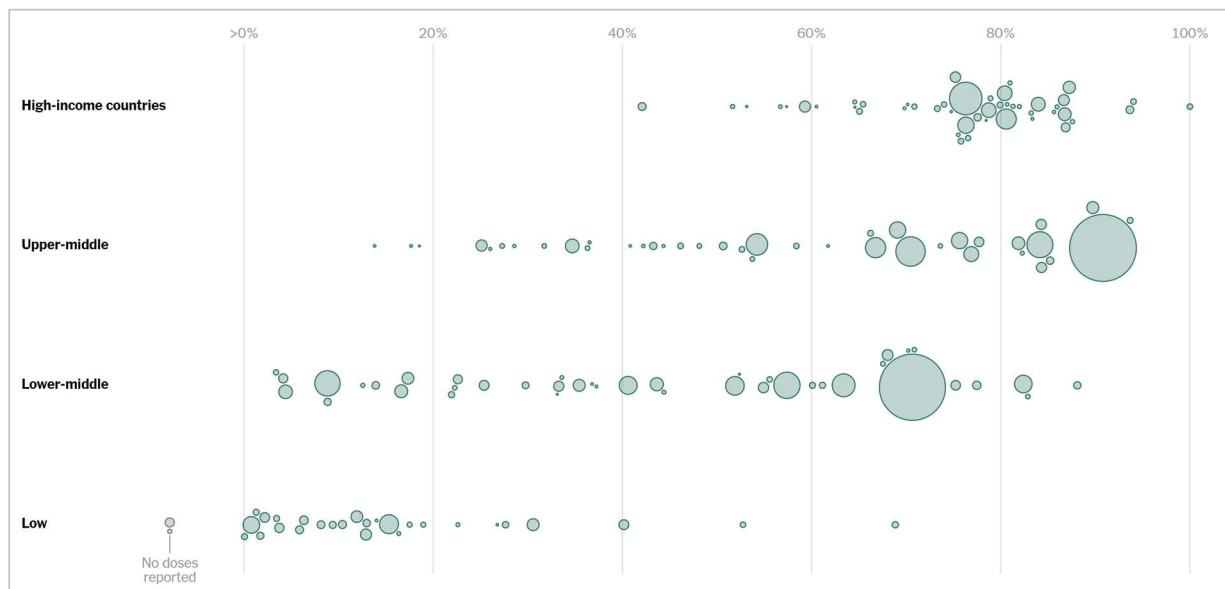
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Advisor

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## The Politics Fueling Global Vaccine Distribution Inequality

COVID-19 vaccines were developed faster than ever before, and a historic manufacturing scale-up contributed to over 11 billion doses being produced in 2021 (Ball, 2020). The scale of COVID-19 vaccine output seems commensurate with the difficulty of ensuring widespread access to vaccines to achieve needed levels of global population immunity. However, over a year into the largest immunization campaign in history, global vaccination rates remain deeply imbalanced (Figure 1), with wealthy countries approaching herd immunity levels while only 14% of the population in low-income nations has received at least one dose of vaccine (Holder, 2022).



*Figure 1.* COVID-19 vaccination rates by country income level as of March 3, 2022. Percentage of total population receiving at least one dose of vaccine. The size of each circle is proportional to country population. (Holder, 2022).

The rapid pace of globalization is blurring the line between domestic and foreign issues. Since the World Health Organization (WHO) declared COVID-19 a global pandemic in March of 2020, this distinction has become even less clear. The pandemic has demonstrated that one

nation's approach to vaccinating its population can affect not only its own prospects and those of its neighbors but also those of the entire world. As each country responds in a unique way to deal with the negative impacts of the pandemic, the limits and justifications of exercising political power to slow the rate of contagion are being tested and redefined, reviving a two-century debate about the role of politics in mass immunization campaigns, and more generally, global health.

This paper contends that vaccination programs have political qualities and require the creation and maintenance of certain power dynamics for their implementation. Of the many frameworks through which to evaluate the political underpinnings of immunization campaigns, I will focus on the role of vaccines in conducting diplomacy and reconfiguring the geopolitical order. This conceptual lens will limit my analysis to the vaccine-mediated interactions that occur between and among countries. Therefore, this paper will not discuss the political factors that shape vaccine distribution locally within countries. An investigation into how the foreign policy agendas of individual nation-states and the flow of vaccines through the international supply chain are tightly coupled will lead to the claim that a resurgence in the political importance of vaccines has divided the world into a familiar patchwork of unequal vaccine access. China will serve as a model of early COVID-19 vaccine diplomacy.

I believe to fully understand why the global COVID-19 vaccination campaign has privileged certain populations at the expense of others, it is valuable to journey into the past. The appropriate starting point is the early 1800s, when vaccine technology was first developed and began to be disseminated at the global scale. This paper explores the foreign policy shifts and political accommodations that occurred over the 19<sup>th</sup> and 20<sup>th</sup> centuries to transform vaccines from a technological marvel into the linchpin of global disease eradication efforts. This historical context will situate the contemporary fight against SARS-CoV-2 in a recurring pattern of

politicized vaccination programs. More importantly, this frame of reference will highlight how the vaccine diplomacy being practiced today differs from that of the past, and why this change is fueling inequities in global vaccine provision.

### **Analytical Framework**

Vaccines are complicated technologies that raise political questions such as who is responsible for purchasing them, who exerts control over their quality and usage, and how can immunization coverage be accurately monitored. This entanglement of politics and vaccines can be understood within the broad framework of technological politics. Arising from the work of political theorist Langdon Winner, the theory of technological politics is predicated on the argument that technological creations – be it agricultural tools, military arms, or transportation systems – are more than just neutral instruments that aid human activity (Winner, 1986). Winner differentiates his view from other theories on the social construction of technology (SCOT) by proposing that technologies are tools for building order in our world – they produce, maintain, and disrupt the way power is distributed between humans, resulting in arrangements of authority and subordination, i.e., politics (Winner, 1986). A technopolitics analysis should examine the reciprocal relationship between what people do with technology and what technology is doing with us and our world.

Political scientists and global health experts are consistent in their portrayal of vaccines as an inherently political technology. Holmberg et al. (2017) were unambiguous in their characterization of vaccination campaigns as “expressions of state power” (p.1). By likening vaccines to taxation and conscription programs, Holmberg et al. (2017) underscored the conditions that entangle vaccines in controversy, inspiring civic duty and shared solidarity in some social groups and vehement opposition in others. Woodle (2000) predicted that

decentralization of vaccination programs could have serious collateral effects with respect to “efficient expenditure of scarce resources, management of vaccine supply, data collection and disease surveillance” (p. 127). Therefore, a centralized, hierarchical system is needed to coordinate and standardize the procedures involved in the highly complex endeavor of vaccinating vast numbers of people. Technological politics is thus an appropriate lens through which to analyze the historical and contemporary uses of vaccines to achieve political objectives. However, within the limited scope of this paper, a complete discussion of every political dimension of vaccination campaigns is not feasible. Furthermore, sociocultural determinants of vaccine uptake, although particularly relevant to the COVID-19 pandemic, are not pertinent to the focus of this paper. Under these conditions, I will restrict my investigation to the foreign policy agendas concerning vaccines that shape the relationships between countries.

Diplomacy can be defined as the conduct of international relations by negotiation or by any other means to produce results in which each country has an interest (Kickbusch et al., 2007). Vaccine diplomacy is situated within the broader framework for *medical diplomacy* introduced in 1978 by Dr. Peter Bourne, special assistant to the president for health issues during the Carter Administration (Katz et al., 2011). Bourne (1978) argued that medicine and health serve as a basis “for bettering international relations ... and bridging diplomatic barriers” (p. 121). Bourne’s view on the role of health in diplomacy has since matured into an established area of study commonly known as *global health diplomacy* – a reflection of the growing realization that the profound sociopolitical implications of health issues extend beyond national borders and require a concerted global effort (Katz et al., 2011). As Kickbusch et al. (2007) observed, “no longer do diplomats just talk to other diplomats” (p. 230); the negotiating process has expanded to involve a diversity of experts in different areas and disciplines. According to

Katz et al. (2011), *global health diplomacy* can manifest as three different interactions around international public health issues: (1) core diplomacy: formal negotiations between or among nations leading to bilateral or multilateral treaties; (2) multistakeholder diplomacy: negotiations between or among nations and other actors, including government agencies (e.g., the U.S. Agency for International Development [USAID]) and international organizations (e.g., WHO), not necessarily intended to lead to binding agreements; and (3) informal diplomacy: interactions between international public health actors and their counterparts in the field, including host country officials, representatives of multilateral and nongovernmental organizations (NGOs), private funders (e.g., Bill and Melinda Gates Foundation), laboratories, and academic institutions.

*Vaccine diplomacy* is a branch of *global health diplomacy* that “promotes the use and delivery of vaccines to achieve larger global health goals and shared foreign policy objectives” (Shakeel et al., 2019, p. 82). Hotez (2014) added that vaccine diplomacy “encompasses the important work of Gavi, the Vaccine Alliance, as well as elements of the WHO, the Gates Foundation, and other important international organizations” (p. 43). An underlying theme of vaccine diplomacy is the uniqueness of vaccines, especially in the context of a globally debilitating pandemic. Hotez (2014) argued that vaccines are more powerful than any other medical or public health intervention in terms of the lives that they save.

### **The Origins of Vaccine Diplomacy**

The use of vaccines as instruments of foreign policy dates back to the late 18<sup>th</sup> century, when English physician Edward Jenner developed the world’s first vaccine after discovering that cowpox delivered as an inoculum could prevent smallpox (Bazin, 2000). Prior to Jenner’s breakthrough, countries more or less fended for themselves in fighting the spread of smallpox

(Fidler, 2005). A collaborative global network to share medical knowledge and establish common measures for protecting public health had never existed before. After Jenner published the successful results of his pioneering method, the smallpox vaccine soon achieved international acclaim and it did not take long for national governments to recognize its diplomatic power. As early as 1801, the United States was vaccinating Native American dignitaries visiting Congress in Washington, D.C. A few years later, Lewis and Clark set off on their famous expedition equipped with smallpox vaccines to immunize Indian tribes in the newly acquired region of the United States (Hotez, 2014). Across the Atlantic, England was embroiled in the Napoleonic Wars with France. Jenner famously called upon France to put public health ahead of national conflict, declaring “the sciences are never at war” (Bazin, 2000, p. 246). Inspired by Jenner’s sentiments, England shipped smallpox vaccines to France to immunize Napoleon’s army. France returned the gesture of goodwill by releasing English prisoners (Hotez, 2014).

As rates of international trade and travel escalated throughout the 19<sup>th</sup> century while vaccine technology remained in its infancy, infectious diseases continued to spread across borders. National governance alone was no longer effective in addressing devastating waves of disease. These outbreaks not only caused serious mortality but also imposed significant delays and costs on trade and commerce (Fidler, 2005). The global nature of the problem demanded international health cooperation, and the convening of the first International Sanitary Conference in Europe in 1851 laid the architecture for this multilateral cooperation. The 12 attending countries produced an international legal framework based on obligations for states to make information about disease outbreaks more available and to maintain disease-prevention measures that were scientifically effective with minimal impact on trade and travel (Fidler, 2005). Thirteen subsequent conferences took place over the next 80 years, with nearly 50 countries participating

at the final meeting in 1938 (Howard-Jones, 1975). These conferences set the stage for the creation of WHO in 1948. WHO's establishment signified that a single set of legal rules on international infectious disease control could be adopted to replace the fragmented patchwork of sanitary convention treaties and that these rules could be efficiently amended in response to changes in scientific or other factors (Fidler, 2005).

The formation of WHO coincided with a dramatic decline in the political importance of international infectious disease control. Scholars of international health diplomacy agree that the driving motivation behind international health cooperation in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries was not to better the health of the world but to reduce the burden on European and North American trade caused by national responses to the threat of importing diseases – namely, cholera, plague, and yellow fever – from Asia and the Middle East (Goodman, 1971; Howard-Jones, 1975). With the economic interests of the great powers taking precedence, the international sanitary conventions addressed a limited range of health risks. However, by the end of WWII, widespread application of medical innovations, such as vaccines, and the modernization of clean water and sanitation systems contributed to significant improvements in infectious disease control (Fidler, 2005). Under these conditions, WHO and major states of the international system pursued strategies that abandoned the political focus of the past for new interests in engaging the entire world in the fight against disease.

WHO concentrated on attacking diseases at their local sources in developing countries, and this focus culminated in disease eradication efforts. After the failure of its initial campaign to rid the world of smallpox, WHO launched the Intensified Eradication Program in 1967 with a promise of renewed effort (Centers for Disease Control and Prevention, 2021). Diplomacy and cooperation channeled through WHO played pivotal roles in the success of the intensified



efforts. At the height of the Cold War, as the U.S. and the Soviet Union inched towards nuclear conflict, the two superpowers collaborated to support smallpox eradication campaigns in developing countries, with the Soviet Union pioneering a freeze-drying technique that made it possible to deliver stable vaccines to remote tropical areas and with the U.S. providing funding and vaccine inventory (Hotez, 2014). The last naturally occurring smallpox case was diagnosed in 1977, and WHO declared the global eradication of the disease in 1980.

Cold War vaccine diplomacy also encompassed polio eradication efforts. Between 1956 and 1959, U.S. virologist Dr. Albert Sabin worked closely with Soviet scientists to develop, test, and license his oral polio vaccine (Hotez, 2001). Soviet children were among the first to be administered test doses of Sabin's vaccine. These clinical trials in the Soviet Union established the safety of the vaccine, and encouraged the U.S. to approve and license the vaccine in 1963 (Hotez, 2014). Sabin's polio vaccine quickly became the vaccine of choice for mass immunization campaigns due to its ease of administration and low cost, and it remains the world standard today. The smallpox and polio vaccine initiatives that brokered Cold War diplomacy exemplify Katz et al.'s (2001) conceptualization of multistakeholder *global health diplomacy* since "the rival powers did not sign formal agreements or treaties but coordinated their assistance informally around a public health goal of mutual interest" (p. 509).

The putting aside of political differences to solve public health or pandemic threats would become a hallmark of modern vaccine diplomacy. In the later decades of the 20<sup>th</sup> century, vaccines became key to realizing Bourne's (1978) vision of *medical diplomacy* as a way to "transcend traditional and more volatile and emotional concerns" (p. 121). Since 1994, the United Nations Children's Fund (UNICEF), with the help of associated NGOs, has used vaccines and vaccination campaigns to successfully negotiate cease-fires in some of the most intractable

civil conflicts in Africa and the Middle East (Hotez, 2001). In addition to promoting scientific collaboration for vaccine development, the 21<sup>st</sup> century framework for vaccine diplomacy emphasizes the importance of ensuring universal or equitable access for low- and middle-income countries to vaccines for potential pandemic diseases (Hotez, 2014; Hotez & Venkat Narayan, 2021).

### **COVID-19 Vaccine Diplomacy**

Without the manufacturing and storage infrastructure to support mass vaccination campaigns at home, many low- and middle-income countries are reliant on vaccine donations from abroad. The COVID-19 Global Access Facility, or COVAX, was established in April of 2020 to coordinate the procurement and delivery of these donations. As a multilateral initiative led by WHO, the Coalition for Epidemic Preparedness Innovations (CEPI), and Gavi, the Vaccine Alliance, COVAX exemplifies Hotez's (2014) conceptualization of modern vaccine diplomacy by promoting equitable and fair distribution of COVID-19 vaccines around the world (Berkley, 2020). COVAX employs a two-phase allocation algorithm, in which participating countries first receive doses proportionally to their total population up to 20% coverage, then participants receive doses at variable rates based on consideration of COVID-19 risk and vulnerability to severe disease (World Health Organization, 2020).

While COVAX seemed like an appropriate solution to the challenge of vaccinating billions of people during a devastating pandemic, in practice, the initiative has far undershot its vaccine roll-out projections. COVAX aimed to deliver 2-3 billion doses of COVID-19 vaccines worldwide by early 2022 (Usher, 2021); however, as of March 2022, COVAX is responsible for the shipment of only 1.3 billion doses to 144 countries (UNICEF, 2022). Since COVAX relies on vaccine donations, it is rendered an ineffective distribution mechanism if it is not receiving these

vaccines – and that is exactly what is happening. The nations with access to surplus vaccine supply are opting to bypass COVAX and instead join bilateral agreements to directly provide doses to countries of their choosing. The motivations and outcomes of these bilateral deals negotiated outside of the COVAX framework are discordant with former peace- and equity-oriented definitions of vaccine diplomacy (Hotez, 2014; Hotez & Venkat Narayan, 2021). At the core of this COVID-19 vaccine diplomacy is an increasing tension between mutual benefit and self-interest as nation-states vie for favorable perception in the minds of international stakeholders (Lee, 2021). For no country has this been more evident than China.

Among the several countries that have leveraged their excess vaccine stock as a diplomatic tool for bolstering international influence and image, China stands out for its speed in consolidating soft power gains through vaccine exports (Huang, 2021). In March of 2021, China was manufacturing one third of the total COVID-19 vaccine doses in the world and exporting 62% of its doses to other countries, while the U.S. was exporting 0% of its vaccine supply despite producing 27% of the world’s coronavirus vaccines (Lee, 2021). As of September 2021, 84% of Chinese vaccines were provided bilaterally, while the U.S. and other wealthy countries were funneling vaccine donations primarily through multilateral groupings like COVAX (Lin et al, 2021). China’s model of vaccine diplomacy is representative of the scale and objectives of the strategies being pursued by other non-Western vaccine donors, like Russia and India, that preferentially operate outside of COVAX (Lee, 2021). Consequently, the actions of China have been central to the rewriting of vaccine diplomacy in literature during the COVID-19 pandemic.

The China Power Project of the Center for Strategic and International Studies (CSIS) developed a unique indexing system to score countries based on the extent to which China engaged them in vaccine diplomacy and how receptive they were to Chinese activities (Lin et al.,

2021). Early in the COVID-19 pandemic, Chinese leaders proclaimed that Chinese-developed COVID-19 vaccines would contribute “to ensuring vaccine accessibility and affordability in developing countries” (as cited in Wheaton, 2020, para. 3) and, therefore, would be offered as a global public good (GPG), i.e., no country would be excluded from the vaccine’s benefits for failing to pay for them and consumption of the vaccine by one country would neither prevent access nor reduce availability to others (Ress, 2013). Despite this altruistic, fair-minded framing of Chinese vaccines as GPGs, Lin et al. (2021) found that, as of September 7, 2021, 96% of the 1.1 billion Chinese vaccine exports were sold rather than donated (Figure 2). As a result, low-income countries have lacked the financial resources to purchase Chinese vaccines, and the number of donations these countries have received has been far below the size of their populations. This is an obvious contradiction to Beijing’s efforts to project the impression that Chinese vaccines are being equitably distributed worldwide.

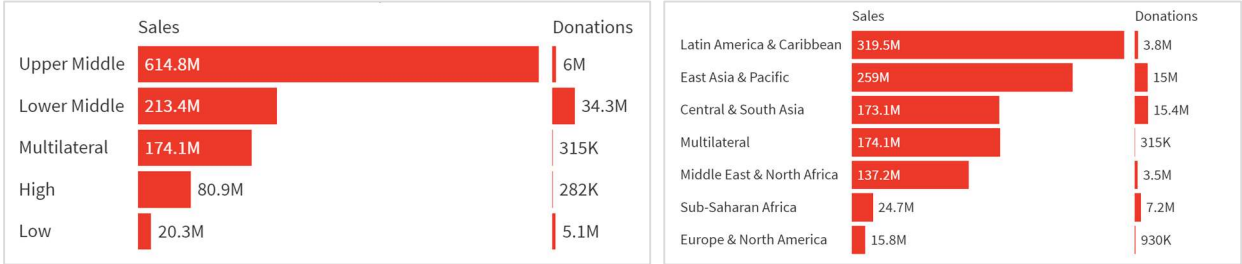


Figure 2. China’s provision of vaccines by country income level (left) and region (right), includes finalized commitments as of September 7, 2021. (Lin et al., 2021).

If more Chinese vaccines have gone to high-income countries (7%) than low-income countries (2%), then what is determining the destination of these vaccines? Lin et al. (2021) found that China’s decision to provide vaccines is chiefly influenced by political and strategic interests – including the desire to reinforce established relationships and forge new ones – as opposed to need or reciprocity. China’s provision of vaccines also frequently comes with a

precondition to align with Chinese stances on issues. A central pillar of Chinese foreign policy during the COVID-19 pandemic concerns repairing China's image in the minds of foreign publics – transforming China from an object of mistrust for covering up the coronavirus' initial outbreak into a benevolent global power offering leadership during a time of widespread upheaval (Lee, 2021). In 2020, global perceptions of China were overwhelmingly unfavorable. Between June 10 and Aug 3, 2020, a Pew Research Center survey of 14,276 adults in the 14 advanced countries (Belgium, Japan, Italy, Denmark, France, Australia, Germany, the U.K., the U.S., the Netherlands, Canada, Spain, Sweden, and South Korea) indicated that negative views of China – with respect to its handling of COVID-19 and its leaders' conduct in world affairs – in nine of these countries had reached their highest level in the Center's 12 years of polling on the issue (Silver et al., 2020). China recognized how its vaccine exports can be used to rebuild a reputation that is powerful, trusted, attractive, and conducive to the country's economic and political aims. Humbly shipping vaccines overseas was not a substantial enough measure for China.

To elevate the impact of its vaccine deliveries and to reclaim a competitive identity, China organized highly publicized vaccine handover ceremonies in at least 84 of the 103 countries that had received Chinese vaccines as of mid-September 2021 (Lin et al., 2021). Additionally, China has adopted more aggressive tactics that diverge from the traditional route of national rebranding through praise and support. For example, in June of 2021, China threatened to withhold its vaccines from Ukraine after the Eastern European country briefly endorsed a statement condemning China of human rights abuses in its western region of Xinjiang (Keaten, 2021). Similarly, Paraguay was denied access to Chinese vaccines after the South American nation chose to stand firm its allegiance to Taiwan (Pratt & Levin, 2021).

China has also exploited its existing relationships to repair its image through vaccination. As seen in Figure 2, a majority of Chinese vaccine exports have gone to Latin America. On July 2, 2020, China commenced Phase III clinical trials of its Sinovac vaccine in Brazil, representing the first Chinese vaccine trial conducted outside of mainland China (Cohen, 2020). China and Brazil maintain strong diplomatic ties as members of BRICS – a group of the world’s five major emerging economies. Therefore, China was able to capitalize on this relationship to increase the credibility of Chinese vaccines in the Latin America market.

Public displays of gratitude for Chinese vaccines, calculated threats to terminate vaccine access, and leveraging of established diplomatic relationships seem to be paying off for China. As presented in Table 1, views on how China handled the pandemic became more positive between the summer of 2020 and the spring of 2021. The share of respondents across 12 countries who said China had done a good job responding to the coronavirus outbreak rose from a median of 39% to 50%, with double-digit increases in nine countries (Silver et al., 2021). Although the recent opinions on China are certainly mixed, they are more favorable than perceptions of the U.S. – a median of just 37% positively evaluated the American response to the pandemic (Silver et al., 2021).

*Table 1.* Percentage of those in the publics surveyed in both Summer 2020 and Spring 2021 who believe China has done a good job dealing with the coronavirus outbreak

	<b>2020</b>	<b>2021</b>	<b>Change</b>
	%	%	
Belgium	40	61	▲ <b>21</b>
Spain	49	67	▲ <b>18</b>
Netherlands	42	57	▲ <b>15</b>
Italy	51	65	▲ <b>14</b>
Canada	36	50	▲ <b>14</b>
Sweden	33	45	▲ <b>12</b>
Australia	25	37	▲ <b>12</b>
UK	37	48	▲ <b>11</b>
France	44	54	▲ <b>10</b>
Germany	41	49	▲ <b>8</b>
Japan	16	24	▲ <b>8</b>
South Korea	20	27	▲ <b>7</b>
<b>MEDIAN</b>	39	50	

Source: Silver et al., 2021

## **Discussion**

Prior to COVID-19, vaccine diplomacy was framed in literature as an agent of conflict resolution (Hotez, 2001; Katz et al., 2011). From the Napoleonic Wars to the Cold War to civil wars in Africa and the Middle East, vaccination programs proved successful in motivating publics in conflict to set aside their differences and join forces in fighting the universal plight of disease. Throughout the late 20<sup>th</sup> and early 21<sup>st</sup> centuries, as medicine and healthcare became integrated into the foreign policy agendas of the governments of an increasingly interconnected world, definitions of vaccine diplomacy adapted to the emerging pattern of international cooperation channeled through multilateral frameworks such as WHO, the Gates Foundation, and Gavi, the Vaccine Alliance (Hotez, 2014).

Today, national identity is more competitive than ever due to the effects of globalization. In a world of vast communication networks, high-speed data, and increased surveillance, nation-states' every move – good or bad – is laid bare for global audiences. Rankings and indices pit nations against one another in every sector – be it tourism, governance, standard of living, and, more recently, COVID-19 vaccines. Reputation is currency in the international system, and the COVID-19 pandemic has demonstrated the great lengths countries are willing to go to prosper.

In this paper, China's global vaccination efforts during the COVID-19 pandemic were used to exemplify a new form of vaccine diplomacy – one characterized by unilateral “vaccinationalism” (Hotez & Venkat Narayan, 2021, para. 8) masquerading as symbiotic bilateral negotiations. Over the pandemic, national governments have centralized control of vaccination campaigns to support strategic and political narratives. For China, this narrative promotes a global approach to national rebranding through technological prowess, altruism, and selective partnering with countries who align with China's position on key policy issues. While China has successfully advanced its image and influence throughout the pandemic, its decision to conform to a contemporary trend of prioritizing political interests over global health outcomes has contributed to a crisis of vaccine inequity, in which low- and middle-income nations are left behind in the race to achieve population immunity.

This paper serves to update the scholarly conversation on the link between vaccines and politics, namely that involving interactions at the international scale. Since vaccine diplomacy responds to fluctuations in national policy objectives, the characteristics of COVID-19 vaccine diplomacy I have identified in this paper constitute trends, not irrevocable changes. The U.S., for example, was criticized early in the COVID-19 pandemic for nationalistic hoarding of domestically produced vaccines; however, in early 2022, the U.S. has now pivoted to multilateral



cooperation, leading the world in vaccine doses donated to COVAX (Our World in Data, 2022). Immunization is a complicated technopolitical system that can serve as a historical lens through which to view changes to society and nation over time. Therefore, my analysis of Chinese vaccine diplomacy should not be interpreted as a permanent trajectory for the country. Nor should my choice of China as a model of COVID-19 vaccine diplomacy be misconstrued as an indictment of the country as the sole contributor to unequal vaccine access. No single country is responsible since vaccination is a global effort. In taking a global approach, I have excluded many perspectives on the issue of ensuring equitable vaccine distribution. From supply chain constraints to anti-vaccine rhetoric, all of these challenges must be addressed to achieve fair provision of COVID-19 vaccines. Successfully vaccinating the globe will require us to return to the 20<sup>th</sup> century multilateral framework of international cooperation in which smallpox and polio eradication efforts flourished.

## References

- Ball, P. (2020). *The lightning-fast quest for COVID vaccines – and what it means for other diseases*. Nature. <https://www.nature.com/articles/d41586-020-03626-1>
- Bazin, H. (2000). *The eradication of smallpox: Edward Jenner and the first and only eradication of a human infectious disease*. Academic Press, San Diego, CA.
- Berkley, S. (2020). *COVAX explained*. Gavi, the Vaccine Alliance. <https://www.gavi.org/vaccineswork/covax-explained>
- Bourne, P. G. (1978). A partnership for international health care. *Public health reports (Washington, D.C.: 1974)*, 93(2), 114–123.
- Centers for Disease Control and Prevention. (2021). *History of smallpox*. <https://www.cdc.gov/smallpox/history/history.html>
- Cohen, J. (2020). *China’s vaccine gambit*. Science. <https://www.science.org/content/article/global-push-covid-19-vaccines-china-aims-win-friends-and-cut-deals>
- Fidler, D. P. (2005). From international sanitary conventions to global health security: The new international health regulations. *Chinese Journal of International Law*, 4(2), 325-392. <https://doi.org/10.1093/chinesejil/jmi029>
- Goodman, N. M. (1971). *International health organizations and their work* (2<sup>nd</sup> ed.). Churchill Livingstone.
- Holder, J. (2022). *Tracking Coronavirus vaccinations around the world*. The New York Times. <https://www.nytimes.com/interactive/2021/world/covid-vaccinations-tracker.html>
- Holmberg, C., Blume, S., & Greenough, P. (Eds.). (2017). *The politics of vaccination: A global history*. Manchester University Press. [https://doi.org/10.26530/oopen\\_626407](https://doi.org/10.26530/oopen_626407)

- Hotez, P. J. (2001). Vaccines as instruments of foreign policy. *EMBO Reports*, 2(10), 862-868.  
<https://doi.org/10.1093/embo-reports/kve215>
- Hotez, P. J. (2014). Vaccine diplomacy: Historical perspective and future directions. *PLOS Neglected Tropical Diseases*, 8(6). <https://doi.org/10.1371/journal.pntd.0002808>
- Hotez, P. J., & Venkat Narayan, K. M. (2021). Restoring vaccine diplomacy. *The Journal of the American Medical Association*, 325(23), 2337-2338.  
<https://doi.org/10.1001/jama.2021.7439>
- Howard-Jones, N. (1975). *The scientific background of the International Sanitary Conferences, 1851-1938*. Geneva: World Health Organization.
- Katz, R., Kornblat, S., Arnold, G., Lief, E., & Fischer, J. E. (2011). Defining health diplomacy: Changing demands in the era of globalization. *Milbank Quarterly*, 89(3), 503-523.  
<https://doi.org/10.1111/j.1468-0009.2011.00637.x>
- Keaten, J. (2021). *Diplomats say China puts squeeze on Ukraine*. AP News.  
<https://apnews.com/article/united-nations-china-europe-ukraine-health-a0a5ae8f735b92e39c623e453529cbb9>
- Kickbusch, I., Silberschmidt, G., & Buss, P. (2007). Global health diplomacy: The need for new perspectives, strategic approaches and skills in global health. *Bull World Health Organ*, 85(3), 230–232. <https://doi.org/10.2471/blt.06.039222>
- Lee, S. T. (2021). Vaccine diplomacy: nation branding and China’s COVID-19 soft power play. *Place Branding and Public Diplomacy*, 1-15. <https://doi.org/10.1057/s41254-021-00224-4>
- Lin, B., Funaiolo, M. P., Hart, B., & Price, H. (2021). *China is exploiting the pandemic to advance its interests, with mixed results*. Center for Strategic and International Studies.

<https://www.csis.org/analysis/china-exploiting-pandemic-advance-its-interests-mixed-results>

Our World in Data. (2022). *COVID-19 vaccine doses donated to COVAX*. Retrieved March 11, 2022, from <https://ourworldindata.org/grapher/covax-donations?country=FRA~ESP~SWE~USA~CAN~NOR~NZL~GBR~DNK~CHE~ITA~DEU~PRT~ARE~BEL~European+Union~JPN~NLD~FIN~HKG~IRL>

Pratt, S. F., & Levin, J. (2021). *Vaccines will shape the new geopolitical order*. Foreign Policy. <https://foreignpolicy.com/2021/04/29/vaccine-geopolitics-diplomacy-israel-russia-china/>

Ress, M. A. (2013). *Global public goods, transnational public goods: Some definitions*. Knowledge Ecology International. <https://www.keionline.org/book/globalpublicgoodstransnationalpublicgoodssomedefinitions>

Shakeel, S. I., Brown, M., Sethi, S., & Mackey, T. K. (2019). Achieving the end game: Employing "vaccine diplomacy" to eradicate polio in Pakistan. *BMC public health*, 19(1), 79. <https://doi.org/10.1186/s12889-019-6393-1>

Silver, L., Devlin, K., & Huang, C. (2020). *Unfavorable views of China reach historic highs in many countries*. Pew Research Center. <https://www.pewresearch.org/global/2020/10/06/unfavorable-views-of-china-reach-historic-highs-in-many-countries/>

Silver, L., Devlin, K., & Huang, C. (2021). *Large majorities say China does not respect the personal freedoms of its people*. Pew Research Center. <https://www.pewresearch.org/global/2021/06/30/large-majorities-say-china-does-not-respect-the-personal-freedoms-of-its-people/>

- UNICEF. (2022). *COVID-19 vaccine market dashboard*. <https://www.unicef.org/supply/covid-19-vaccine-market-dashboard>
- Usher, A. D. (2021). A beautiful idea: How COVAX has fallen short. *The Lancet*, 397(10292), 2322-2325. [https://doi.org/10.1016/S0140-6736\(21\)01367-2](https://doi.org/10.1016/S0140-6736(21)01367-2)
- Wheaton, S. (2020). *Chinese vaccine would be 'global public good,' Xi says*. Politico. <https://www.politico.com/news/2020/05/18/chinese-vaccine-would-be-global-public-good-xi-says-265039>
- Winner, L. (1986). *The whale and the reactor: A search for limits in an age of high technology*. University of Chicago Press.
- Woodle, D. (2000). Vaccine procurement and self-sufficiency in developing countries. *Health Policy and Planning*, 15(2), 121-129. <https://doi.org/10.1093/heapol/15.2.121>
- World Health Organization. (2020). *Fair allocation mechanism for COVID-19 vaccines through the COVAX facility*. <https://www.who.int/publications/m/item/fair-allocation-mechanism-for-covid-19-vaccines-through-the-covax-facility>