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Addressing the Vaccine Gap

Goal-based Global Governance and Health Silk Road

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China Investment Research (CIR)

Shanghai Institutes for International Studies (SIIS)

Shanghai University of Finance and Economics (SUFE)

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Content

I.

Introduction

Our previous report *Health Silk Road 2020: A Bridge to the Future for Health to All* tracked the rapid development of the Health Silk Road. The year 2020 concluded with two Chinese vaccines being tested throughout 15 countries. In this study, we continue to track the H1 2021 development of the Health Silk Road with a focus on vaccine production and distribution of both Chinese vaccines and those manufactured in countries around the world. During this period of explosive vaccine production growth, both actual in 2021 and planned for 2022, there developed a significant gap between the dosages produced, versus those distributed and to which recipients.

This is a world full of differences. But the people of all countries have a common expectation, that is, to work together to free the world from the shadow of COVID-19 and return to a normal track: normal social activities, normal economic activities, and normal international travels.

In the first half of 2020, when COVID-19 appeared and broke out, some epidemiologists predicted that the epidemic would be effectively controlled in the summer of 2021 and the world would return to normal. However, we have not yet seen any signs of restoring order in the world in the second half of 2021. Indeed, after more than a year of hard work and trials, we have seen that the spread of the virus has been moderated, and the number of the infected patients has declined in some countries, which allows the world to see the dawn of the restoration of normal order. However, in recent months, the epidemic has suddenly spread rapidly again in certain developing countries such as in regions of Southeast Asia, Latin America and Africa. This shows that the effective containing of the virus in some individual countries can only provide an exemplary role, and cannot solve the problem of re-opening the borders between countries, nor can it guarantee the world back to normal order. If other countries lose the guard against COVID-19, the effective governance of individual countries cannot be sustained.

The former Secretary-General of the United Nations (UN), Mr. BAN Ki-moon and others have published an article expressing their expectations and concerns on how to help the world back to the normal track destroyed by the

epidemic.[1] They expect the world that is being affected by the epidemic to mark a global turning point faster. Disappointed with the international cooperation in 2020，they hope international cooperation will advance through twists and turns in 2021. Their article states, no one, anywhere, is safe from COVID-19 until everyone, everywhere, is safe. The first step, which will pay for itself many times over, is to ensure mass vaccination in every affected country. Support from the Group of Seven (G7) and Group of Twenty (G20) that will make vaccines readily accessible to low- and middle-income countries is not an act of charity; it is in every country's strategic interest. Indeed, the International Monetary Fund (IMF) believes that such support would be the best public investment ever made. The G7 should also lead the way in support of dose sharing and voluntary licensing agreements, potentially including temporary patent waivers that would allow the knowledge and technology transfer needed to manufacture vaccines on every continent.

The views of these veteran politicians indicate that if the current methods and approaches are used, there is still a long way to go before the world restores normal order and international exchanges. More than a year of human experience tells us that infectious diseases spread based on interpersonal activities and communications, and the new arrangement of social activities itself is an effective way to enhance human immunity and adaptability.

The epidemic since 2020 and the measures taken to control the epidemic have severely affected the economic activities of the world. There has been massive unemployment around the world, affecting the livelihoods of hundreds of millions of people. Some developing countries have even experienced economic contraction and debt crises. Economic difficulties have hindered some countries' commitments to combat climate change. Faced with the prolonged challenges of returning to normal, we can no longer do things unilaterally. The international community should seize the opportunity, take responsibility, and usher the world into a healthier period. 2022 cannot be missed again. Goal-based governance can help us clarify the tasks and priorities that need to be done for international cooperation, and provide the conditions for the world to restore its normal order.

[1] Graça Machel, et al , The World Needs a Breakthrough Year, Project Syndicate, 2021. https://www.project-syndicate.org/commentary/world-needs-breakthrough-year-in-2021-by-graca-machel-et-al-2021-06

II.

Progresses and gaps: several observations

By the end of June 2021, the world has made much progress in the fight against the COVID-19 epidemic, yet leaving many goals unfulfilled. It is necessary for us to sort out the progresses we have made and the gaps that remain unbridged. In doing so, the mechanisms for international cooperation and global governance will be re-examined.

1. Progresses

Progress 1: Countries and regions gradually sum up effective epidemic prevention methods

"Blocking the chain of virus transmission, finding a cure, and reducing mortality" has been the direction of the efforts of all countries in the past year and a half. After more than a year of practices in fighting against COVID-19, governments, professionals and citizens of various countries have mastered more and more relevant knowledge and tools, with improved capabilities to prevent and respond to the pandemic. The number of epidemic cases and mortality declines owing to strengthened measures of travel restrictions and isolation, medical quarantine and treatment, improving the level of prevention and control of medical institutions, vaccination, promoting epidemic prevention knowledge, improving citizens' self-protection, other non-pharmaceutical interventions, and mobilizing resources of the whole society, etc. We have seen that the measures taken by the governments in many countries have shown social effects. Such as 1. Multi-Ministry Task Force were established before the emergence of the first COVID-19 case. 2. Screening measures and border controls, including temperature measures, were held for incoming travelers. 3. To detect cases, complementary diagnostic methods and containment and surveillance measures were deployed. 4. A network of preparedness facilities was set up to manage infected cases. 5. All confirmed or suspected cases were isolated. 6. Social and community assessments were performed. 7. Clinical guidelines for medical treatment were formulated and ICU responses were provided to the virus outbreak. 8. Solutions were offered for the treatment of severely ill patients, the control of infection, the sharing of information among health personnel, psychological problems in healthcare workers and their exhaustion.

Progress 2: Governments of various countries have taken utmost efforts for effective epidemic prevention within their respective national boundaries, and have made certain achievements

Facing the ravages of a virus that has never been experienced before, governments of various countries have launched efforts to block the virus and rescue patients after receiving case reports, and adopted various social controls, technical, and medical measures to prevent further spreading and expanding of the epidemics. Whether it is banning large gatherings to stop the spread of the virus, or emphasizing the resilience and adaptability of the society in the face of the virus, these efforts mark a useful exploration of human society. While the range and redundancy of anti-epidemic resources in each country are different, the anti-epidemic measures taken by governments of various countries based on limited resources and capabilities are all commendable. In particular, the measures of border control have effectively prevented the spread of the epidemic.

Progress 3: With the advancement of epidemic prevention, the worldwide panic has been eliminated, and people have begun to treat COVID-19 rationally

Panic is the drive for all kinds of policies. Panic will also cause looting and shortage of anti-epidemic materials, making access even harder for the people and areas mostly in need. With the joint efforts of medical staff, governments, civil society, and vaccine research and development companies around the world, the epidemic has been brought under control. Although risks linger with the mutation of the virus, on the whole, the international community has begun to treat COVID-19 rationally by adapting to a society where a certain number of infected people still exist. People's personal hygiene habits (wearing masks, reducing unnecessary travel, and reducing exposure) have been reinforced, while management measures for public facilities such as schools, hospitals, churches, stadiums, theaters, and libraries have gradually formed.

Progress 4: Significant progress has been made in the research and development, production and distribution of vaccines, reaching a certain scale of production;

With the joint efforts of global scientists and biopharmaceutical companies, the combat of humans against the spread of the virus has achieved considerable success. Vaccines are the main tool to stop the further spread of the COVID-19 virus. By vaccinating a sufficient proportion of the population to gain immunity to infectious diseases, "herd immunity" can be achieved, thereby reducing the further spread of the epidemic from person to person. Most epidemiologists believe that, to achieve “herd immunity”, the proportion of vaccination should reach 60% to 90% of the population. Twelve vaccines have been approved for marketing worldwide by the end of June, 2021, including those pharmaceutical companies from the United States (Pfizer, Modena, Johnson & Johnson), Germany, the United Kingdom (AstraZeneca), Russia (Gamaria Research Institute, and Vector Research Center), China (Sinopharm, CanSino, BioNTech/Fosun JV) and India (Bharat). In 2021, the global vaccine production capacity is expected to

reach 12 billion doses.[2] China's vaccine production capacity is expected to reach 5 billion doses in 2022.[3] With the increasing number of approved vaccines, the production capacity is expected to rise substantially.

Major Vaccine Producers (2021-2022)

Non-Chinese

Company	2021 Total Doses (Billion)	2022 Forecast Doses (Billion)
BioNTech/Pfizer	3.0 (up from 2.5)	4.5
Oxford/AstraZeneca	2.7	3.8
Novovax	1.3	2.4
Janssen (J&J)	1.0	1.8
Sputnix V (Russia)	0.4	1.6
Moderna	0.9	1.4 (1)
Bharat Biotech	0.6	1.1
Sanofi/GSK	Q4	0.7
Curevax	0.3	0.6
	10.2	17.9

(1) Have also seen more projections as high as 3.0
Sources: Airfinity; Financial Times June 2021

[Graph 1] Major Vaccine Producers (Non-Chinese)

Progress 5: To varying degrees, various parts of the world have begun to normalize their lives and production with the existence of COVID-19 epidemic.

In some countries, the spread of the COVID-19 virus has been basically under control. The medical system is capable of detecting, testing, isolating and treating every case and every close contact. In specific establishments such as hospitals and nursing homes, protective measures have been perfected to minimize the risk of outbreaks. At airports, railway stations, wharfs and other venues where overseas imports take place, the detection, protection and isolation measures are upgraded. Effective preventive measures have been taken in workplaces, schools and other places where people gather. And communities are fully aware of protective measures and have the ability to adapt to the "new normal." In some countries, schools, universities, bars, restaurants and cinemas, and certain international sports events have gradually resumed.

2. Gaps

Gap 1: The gap between demand and supply of vaccine

[2] 12 Billion Vaccine Doses by the End of 2021, September 15, 2021, https://www.bworldonline.com/12-billion-vaccine-doses-by-the-end-of-2021/.
[3] China Vaccine Capacity to Hit 5 Billion Doses Next Year, July 16th 2021, https://www.caixinglobal.com/2021-04-10/china-vaccine-capacity-to-hit-5-billion-doses-next-year-industry-chief-says-101688506.html.

The total population of the world is settled. The proportion of the global population that needs to travel across borders can also be calculated. Therefore, the total demand for vaccines and the demand for cross-border vaccine certification are relatively certain. During H1 2021, the World Health Organization (WHO) estimated that 11 billion doses of vaccine are needed to inoculate 75% of the world's population aged 5 and over. It is clear from the numbers in **Graph 1** that the world's leading vaccine producing countries would have difficulty supplying both their own populations and the remaining world's needs based solely upon 2021 production.

In February, COVAX (the global procurement mechanism for COVID-19 vaccines to help protect the most at-risk groups in all participating countries) signed an MoU with the U.S. based vaccine manufacturer Novavax along with its Indian partner Serum Institute to receive 1.1 billion doses by year end 2021 in order to provide these vaccines to 92 low- and middle- income countries approved by the GAVI (the Vaccine Alliance) Board.[4] In June, we saw the United States (U.S.) committed to distributing 500 million doses of U.S.-manufactured vaccines to lower income countries; the European Union (EU) followed days later with a commitment of 870 million doses, also before the end of 2022.[5] China pledged to provide 2 billion doses of COVID-19 vaccines to the world and offered US$100 million to the COVAX throughout this year.[6] There is still a huge gap between the vaccine demand (11 billion doses) and the available vaccine supply taking into account the contributions from the west (1.4 billion doses), China (2 billion doses) and from the COVAX scheme (1 billion doses).

As the scale of production expands, the gap between demand and supply will be narrowed. However, the urgency of people's demand for vaccines in different regions will fluctuate with the reemergence of the epidemic and the degree of control. People in well-controlled areas are not in a hurry to get vaccines, whereas in places of sudden outbreak and rapid spread of the epidemic, people's demand for vaccines will surge. In addition, if a large-scale epidemic occurs in a vaccine-producing country, the supply-demand relationship will be likely to change. For instance, if a large-scale epidemic occurred in India, India would have to stop part of its production, resulting in a short-term global supply shortage.

Gap 2: The gap between developed and developing countries

COVID-19 has spread almost all over the world. The proportion of people infected in developed countries is not less than that in developing countries. However, due to the relatively abundant medical resources in developed countries and the relatively strong social and economic resilience, the infected people have better access to treatment and thus greater chance of recovery. Likewise, the capacity of socio-economic recovery is also relatively strong. The epidemic may reshuffle the world economy. Some economies that have just improved may return to poverty due to the

[4] Novavax, Serum Institute plans to supply 1.1 billion doses to COVAX, February 19th 2021, https://www.business-standard.com/article/companies/novavax-serum-institute-plans-to-supply-1-1-billion-doses-to-covax-121021901472_1.html.
[5] The total number of the pledged vaccines by the USA and the EU only reflects the commitment in June and therefore does not include the commitment of the G7 countries following-on.
[6] Xi Jinping: China to provide 2 billion COVID-19 vaccines to the world this year https://news.cgtn.com/news/2021-08-05/Xi-Jinping-sends-message-to-intl-COVID-19-vaccine-meeting-12u3XcrwA8g/index.html, accessed 28 August 2021.

epidemic. These are not conducive to the recovery of the world economy. How to narrow the gap between developed and developing countries in their differentiated response to the epidemic is an important agenda for global governance. For example, how to make vaccines available and affordable to developing countries and how to overcome the immediate difficulties of developing countries through financial support and debt relief will be challenging.

The two-speed vaccination leave poor countries largely helpless in the emergence of increasingly dangerous variants. Despite their promises, rich countries have so far rarely shared their vaccines: of the 3.3 billion doses already administered, only 1% have been placed in the poorest countries. To vaccinate 70% of the planet - the theoretical threshold for herd immunity - around 11 billion doses are needed, but unless shared more equitably, this goal will not be achieved before 2023, according to the work of Duke Global Health Innovation Center in Durham, North Carolina.[7]

Gap 3: The gap between anti-epidemic resource reserves and effective allocation of resources

A certain amount of reserve of anti-epidemic resources is a prerequisite for fighting the epidemic. However, COVID-19 is a new virus, and once it spreads, it becomes an infectious disease on a global scale, and the reserves or redundancy of relevant epidemic prevention resources are far from sufficient. With certain achievements in epidemic prevention, the production and reserves of relevant anti-epidemic resources have begun to accumulate. But these resources are reserved in the hands of specific countries or related companies. Responding to the spread of the pandemic, especially the sudden outbreak in the weak areas of epidemic prevention, requires a systemic and effective allocation of anti-epidemic resources on a global scale. Only effective allocation of resources can achieve a multiplier effect with half the effort.

Developed countries have booked most of the world's vaccines. "Rich countries accounting for 16% of the world's population have purchased 60% of the global vaccine supply."[8] Insufficient production capacity has triggered a battle for vaccines. Countries such as the United States, the EU member states, the United Kingdom, Canada, among others, have ordered vaccines that are several times larger than their registered population. Vaccine procurement in low- and middle-income countries is seriously lagging behind. In 2021, COVAX, which aims to ensure fair and equitable access to vaccines in low- and middle-income countries, plans to provide 200 million doses of vaccines to 92 countries, and the delivery is set behind the schedule of developed countries. Middle-income countries actively raise vaccines through multiple channels, while the least developed countries and small countries are relatively vulnerable in the quest for vaccines.

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[7] Laurence Caramel, Zeliha Chaffin et Chloé Hecketsweiler, Accès aux vaccins anti-Covid : la grande fracture Nord-Sud, https://www.lemonde.fr/afrique/article/2021/07/10/acces-aux-vaccins-anti-covid-la-grande-fracture-nord-sud_6087833_3212.html, accessed 30 July 2021 .

[8] WHO, 'Inside the Mammoth Undertaking of Global Vaccine Distribution', https://www.who.int/news-room/feature-stories/detail/inside-the-mammoth-undertaking-of-global-vaccine-distribution.

Gap 4: The gap between the needs of global governance and the capabilities of international organizations

Although the World Health Organization (WHO) has undergone a test in the face of this catastrophic epidemic and has done a lot of work, the functions and capabilities of the WHO are obviously not adequate to meet the global governance needs for epidemic prevention. Whether to bolster the authority and organizational capacity of the WHO, or to establish a global health emergency committee under the UN to strengthen political leadership remains a question. In addition, the stock of medical supplies needed to deal with the epidemic is still quite insufficient. The gap between global demand and international aid is also reflected in the question of how to provide funding for sustained preparedness and rapid response measures in low- and middle-income countries. How to set up an international financing mechanism for epidemic prevention and response to help ease the burden of the future global health crisis is still a major issue. A high-level panel established by the G20 proposes a significant increase in global health financing to at least USD$75 billion, with one-third going to the WHO for research and development and the other two-thirds in establishing a new Global Health Threat Fund administered by the World Bank.[9] Global governance is a governance without government. When the epidemic breaks out, the negotiation and coordination between governments is far less timely and efficient than problem-solving within the jurisdiction of the country. For the time being, the national and global institutions established to deal with the pandemic are not suitable and adequate.

[9] A Global Deal for Our Pandemic Age, Report of the G20 High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response, June 2021.

III.

Goal-based governance and international cooperation

Frequent international exchanges are the main feature of today's world. Health governance is no longer an internal affair of a single country. Global health governance is intricately intertwined with factors such as economic integration, industrialization, urbanization, migration, ecological environment and even climate change. The transportation innovation and economic globalization have brewed cross-border health risks. There are more than 2 billion passengers taking international flights every year, and the virus can spread from one country to another in a very short time through convenient global transportation. The spread of infectious diseases and other diseases has become more and more complicated.

1. Two important dimensions of goal-based governance

The outbreak of COVID-19 in 2020 highlighted the weakness of the international health governance. Many countries have returned to the framework of only paying attention to their own domestic epidemics and adopting their own policy tools. It should be recognized that these domestic self-protection measures of various countries have played an important role in controlling the spread of the epidemic, especially in the early stages of the outbreak, when human beings know little about the virus. Closing borders and restricting social activities have partially delayed the spread of the virus and bought time for medical institutions to obtain treatment plans and develop vaccines. Nevertheless, if countries have concentrated too much on domestic self-protection and neglected the global common goal of fighting the epidemic, it would be difficult to achieve the ultimate goal of common safety and collective protection. By the second half of 2021, the drawbacks of neglecting and abandoning this common goal have already emerged. The depth and width of the world's joint cooperation in response to the epidemic, apart from some efforts of information sharing, experience sharing, and material donations, are very limited. Facing the severe impact of the epidemic, the coordination mechanism of major powers with the G7 and G20 as the main platforms, and the global governance framework centered on the WHO have failed to play the due role. Based on the analysis of progresses and gaps in the

previous section, we find that it is the time now to adjust and improve international cooperation by setting a global common goal.

From the perspective of goal-based governance, the global response to the COVID-19 epidemic should have two important measurement dimensions. The first measurement dimension is how to minimize the impact of the epidemic on the established global governance goals. For targets like the UN 2030 Sustainable Development Goals (SDGs), we must pay special attention to issues that may cause social collapse and short-term irreversible deterioration. From the perspective of the global economy and the achievement of the sustainable development goals established by the UN, the epidemic since 2020 and the measures taken to control the epidemic have severely affected the economic performance worldwide. Some of the original SDGs had to be delayed. In some regions where the economy and environment have started to improve, the situation has deteriorated again due to the repeated waves of the epidemic. There has been massive unemployment around the world, with more than 100 million people returning to poverty, according to the World Bank's estimation.[10] Economic difficulties have led some countries to reduce green investment. Some developing countries have been suffering from economic contraction and debt crises, and serious problems have arisen in children's education, basic health, and the prevention and treatment of other traditional infectious diseases. In some countries and regions, the outbreak of the epidemic and the measures taken to restrict social activities in response to the epidemic have caused long-term social adversity. In some Latin American countries, schools cannot be opened because of the epidemic. What's more, due to technological hindrance, it is also unrealistic to implement online education there. If school-age children (including female ones) fail to enter school for several consecutive years, it may cause a generation to lose the opportunity to receive a good education and high-level labor training, leading to long-lasting harms to the economies. In short, judging from the above situation, the goals set for poverty eradication and green transformation in the UN SDGs may be postponed due to the spread of the epidemic. To this end, the UN should establish a special task force for further advancement of the SDGs, by means of making targeted initiatives and arrangements of the international cooperation to avoid irreversible deterioration caused by the epidemic.

The second important measurement dimension of goal-based governance is that under the premise that the epidemic is basically under control, the goal is to restore normal international exchanges at a suitable point of time, and set up priorities and international cooperation guidelines corresponding to this goal. After the goal is set, the effective allocation of resources and the best time schedule will improve the efficiency of governance and achieve the best governance effect.

To achieve the effectiveness of governance, it is necessary to increase the "resilience" of the society against the impact of the epidemic. In response to the impact of the epidemic, the goal that human society must pursue is to restore a society that is functioning normally and is minimally disturbed by the epidemic. In a society with resilience, when the epidemic begins to break out and spread, the society has the capabilities to sense, track, and take measures to cease

[10] Poverty and Shared Prosperity 2020, World Bank, https://www.worldbank.org/en/publication/poverty-and-shared-prosperity.

the spread of the virus. Should we continue to block borders between countries to control the spread of the virus, or reopen borders between countries to facilitate economic recovery? This is always a dilemma. When will the border control measures come to an end? In the initial stage of dealing with infectious diseases, the first task is to control the spread of the virus and protect the safety of life. When people all over the world cannot maintain a normal life under the constant threat of the virus, this disaster triggered by the epidemic will turn into a global social and economic crisis. Therefore, when the vaccination rate reaches a certain percentage, and when the lethality rate of the virus is no longer as high as it was at the beginning, people trapped by the pandemic hope to return to normal social life, including reopening borders and resuming international travel.

2. The four roles of goal-based governance

Goal-based governance is an important path and method of global governance. By measuring our current and future work and tasks with goals, we can reformulate and adjust the agenda, content and methods of international cooperation. When consensus-based global goals are established, these goals can help us (1) Establishing priorities to be used in allocating both attention and scarce resources among competing objectives; (2) Galvanizing the efforts of those assigned to work toward attaining the goals associated with resultant priorities; (3) Identifying targets and providing yardsticks or benchmarks to be used to tracking progress toward achieving the goals, and (4) combating the tendency for short-term desires and impulses to distract the attention or resources of those assigned to the work of goal attainment.[11]

◆ Distribute attention and scarce resources reasonably among the many goals that should be accomplished, and then determine priorities.

If our goal is that more than 80% of the world's population has been vaccinated and there are no large-scale cluster of outbreaks, all countries can respond quickly when the alarm is sounded, and international travel will be possible. Recovery, then the role of international organizations, as well as international cooperation, especially the cooperation of major powers in the world becomes crucial. This report attempts to enumerate some of the current priorities of international cooperation as follows.

(1) Ensure that poor countries receive vaccines;

(2) Reduce restrictions on vaccine import and export;

(3) Look for suitable production sites outside developed countries that can reach the level of vaccine manufacturing technology;

(4) While carrying out vaccination, continue to carry out vaccine research, evaluation and development to enhance the effectiveness and safety of vaccines;

[11] Oran R. Young, Governing Complex Systems: Social Capital for the Anthropocene. Cambridge, MA: The MIT Press, 2017, p 122.

(5) Improve the rapid testing capabilities of poor countries;

(6) Provide precise financing needed for the production of vaccines and rapid testing tools;

(7) Expand anti-epidemic resource reserves to ensure the limited redundancy of anti-epidemic resources is fairly distributed and used on a global scale;

(8) A global disease sensing and monitoring system must be established to ensure that the region and the WHO can obtain epidemic information in the shortest time. Experts from the WHO can immediately guide the anti-epidemic measures in the outbreaking area.

In addition, there is an urgent need to increase investment in local, national, and regional health systems, especially those that currently lack the capacity for rapid detection and response. Under the International Monetary Fund, World Bank, G7, G20, and the Belt and Road Initiative (BRI), promoting financial support for global health is a priority for ensuring global health in the future. Global health governance should evolve from an inter-state cooperation mechanism to a multi-level and multiple governance system that includes governments, intergovernmental organizations, non-governmental organizations, and private enterprises (health care industry).

◆ Encourage those efforts to achieve the established priority goals.

With common goals and the priorities under the goals in place, people will be inspired making efforts to achieve the established priorities. Achieving a wider supply of global vaccines is our goal. The development of vaccines and the control of the epidemic are for the common interests of mankind. Although different countries have different technical conditions and the timing of obtaining vaccines varies from country to country, the access of vaccines and other anti-epidemic materials should become the basic rights and interests of people all over the world. Some western developed countries hope to gradually expand the benefits of vaccines on the basis of linking the distribution of rights and resources with the investment of resources. Goal-based incentives should strike a balance between "guaranteeing the basic rights of people around the world to obtain vaccines" and "obtaining an appropriate return on investment." Goal-based governance must take into account the expectations of vaccine-producing countries and vaccine-demanding countries, and it is necessary to strike a balance between the benefit of relevant vaccine manufacturers and making vaccines a public good. There must be fair care for the weak (relatively backward developing countries), responsibility requirements and necessary constraints for the strong (some developed countries), and the political demands of other participants (non-state actors) must be accommodated.

In the scenario of this report, there are two aspects of enthusiasm that should be protected and encouraged. One is that large countries should be encouraged to provide anti-epidemic materials, including vaccines, to foreign developing countries at lower prices or in the form of public good. One is that the role of non-state actors (capital owners, enterprises and non-governmental organizations) should be brought into play and encouraged. The WHO should consider the process of "promoting vaccines, diagnostic tools, and therapeutic materials to become public goods" after the Acceleration Plan for the New Coronary Pneumonia Tools (ACT). In order to enable people in low-income countries to obtain vaccines and even free vaccine patents, the World Trade Organization and the WHO

should convene major vaccine-producing countries to negotiate and reach an agreement on voluntary vaccine licensing and technology transfer. It is even possible to apply for a "compulsory license" in accordance with the "Trade-related Intellectual Property Agreement" (TRIPS), that is, to ask the patent holder to give up the relevant intellectual property rights. At the same time, we should give full play to the advantages of non-governmental organizations in respect of resources, concepts, and organizations, to supplement and improve the international mechanism for epidemic prevention and control, and ultimately achieve resource sharing, responsibility sharing, and cooperation and co-governance in the global infectious disease prevention and control process.

The outbreak of the epidemic has exposed WHO's lack of authority, decision-making power, and coerciveness. Therefore, countries should be encouraged to provide more financial support to international health governance institutions such as the WHO. The WHO is financially tight and relies heavily on voluntary donations. These shortcomings weaken the decision-making power of the WHO. The WHO has very limited resources available to fight the epidemic, so it is difficult for it to coordinate collective actions by member states.

◆ Determine goals and provide standards or benchmarks for tracking and achieving these goals

The third role of goal governance is to determine goals and provide standards or benchmarks for tracking the progress of achieving these goals. Based on the conclusions and conclusions of governments and world health experts over the past year or so, mankind has accumulated a considerable level of experience. We have summarized the following general standards or benchmarks based on goal-based governance ideas and needs. More detailed standards rely on experts in the field of anti-epidemic discussion and formulation.

(1) Establish global technical indicators that need to be met to resume normal international exchanges.

(2) Define the "COVID-19 susceptible area" and its response measures.

(3) Determine the minimum safe amount of anti-epidemic material reserves in major regions.

(4) Determine the global allocation authority for redundant anti-epidemic supplies and the division of labor among the main providers.

(5) The speed and accuracy of higher-level screening and diagnosis.

(6) Refined standards for the identification of medium and high risk areas by international organizations.

(7) Global vaccine popularization roadmap: R&D (certification by international organizations)-production (property issues)-distribution (international approval)-effectiveness (assessment method).

(8) 100% vaccination rate for airport, port and international transportation staff.

(9) Technical standards and operation guidelines for cleaning cross-border transportation vehicles.

(10) Standards on the technology, environment, storage and transportation of vaccine production and distribution.

(11) Establish a rescue mechanism to provide emergency anti-epidemic materials and vaccines to poor

countries that have been severely hit by the epidemic.

From July to August 2021, the Tokyo Olympic Games, which was delayed for one year, could be held in Tokyo without spectators. The greatest significance of this Olympics is that it is a test of resuming international travel and hosting global international events during the epidemic. It is an actual test of the standards that should be met in all aspects listed above. The Tokyo Olympics Game plays a role of tests and trials for large-scale events on personnel, flights, isolation methods, accommodation management, diet, venue arrangements, and the arrangements of the isolation and quarantine for the athletes when they return home. It helps the international society to gain experience through testing and develop some procedures and standards.

The Beijing Winter Olympics in early 2022 will propose more complete standards and conduct effective tests on the basis of the Tokyo Olympics. The characteristics of the Olympics are that the delegations come from different countries but the number of people is limited, and the athletes live in a relatively closed environment during the event. On the basis of the Olympic Games, the international community in the future can obtain experience and formulate standards through testing of short-term normal international exchanges between two or more countries that have achieved epidemic control. The two or more countries participating in this test preferably have a medium-sized population, and they all have good technical conditions and meet the above-mentioned standards.

◆ Try to eliminate self-interested and short-term behavior that distracts and affects the achievement of goals.

When a global and systemic goal is established, goal-based governance is to try to eliminate self-interested and short-term behaviors that hinder the achievement of the goal. These behaviors will distract attention or resources that can help us achieve systemic goals. From this perspective, there are two aspects of self-interested and short-term behavior in the world today that are seriously dispersing the goals of fighting the epidemic and restoring normal social life and international exchanges. They are (1) vaccine nationalism and the imbalance in the distribution of international medical resources. During the COVID-19 epidemic, some developed countries monopolized vaccine production and procurement and implemented "vaccine nationalism" policies. Medical equipment and health care resources are concentrated in developed countries, while the limited medical and health resources of the WHO are not enough to assist poor countries. The vaccine distribution gap between rich and poor countries has delayed global concerted anti-epidemic actions, leading to rampant variant viruses. The vaccine divide has also caused continuous outbreaks of new epidemics in developing countries, and eventually returned to developed regions where the situation has improved (such as China and the United States, which suffered from the outbreaks in August 2021 due to Delta variants). (2) In the process of fighting the epidemic, some big countries have tried their best to suppress other big countries from playing a role, worrying that other big countries will gain new influence through vaccine supply. For example, the U.S. media described China's sharing of vaccines produced in China with some developing countries through the "Belt and Road" and other international cooperation platforms as "vaccine diplomacy with other

purposes." For the purpose of geopolitical competition, some people in the United States and the Western world are constantly slandering China's experience and contributions in fighting the epidemic, and even rejecting the recognition of China's vaccines. This has caused the cooperation between major countries to "face the common challenges of the epidemic" to lose mutual trust. The self-interested and short-sighted behaviors of the United States and some Western countries have shaken the trust foundation for achieving the global anti-epidemic goal, distracted the attention of the anti-epidemic, and caused unreasonable resource allocation.

To achieve goal-based governance, it is necessary to eliminate geopolitical obstacles and put aside ideological hostility, and achieve the common goal of fighting the epidemic. Only in this way can it reflect the "solidarity, science and solutions" advocated by the WHO and form a cohesive international contract.

Judging from its actions in response to the development of the global epidemic, the United States has so far focused its attention on the competitive relationship between the West and China, and the West and Russia. The United States has not only been distracted from the anti-pandemic by its competition with China and Russia, but it has also asked its allies to distract their attention from the epidemic. The United States and Europe still resisted vaccines produced in China. When the epidemic is surging, all the life-saving tools on the "ship of the world" are useful, and it is not necessary to distinguish whether they are tools from the East or from the West. It is meaningful to help all qualified vaccines to improve their efficiency and safety, but it is meaningless to mobilize the power of allies to reject Chinese vaccines in all regions of the world. Judging from the global outbreak and the process of fighting the epidemic, the main contradiction in the future may still be the contradiction arising from the widening North-South gap. In the United States, Europe, East Asia, China, Japan and South Korea, the vaccination rate and the restoration of social order have given local people hope, while the epidemic in Latin America, South Asia, and Africa continues to expand. The Director-General of the WHO Tedros Adhanom Ghebreyesus pointed out: “High-income countries accounting for 15% of the global population have received 45% of the global vaccine production, while residents of low-income countries accounting for about 50% of the global population received only 17% of the vaccine produced, while Africa only accounts for 1.8%.” Developed countries decided to vaccinate their people first and hoard a large number of vaccines for emergencies. On the other side of the world, poor countries have a large-scale out-of-control epidemic because they lack vaccines. The result will be "a new North-South division due to the uneven vaccine distribution." The deepening of the North-South contradictions in the world is not conducive to world peace and stability.

IV.

Analysis on EU experience and initiatives: regional cooperation in re-opening the border

1. Introduction of EU's cross-border recognition of vaccine passport

The EU is coordinating a common European response to the COVID-19 outbreak. One of the achievements that the EU has made in cooperation is the cross-border recognition scheme of vaccination certificates among member states. The EU has developed official standards to harmonize the border control requirements related to COVID-19 prevention of its 27 member states plus Iceland, Liechtenstein, Norway and Switzerland. The EU Commission has been working with the member states via the eHealth Network, a voluntary network connecting national authorities responsible for eHealth, on preparing the interoperability of vaccination certificates. A common trust framework was agreed on March 12, 2021 via the eHealth Network, (a voluntary network connecting national authorities responsible for eHealth), resulting in a legislative proposal establishing a common framework for a Digital Green Certificate.

On June 9, 2021, the EU Parliament has officially approved the adoption of the EU Digital Green Certificate.[12] It will facilitate safe free movement of citizens inside the EU during the pandemic via a common framework for the issuance, verification and acceptance of vaccination certificates within the EU. The EU Digital Green Certificate will be a proof that a person either has been vaccinated against COVID-19, or received a negative test result, or has recovered from COVID-19. The Digital Green Certificate becomes operational from the July 1, 2021 until June 30, 2022. However, it should not be considered as a travel document nor a precondition for EU citizens to exercising the right to free movement. Moreover, a non-EU citizen can also request a Digital Green Certificate from the EU member state he or

[12] Regulation (EU) 2021/953 of the European Parliament and of the Council of 14 June 2021 on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) to facilitate free movement during the COVID-19 pandemic, OJ L 211/1.

she is travelling to. The traveler will have to provide the necessary information, including reliable proof of COVID-19 vaccination. The member state would then have to assess if reliable proof has been provided and decide whether to issue a Digital Green Certificate or not.

2. Lessons from the EU cross-border recognition of vaccine passports:

◆ A mutual vaccine authorization list within the EU

The first condition to the establishment of a mutual recognition regime is a shared list of vaccines which are proved safe and effective. The current authorized for use list of vaccines across the EU includes: Comirnaty, Spikevax (previously Moderna), Vaxzervria (previously AstraZeneca) and COVID-19 Vaccine Janssen.[13] In addition, European Medicines Agency (EMA is currently reviewing four types of vaccines (CVnCoV, NVX-CoV2373, Sputnik, COVID-19 Vaccine (Vero Cell) Inactivated) for safety and effectiveness test.

On January 15th, 2021, the sixth meeting of the WHO's Emergency Committee on COVID-19 recommended that the WHO Secretariat to develop WHO's policy position on the legal, ethical, scientific, and technological consideration related to requirements for proof of COVID-19 vaccination for international travelers. Although WHO's Emergency Use Listing could serve as a basis for developing mutual recognition regime of vaccines in a cross-border context, WHO continues to recommend that member states do not require vaccination certificate as a precondition of entry, given limited evidence about the performance of vaccine in reducing transmission and inequity concern in the global vaccine distribution.

◆ Maximum harmonization of border control requirement;

As part of the rules, EU member states have agreed not to impose any additional travel restrictions (such as mandatory quarantines, additional testing or self-isolation) on travelers who hold a green certificate. All EU member states are required to accept vaccination certificates issued by other member states for vaccines that have been authorized by the EMA (including the vaccines from AstraZeneca, PfizerBioNtech, Moderna, Janssen, and Johnson & Johnson). Nevertheless, they may also choose to accept certificates for vaccines that have been approved by other nations or listed by the WHO for emergency use.[14] Considering that some EU member states have also approved the use of Russian and Chinese-made vaccines,[15] which are not yet on the list of the EMA, this maximum harmonization therefore leaves leeway for these member states to embrace a broader list of vaccines.

[13] EMA COVID-19 Vaccines: authorized, https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines/vaccines-covid-19/covid-19-vaccines-authorised.
[14] Regulation (EU) 2021/953, Article 5 (5).
[15] Why Eastern Europe is looking to Russia and China for vaccines, February 18th 2021, https://www.spectator.com.au/2021/02/why-eastern-europe-is-looking-to-russia-and-china-for-vaccines/.

◆ Minimum personal data disclosure;

Only a limited set of information (such as name, date of birth, date of issuance, relevant information about the vaccine/test/recovery and a unique identifier of the certificate) will be available on the digital certificate so as to protect the health data of the citizens. For verification purposes, only the validity and authenticity of the certificate is checked by verifying who issued and signed it. All health data of the certificate holders remain with the member states that issued an EU Digital Green Certificate. The EU Digital Green Certificate sets an example on how to weigh a balance between minimized information disclosure and adequate monitoring of international travelers.

◆ Centralized administration of Digital Green Passport.

The EU Gateway has been built to facilitate member states to verify certificates of citizens in a secure and privacy-friendly way. It will allow citizens and authorities to be sure that the certificates are authentic while no personal data is exchanged or retained during this process. The EU gateway was set-up by T-Systems and SAP and is hosted at the EU Commission's data center in Luxembourg. It allows for the verification of the digital signatures contained in the QR codes of all certificates without the processing of personal data. The signature keys needed for this verification are stored on servers at the national level; through the gateway, these keys can be accessed by national verification apps or systems all across the EU.

The regional practice of Digital Green Passport proved to be an effective tool to enable the mobility of the EU citizens while ensuring public health. At the international level, in order to facilitate the international traveler's free movement, a secure and shared technical system is also needed for verifying the vaccine certificate issued by various countries. For example, the IATA Travel Pass is a mobile application that helps travelers store COVID-19 test results or vaccine certificates that will allow them to enter the destination country. Nevertheless, such a centralized administration system requires coordination of the governments in unifying the technical specifications and sharing necessary information.

V.

Analysis on China's experience and initiatives

The focus of this report is not to introduce China's domestic epidemic control and the restoration of normal domestic social life and economic activities, but to focus on China's efforts in helping with international epidemic control and China's strategies, initiatives and practices for restoring order of the world as a whole.

- **Adhering to the concept of the shared future for mankind, China initiated global joint-efforts to guarantee the safety of all countries.**

The WHO has repeatedly reminded that the best way to overcome the epidemic is to vaccinate people around the world. Only when the vaccine coverage of the entire population reaches the standard can herd immunity be achieved. The world will not be safe if there are outbreaks of epidemic elsewhere. Therefore, we must find joint ways to prevent and control the global epidemic. Increasing the global vaccination rate will make it possible to achieve global control of the epidemic. In order to achieve the global goal of fighting the epidemic, China maintains close cooperation with thirteen relevant international organizations. China and the UN have established a China-based global humanitarian emergency warehouse.

In May 2021, President Xi Jinping promised that China will provide an additional US$3 billion in international aid over the next three years to support COVID-19 combat and economic and social recovery in other developing countries. China supports its vaccine companies in transferring technologies to the developing countries and carrying out local joint production with them. Having announced support for waiving intellectual property rights on COVID-19 vaccines, China also supports the WTO and other international institutions in making an early decision on this matter. China proposes the initiation of an international forum on vaccine cooperation for vaccine-developing and producing countries, companies and other stakeholders to explore ways of promoting fair and equitable distribution of vaccines around the world.[16]

[16] www.xinhuanet.com/2021-05/21/c_1127476371.htm

◆ **China's experience in vaccine production and vaccination has laid the foundation for China's contribution to the global fight against the epidemic.**

China's new vaccine not only ranks first in the world in terms of quantity, but is also safe and reliable in quality. Phase III clinical trials show that China's vaccine presents both safety and effectiveness. On May 26th, the international medical journal "Journal of the American Medical Association" published the Phase III clinical trial results of two inactivated vaccines developed by Sinopharm. This is the world's first officially published Phase III clinical trial result of the inactivated vaccine of COVID-19. Data show that the protective efficacy of the two inactivated vaccines is 72.8% and 78.1%, respectively. The protective effect of Chinese vaccines applied in Brazil and Chile has been well demonstrated. In areas where vaccinations rate has reached more than 80%, the numbers of deaths, symptomatic cases, and hospitalizations due to infection with COVID-19 have dropped by more than 80%.

Chinese Vaccines Approved/Trialing

- Sinopharm (Beijing) – *approved by 53 countries*; *trials*: Egypt, UAE, Peru, Jordan, Argentina
- Sinopharm (Wuhan) (vero cells) – *approved* by China; *trials* in 7 countries: Egypt, UAE, Peru, Jordan, Mexico, Bahrain, China
- SinoVac/Corona/Vac – *approved by 32 countries*; 7 *trials*: Hong Kong, Philippines, Brazil, Turkey, Indonesia, China, Chile
- CanSino – *approved by 8 countries*: Argentina, Chile, China, Ecuador, Hungary, Malaysia, Mexico, Pakistan; *trials*: Argentina, Chile, Mexico, Pakistan, Russian Federation
- Anhui Zhifei – *approved*: China, Uzbekistan; *trials*: China, Ecuador, Indonesia, Pakistan, Uzbekistan
- Minhai Biotechnology Co: SARS-CoV-2 Vaccine (Vero Cells) – *approved* by China; *trials* in China
- mRNA vaccine is not yet approved (*trialling* in Mexico)

[Graph 2] Chinese Vaccines Development

By May of 2021, twenty-one COVID-19 vaccines produced by China have entered clinical trials. Among them, 4 vaccines have been approved for domestic market, 3 vaccines have been approved for emergency use in China, 8 vaccines have been approved for phase III clinical trials abroad, and 3 vaccines have been approved for phase I clinical trials in developed countries, 1 mRNA vaccine obtained ethical approval abroad. Chinese vaccine has achieved comprehensive coverage of the technical routes of inactivated vaccines, recombinant protein vaccines, adenovirus vector vaccines, and nucleic acid vaccines in overseas clinical trials.

In June, Jiangsu Rec-Biotechnology put Re-CovCOV, a COVID-19 vaccine to its landmark test in New Zealand.

Vaccine developer Zhu Fengcai, deputy director of the Jiangsu Centre of Disease Control and Prevention, said it was the first time a vaccine wholly developed in China had been used in human trials in a developed country. Zhu said one of the goals was to eventually launch ReCOV, the experimental vaccine, in developed countries.[17] Jiangsu Rec-Biotechnology raised 1 billion Chinese Yuan privately in June 2021 and then successfully has its IPO in Q3. At the end of June, Chinese biotech firm Clover Biopharma signed the deal to make millions of COVID-19 vaccines for COVAX Facility. With the agreement reached with GAVI could see the start-up supplying 414 million doses by the end of next year. The Chengdu-based start-up could provide up to 64 million doses to low and middle-income countries this year if it is approved by the WHO. Clover raised capital privately and filed for an IPO during H1.[18]

Moreover, BioNTech and Fosun Pharma announced a strategic collaboration and an exclusive licensing agreement for the Chinese market (including China Mainland, Hong Kong, Macau and Taiwan) with BioNtech's mRNA Vaccine, leveraging BioNTech's proprietary mRNA vaccine technology and Fosun Pharma's clinical development and commercialization capabilities in China. In May 2021, Fosun Pharma agreed to form a JV with BioNtech to build a plant in China, which is capable of supplying up to 1 billion doses of vaccine per year.

China is the world's 2nd largest biopharmaceuticals market and continues to grow at a fast pace, as the country's growing wealth and rapidly aging population create strong demand for healthcare products.[19] China's leadership designated biotech as a "strategic emerging industry" in the 14th Five Year Plan covering the years 2021-2025. Between 2016 and 2020, the number of biotech science industrial parks in China grew from about 400 to 600, reflecting China's priorities to develop the sector. From 2010 to 2020, 141 new biopharma companies were formed in China, compared to 79 from 2000 to 2010. Over the last half decade, the market capitalization of Chinese biopharma companies grew from US$1 billion in 2016 to over US$200 billion in 2020.[20] In August 2020, CanSino Biologics Inc., which developed its vaccine jointly with the Beijing Institute of Biotechnology, launched its US$748 million IPO in Shenzhen's high tech STAR market, after its previous IPO in Hong Kong market in 2019. On June 30th, AIM Vaccine, China's 2nd largest private vaccine maker, filed its IPO application with the HKEX to finance its vaccine R&D and the build-out of new production facilities. AIM kicked off its IPO tutoring on the STAR market in Shenzhen in December 2020. The new equity capital, raised from global investors, helped fund the rapid growth of the Chinese vaccine/biopharma industry.

- **Within the framework of the BRI, China has carried out a wide range of anti-epidemic cooperation with a number of developing countries.**

In May 2021, at the Global Health Summit, President Xi Jinping pointed out, in contrast to limited production

[17] Chinese firm puts COVID-19 vaccine to landmark test in New Zealand, June 22, 2021 , https://sg.news.yahoo.com/chinese-firm-puts-covid-19-105955270.html.
[18] Chinese biotech firms Clover signs deal to make millions of COVID-19 vaccines for Covax Facility, June 30th, 2021 , https://www.scmp.com/news/china/science/article/3139352/chinese-biotech-firm-clover-signs-deal-make-millions-covid-19.
[19] Refer to Appendix II Capital Raising of Chinese Biopharma Industry.
[20] Competing in China's Booming Biopharma Market, Nov. 12, 2021 ,https://www.bcg.com/en-ca/publications/2020/competing-in-chinas-biopharma-market.

capacity and huge domestic demand, China has fulfilled its commitments to help other countries to fight the epidemic. Chinese Foreign Minister Wang Yi stated at the Belt and Road Summit in June 2021 that China and the Belt and Road countries have put up an "international firewall of cooperation against COVID-19". China and the BRI partners have held over 100 meetings to share experience on COVID-19 prevention and control.

By mid-June 2021, China has provided more than 290 billion masks, 3.5 billion protective suits and 4.5 billion testing kits to the international community, and helped many countries build testing labs.[21] China is engaged in extensive vaccine cooperation with many countries, and has donated and exported more than 400 million doses of finished and bulk vaccines to more than 90 countries, most of which are BRI partners. China and Africa have established 41 counterpart hospitals cooperation mechanism. China-aided African Centers for Disease Control and Prevention Headquarters building project officially started at the end of 2020.

◆ **Cooperation with the developing countries as hubs to produce and distribute vaccines.**

In terms of research and development (R&D) of vaccine, some vaccine R&D institutions in China have cooperated with relevant institutions in more than 20 countries, including the UAE, Brazil, Uzbekistan, the Philippines, and Pakistan, to carry out phase III clinical trials. Some vaccine research and development institutions in China are cooperating with foreign companies to develop nucleic acid vaccines. Among them, mRNA vaccines have been applied for registration and marketing in China, and DNA vaccines are conducting phase I and II clinical trials in China. Some vaccine R&D units have received funding support from the Epidemic Prevention Innovation Alliance (CEPI) and are currently conducting overseas phase II/III clinical trials. In terms of production, Chinese vaccine manufacturers have cooperated with a number of countries along the Belt and Road to promote mass production of vaccines. The vaccine stock produced by some Chinese companies has been shipped to Brazil, Indonesia, Egypt, UAE, Pakistan, Malaysia, among other countries, and overseas sub-packaging work has been started.

China is contributing to promoting the availability and affordability of vaccines in developing countries. China takes the vaccine as public goods and made contribution to facilitate the accessibility and affordability of the vaccine. On May 7th and June 1st of 2021, the WHO successively included the Sinopharm and SinoVac Corona Vaccine on the emergency use list, proving the safety and effectiveness of the Chinese vaccine, which are also helpful to increase global supply of vaccines.

◆ China is open to vaccines from other countries and promote mutual recognition between major vaccines

The mutual recognition of the world's major vaccines is a prerequisite for the restoration of normal order in the world. Realizing mutual verification of information such as nucleic acid testing and vaccination will facilitate the exchange of

[21] Wang Yi, 'Despite COVID-19, Belt and Road Cooperation does not Come to a Halt, but Braves the Headwinds and Continues to Move Forward', http://www.china-embassy.org/eng/zgyw/t1886453.htm.

people across borders. As the speed of vaccination continues to accelerate, vaccine passports have also been put on the agenda of various countries. However, international negotiations on mutual recognition of vaccines are clearly behind the expectations of the world. China has launched an electronic version of the international travel health certificate. Mr. Zeng Yixin, Deputy Director of the Chinese National Health Commission, said, "For vaccines imported from abroad, we also have an open attitude. We hope to have more varieties and more choices. As long as they are safe and effective, we welcome them. In fact, some companies are applying for permission to import vaccines from abroad. In our country, we have also made preliminary demonstrations, which is also a supportive attitude. Of course, it has to be approved and is in the process of approval."[22]

China opposes the manipulation of geopolitical competition or market competition in an attempt to exclude other safe and effective vaccines through national groups when there is a serious shortage of vaccines. China has also expressed its incomprehension of some countries and groups of countries deliberately rejecting Chinese vaccines for various reasons and artificially creating obstacles to the world's return to normal international travel and exchanges. It is hoped that these countries and groups of countries can proceed from facts and scientific data, act by way of helping the world as a whole to get out of the haze of the virus, and collaborate under the coordination of the WHO, so as to jointly accomplish the mission of providing safe and effective vaccines to the humankind.

- **China is also concerned about the debt pressure of developing countries caused by the epidemic and advocates international cooperation to help.**

Purchasing and delivering vaccines adds to the debt burden of low- and middle-income countries. The African Union needs to pay approximately US$9 billion for vaccine procurement and delivery to achieve 60% of the immunization target. The vaccine scheduled by the African Union is far from enough to cover 60% of the African population, and some funds have not yet been secured. The WHO estimated that only about a quarter of African countries have enough funds to support vaccination. Although the African Export-Import Bank and the World Bank have respectively provided US$2 billion and US$12 billion in concessional loans to Africa. Related loans and expenditures will further increase the debt burden of developing countries such as those in Africa due to the surging epidemic.

As a response to the pandemic, the G20 Finance Ministers and Central Bank Governors Meeting (G20 FMCBG) passed the Debt Service Suspension Initiative (DSSI) for 73 poorest countries on April 15th, 2020 under the Saudi Arabia's presidency. The initiative was extended twice to the end of 2021. On November 13th, the G20 FMCBG further reached an agreement on the Common Framework for Debt Treatments beyond the DSSI for the same group of poorest countries. It is the first time that China coordinates with the Paris Club on sovereign debt treatment. Indeed, China has fully implemented the DSSI with a total of more than US$1.3 billion debt service suspension by May of 2021, the largest contribution among the G20 members,[23] and is also actively participating in the Common Framework process.

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[22] Zeng Yixin: 21 new Chinese COVID-19 vaccines entered into trials, https://www.sohu.com/a/470866676_114988, accessed June 7th 2021.

[23] Remarks by Chinese President Xi Jinping at the Global Health Summit, Xinhua, May 21, 2021, http://www.xinhuanet.com/english/2021-05/21/c_139961512.htm.

Addressing the Vaccine Gap: Goal-based Global Governance and Health Silk Road

On April 16 and July 5, 2021, Chinese President Xi Jinping held two video meetings with French President Macron and German Chancellor Merkel. President Xi Jinping stated that China opposes "vaccine nationalism" and the artificial creation of an immunization gap, and is willing to work with the international community, including France and Germany, to support and help developing countries obtain vaccines in a timely manner. On July 5, the leaders of the three countries also exchanged views on African issues. President Xi Jinping pointed out that Africa is the region with the largest number of poorest countries, the most arduous task of fighting the COVID-19 epidemic and achieving economic recovery, and it is also the continent with the greatest development potential. China has provided and is currently providing vaccines to more than 40 African countries and the African Union committees, and actively supports Africa in enhancing localized vaccine production capacity. China has signed debt relief agreements or reached consensus on debt relief with 19 African countries, and has participated constructively in sustainable development plans such as the "Great Green Wall of Africa". It is hoped that the European side will enhance its support and assistance to Africa, provide more vaccines to African countries in urgent need, help Africa cope with debt pressure, and facilitate Africa's economic recovery and green and low-carbon development at an early date. President Xi Jinping hopes that France and Germany can join the "Support Africa Development Partnership Initiative" jointly initiated by China and Africa to carry out tripartite, four-party or multi-party cooperation. [24]

[24] http://www.xinhuanet.com/politics/leaders/2021-07/05/c_1127625345.htm

VI.

Vaccine cooperation under the BRI

According to Airfinity, 10.8 billion doses are needed to inoculate 75% of the world's population of aged 5 or over.[25] It is estimated that COVAX will be able to receive 1.1 billion doses by the end of 2021. COVAX, run jointly by the GAVI vaccine alliance and the WHO, was launched in April 2020 to distribute COVID-19 vaccines to the underdeveloped countries. However, COVAX also faced major supply shortages due to the suspension of vaccine production and exports in India due to Delta variant of COVID-19. COVAX's vaccine supply outlook was cut by over 100 million doses as a devastating COVID-19 surge hit India in March this year. It now needs 1.8 billion doses for its own population to deal with its own crisis. Until now, COVAX distribution scheme has received fewer than one per cent of the roughly 530 million surplus doses pledged by wealthy countries.[26] Africa represents 16% of the world population but has received less than 2% of the COVID-19 vaccine doses administered around the world. WHO and COVAX acknowledged that there were several African countries which received vaccines with short-shelf lives, leading them to destroy a total of 450 thousand doses.[27] In June 2021, the U.S. FDA forced J&J to destroy 60 million doses due to possible contamination.[28] On June 22nd 2021, VeryWell Health published an article, informing that millions of COVID-19 vaccine doses are in danger of expiring this summer (to be destroyed as vaccine waste) as many U.S. states, particularly in the South and the Midwest, reject injections.[29] More than 70 countries and territories have vaccinated less than 10 percent of their population, with 12 unable to reach even one percent.[30] There will be a

[25] China Investment Research, GBA: Its Role in the Health Silk Road, http://www.chinainvestmentresearch.org/wp-content/uploads/2021/07/Global-Vaccine-Needs-Capital-Raising-to-Build-Chinese-Biotech__13JUL21...-1.pdf.
[26] All talk, no jabs: the reality of global vaccine diplomacy, https://www.telegraph.co.uk/global-health/science-and-disease/talk-no-jabs-reality-global-vaccine-diplomacy/, accessed 14 July 2021.
[27] African countries destroy 450,000 COVID-19 vaccines, https://www.ippmedia.com/en/features/african-countries-destroy-450000-covid-19-vaccines, accessed 14 July 2021.
[28] The FDA reportedly forces J& J to scrap about 60 million doses of its Covid vaccine, https://www.cnbc.com/2021/06/11/the-fda-reportedly-forces-jj-to-scrap-about-60-million-doses-of-its-covid-vaccine-.html, accessed 14 July 202
[29] Millions of U.S. COVID-19 Vaccine Doses are set to be Expire and be Destroyed this Summer. https://www.verywellhealth.com/expiring-doses-covid-19-vaccines-in-danger-of-waste-5189461, accessed 14 July 2021.
[30] The U.S. is far too fixated on vaccinating Americans. It must focus on the world.

gap of around 9.7 billion doses for the year of 2021 for the vaccine supply, which requires joint cooperation by vaccine manufacturers.

1. Non-Chinese vaccine manufacturers and the estimated number of doses

Non-Chinese companies are expected to produce an estimated 28 billion doses by year 2022 including 10 billion in 2021 and 18 billion in 2022. During G7 summit held on June 11, 2021, the G7 leaders plus invited guests from Australia, India, South Africa, and South Korea, pledged to provide one billion COVID-19 vaccines to the world before the end of 2022, which represents only 3% of their total 2021/2022 production. There is a huge uneven distribution of vaccines around the world. Half of the world's supply has been reserved for just 15% of its population. The 54 richest countries account for 18% of adults on Earth, but 40% of vaccine orders, enough to give each of its adult 2.5 two-dose regimens.[31] Moreover, western vaccine manufacturers are planning to achieve over US$60 billion in 2021 vaccine related revenues, making large profits from the pandemic.

By the end of 2021, the largest surplus of doses will be held by the EU (885 million doses), the U.S. (539 million doses), Japan (300 million doses), the UK (297 million doses), Brazil (177 million doses) and Canada (175 million doses). These six western jurisdictions are expected to account for 89.7% of the likely global surplus of COVID-19 vaccines in 2021, equal to 2.6 billion doses. The surplus of vaccine production and the overstocked vaccine in the western world contrast with those poor countries in which people are struggling to get their first or second shots.

2. The BRI vaccine hubs

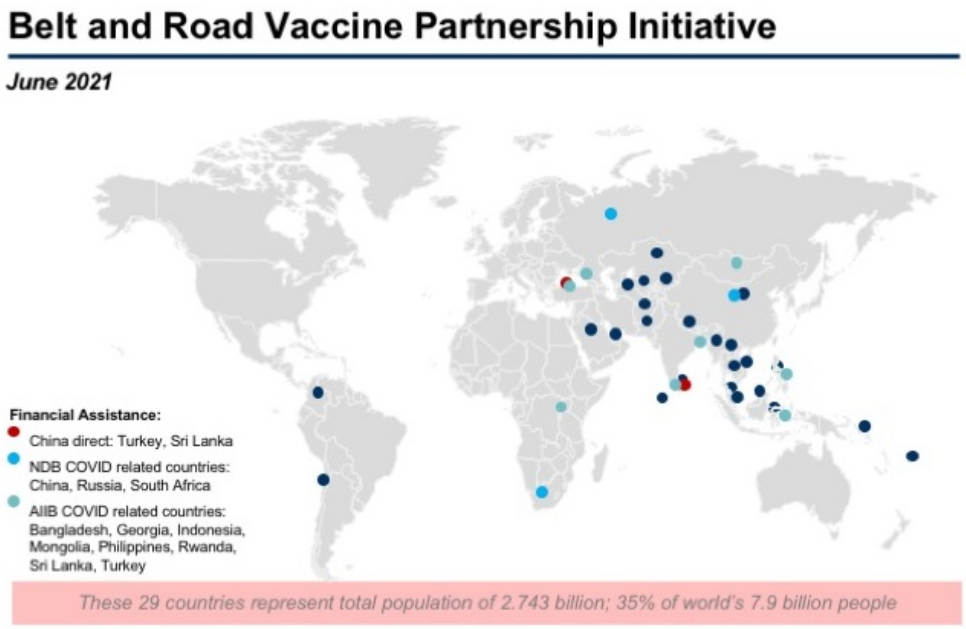
As mentioned in Section V, China not only works to provide vaccines and export them to the developing countries, but also endeavors to help other countries to build their own facilities to produce vaccine locally. This would not only save the cost of vaccines but also provide a more rapid distribution network. Local vaccine manufacturing and distribution will lessen the developing countries' external vaccine dependency on the U.S. and G7 countries.

On June 23, 2021, China held a virtual conference on the BRI entitled the "Asia and Pacific High-Level Conference on Belt and Road Cooperation". In this conference, the Chinese foreign minister Wang Yi announced an agreement with the participating nations (Indonesia, the Philippines, Vietnam, Thailand, Malaysia, Cambodia, Laos, Singapore, Brunei, Pakistan, Bangladesh, Myanmar, Nepal, Sri Lanka, Maldives, Afghanistan, Uzbekistan, Kazakhstan, Tajikistan, Turkmenistan, Kyrgyzstan, Saudi Arabia, UAE, Columbia, Chile, Fiji, Solomon Islands, China, Mongolia) to further establish international cooperation on vaccines and promote the fair international distribution of vaccines, as a global

https://www.washingtonpost.com/opinions/2021/07/13/us-is-far-too-fixated-vaccinating-americans-it-must-focus-world/, accessed 14 July 2021.

[31] There will be enough vaccines for all-if rich countries share: https://www.economist.com/graphic-detail/2021/02/13/there-will-be-enough-vaccines-for-all-if-rich-countries-share, accessed 14 July 2021.

public good, in countries around the world.[32] Among these 29 countries, Turkey and Sri Lanka received government loans directly from China policy banks; China, Russia and South Africa received COVID-19 related loans from NDB; Bangladesh, Georgia, Indonesia, Mongolia, the Philippines, Rwanda, Sri Lanka, and Turkey received COVID-19 related loans from AIIB.[33]



[Graph 3] Belt and Road Vaccine Partnership Initiative

Chinese companies are expected to produce 8.5 billion doses by year 2022 including 3.2 billion in 2021 and 5.3 billion in 2022. The newly launched Belt and Road Vaccine Partnership Initiative – covers 35% of global population. Nevertheless, the world shortage of vaccines cannot be met solely by Chinese manufacturers and therefore other regional hubs are needed for vaccine production and supply.

One of the unique features of the BRI partnership is to distribute vaccines as public goods through technology transfer and provide training to its local partners to enable local production. Unlike the western counterparts who produce vaccines in their home country and then export vaccines to the developing countries, Chinese pharmaceutical companies work with their local partners to set up facilities and share the profits with them. The BRI vaccine partnership not only reduces the price monopoly of the western pharmaceuticals, but also facilitates vaccine independence of the developing countries via local production and distribution.

[32] Refer to Appendix I BRI Vaccine Partner List.
[33] More financing details of the Belt and Road Vaccine Partners in Section VI part 3.

Major Vaccine Producers (2021-2022)

Chinese

Company	2021 Total Doses (Billion)	2022 Forecast Doses (Billion)
Sinovac (China)	1.7	3.1
Sinopharm	1.0	1.5
CanSino	0.5	0.7
	3.2	5.3

- Does not include Fosun Pharma/BioNTech JV 1 billion in 2022 (described below)
- As at 10th July, there are an estimated 35 Chinese vaccines under consideration

[Graph 4] Major Vaccine Producers (Chinese)[34]

As of July 10th, 2021, China has 35 vaccines under consideration and two more China-made vaccines produced by CanSino and Wuhan Institute of Biological Products are awaiting to be approved as WHO's listing for emergency use. Although many of the BRI hubs have only started local production with relatively low production volume in 2021, but they played an important role to predict the future production capacity of Chinese vaccine partners and their potential role for independent local supply chain. The future expansion of the global vaccine supply also depends on the authorization of promising vaccines of various partner nations and the production capacities of their local pharmaceutical companies. Vaccine distribution is not a zero-sum game, but a joint cooperation of the world. With the help of BRI vaccine hubs, it is expected that they can make up for the vaccine demand shortage and leveraging the imbalance of power between vaccine producing countries and those developing countries in urgent need of vaccines.

◆ Selective country report of BRI vaccine partnership

Among these 28 vaccine hub countries, we will use Indonesia and UAE as examples to show latest cooperation between China and its vaccine partners in local production and facilities construction. These two hubs are selected owing to its developing distribution network and fast-growing pharmaceutical companies through joint agreement with Chinese vaccines manufacturers.

-Indonesia

On April 20th, 2021, Chinese President Xi Jinping went in phone conversation with Indonesian President Joko Widodo. President Xi said China will continue to carry out vaccine cooperation with Indonesia, help Indonesia build

[34] China Investment Research, GBA: Its Role in the Health Silk Road, http://www.chinainvestmentresearch.org/wp-content/uploads/2021/07/Global-Vaccine-Needs-Capital-Raising-to-Build-Chinese-Biotech__13JUL21...-1.pdf. According to Mr. Zeng Yixin in June, Chinese Deputy Director of National Health Commission, 21 new Chinese COVID-19 vaccines entered into trials. In early July Asian financial press reports, Chinese Biotech IPO statistics suggested that more than 10 vaccines are under development.

a regional vaccine production center and jointly resist the vaccine divide.[35] On June 7th, 2021, Chinese Foreign Minister Wang Yi said China would deepen its COVID-19 cooperation with Indonesia during a meeting with Indonesian President's special envoy Luhut Binsar Paniaitan in the southwestern city of Guiyang, China.[36] This would include support for the building of a regional vaccine production center in Indonesia, as well as encouraging more Chinese vaccine manufactures to conduct clinical trials in the country.

China Sinovac Biotech Ltd. signed two agreements with Indonesia's PT Bio Farma for the supply, local production and technology licensing of the CoronaVac in August 2020.[37] Under the agreement, Sinovac committed to supply Bio Farma bulk vaccine to enable the latter to produce at least 40 million doses of Coronavac in Indonesia before March 2021 and aim for 154 million doses before the end of the year. In June 2021, Bio Farma has produced 65.52 million doses of COVID-19 vaccines and will continue to carry out the fill and finish process for the vaccines, of which 51.4 million doses have been released and the remaining 14.1 million doses are still waiting for the lot release from BPOM.[38]

Indonesia used three types of vaccines, namely Sinovac, Astrazeneca COVAX Facility and Sinopharm. By June 2021, the current vaccine supply in Indonesia stands at 104.7 million doses: consisting of 94.5 million doses from Sinovac (among which 91.5 million in bulk form and 3 million doses in finished form), 8.2 million doses of AstraZeneca with COVAX program, and 2 million doses Sinopharm from the Mutual Cooperation Vaccination program.[39] On June 21st, 2021, Indonesia has received another 10 million doses in bulk from Sinovac. According to Indonesia Health Ministry secretary-general Oscar Primadi, the delivery marked the 17th phase of the COVID-19 vaccine arrival in Indonesia, with a total of 91 million bulk vaccine to be produced into finished vaccines. The government is making efforts to secure the targeted supply of 426.8 million shots.

-UAE

In March 2021, China and UAE have launched "Life Sciences and Vaccine Manufacturing in the UAE", a joint project by UAE's Group 42 and China CNBG (Sinopharm) to initiate the first COVID-19 vaccine production line in the UAE.[40] The vaccine will be called Hayat-Vax (Hayat means "life" in Arabic), but is the same inactivated vaccine from the Beijing Institute of Biological Product (BiBP), a unit of Sinopharm's China National Biotec Group (CNBG), that the UAE approved for general use in December and previously for front line workers in July 2020. Hayat-Vax is the first COVID-19 vaccine to be produced in the Arab world.

The new plant, being built in the Khalifa Industrial Zone of Abu Dhabi (KIZAD), the region's largest industrial zone, will have a production capacity of 200 million doses per year with three filling lines and five automated packaging lines. In the interim, production of Hayat-Vax was launched in April 2021 in Ras al-Khaimah, one of

35 http://www.xinhuanet.com/english/2021-04/20/c_139894439.htm
36 https://www.scmp.com/news/china/science/article/3136054/china-pushes-expand-covid-19-vaccine-development-more-work
37 https://www.pharmaceutical-tech.com/pressreleases/sinovac-signs-agreement-with-bio-farma-indonesia-for-covid-19-vaccine-cooperation
38 https://www.biofarma.co.id/en/latest-news/detail/78-milliondosesof-covid19-vaccine-to-be-produced-in-july-2021
39 https://jakartaglobe.id/special-updates/indonesia-receives-10m-doses-of-sinovac-bulk-vaccines
40 https://www.gulftoday.ae/news/2021/03/28/uae-china-launch-virus-vaccine--manufacturing-in-the-uae-project

the UAE's seven emirates, by Gulf Pharmaceutical Industries PSC (Julphar) under a deal between G42 and Julphar.[41] Julphar production has an initial capacity of 2 million doses per month.

While the UAE had approved vaccines from Pfizer and AstraZeneca as well as Russia's Sputnik V, its inoculation programme hinged on Sinopharm's potential to produce the vaccines locally - for a vaccine which can be transported and stored at normal refrigerated temperature. These characteristics help enable Sinopharm to be used in vaccination programmes in the developing world, and a key to the UAE's aspirations of becoming a supply hub to the Middle East and beyond. The joint venture between Sinopharm and Group 42 further aids the UAE to diversify its economy away from hydrocarbons in a greening world.

On January 31st, 2021, Dubai launched its Vaccine Logistics Alliance (VLA), designed to expedite global distribution of COVID-19 vaccines through Dubai to developing countries. The Alliance members include Emirates SkyCargo (global leader in temperature sensitive pharma), Dubai Airports (cool chain space for pharma), DP World (worldwide ports and logistics leader) and International Humanitarian City thus enabling vaccine distribution by air, land and sea. VLA is focussed on leveraging Dubai's existing position as a global hub for the pharmaceutical industry vaccine storage to store and transport COVID-19 vaccines to a destination network spanning six continents via Emirates SkyCargo.[42]

3. China's Unique Financing Model

Our previous report on *Health Silk Road 2020: A Bridge to the Future for Health to All* tracks the clinical trials of COVID-19 vaccine developed by Chinese drug companies and anti-epidemic assistance between China and BRI countries from Q3 2019 to Q3 2020. We included loans and/or grants to the WHO, to multiple countries and to regional organizations such as the LAC for financing healthcare and social safety-related expenditure, as well as supporting economic recovery efforts. These loans/grants originated from China's government, its central bank (PBOC), its policy banks (China Development Bank and China EXIM Bank), and China's equity ownership positions in two multilateral banks: Asian Infrastructure Investment Bank (AIIB) and the New Development Bank (NDB) The current stage of development is focused on production and distribution of vaccines along the BRI cooperation from Q4 2020 until Q2 2021. It shows that the investment focus of AIIB and NDB loans had been shifted from infrastructure to providing healthcare and liquidity to supply the domestic economies instead.

While Western countries acquire and distribute vaccines manufactured in their home countries, China has created a unique model which provides technology transfer of the vaccines, financing for healthcare infrastructure and for economic recovery (via both wholly-owned government policy banks as well as minority investments it has in multilateral banks).

Q4 2020 Government Related Loans

[41] https://www.straitstimes.com/world/middle-east/china-picks-uae-as-regional-production-hub-for-sinopharm-covid-19-vaccine
[42] https://www.skycargo.com/media-centre/dubai-forms-vaccine-logistics-alliance-to-expedite-global-distribution-of-covid-19-vaccines-through-the-emirate-to-developing-countries/

After we finalized the Q3 data for our report, Q4 saw additional AIIB COVID-19 activity, including a grant of US$90 million to Sri Lanka for medical needs, as well as COVID loans by the multilateral banks. AIIB made loans to the Cook Islands (US$20 million), Cambodia (US$60 million), Ecuador (US$50 million), Turkey (US$200 million), Uzbekistan (US$200 million) as well as committing US$30 million to Legend Capital Co. Ltd fund (China) for enhancing healthcare digitization.

The 5 COVID related loans in Q4 represented a decrease from the 7 committed in Q3 and the 10 COVID related commitments in Q2. The two largest COVID loans of US$200 million each were to Central Banks in Turkey and Uzbekistan, primarily to facilitate liquidity to local domestic banks[43]**.**

Also in Q4, NDB extended COVID-19 related loan facilities to India (US$1 billion) and to Brazil (US$1 billion), both in December 2020[44].

The adjusted total Chinese COVID related commitments for Q4 2020 was US$545.6 million, US$145.5 million for the 5 Q4 AIIB loans plus one healthcare investment, while US$400 million to the 2 NDB loans.

H1 2021

We set out below COVID related loans committed during H1 2021 related to healthcare, trade with China and liquidity facilities for local businesses in the various countries. As compared to 2020 COVID related loans, the trend has been more of a focus on financial recovery/trade facilitation, although several other countries remain mired in COVID outbreaks and thus required external financing to support healthcare infrastructure through the pandemic.

Q1 2021 Government Related Loans

In Q1 2021, Government Related Loans include two Government/policy bank loans, three AIIB COVID focused loans and two NDB loans as set out below.

During this quarter, both PBOC and China Development Bank committed to two credit facilities;

- US$400 million loan to a state-owned bank in Turkey designed to boost trade in local currencies and to meet the financing needs of companies engaging in foreign trade
- US$1.5 billion currency swap between China's PBOC and Sri Lanka's Central Bank to promote bilateral trade between the two countries

Q1 Multi-lateral Bank COVID related loans

[43] http://www.chinainvestmentresearch.org/wp-content/uploads/2021/04/China-Outbound-Investments-Vol-48-%E2%80%93-Q4.pdf
[44] https://www.silkroadbriefing.com/news/2021/04/26/chinas-health-silk-road-analysis-covid-financing-global-implications/

- AIIB - US$300 million loan to the Philippines government designed to provide critically needed vaccines to assist the Government in mitigating adverse health, social, and economic impacts caused by the COVID-19 pandemic, co-financed with the Asian Development Bank (ADB)
- AIIB - US$180 million via two sovereign-backed loans, US$90 million each, one to each of two state-owned banks, Bank of Ceylon and People's Bank (discussed later)
- AIIB - US$300 million *COVID-19 Emergency and Crisis Response Facility* designed to reduce liquidity constraints brought on by the COVID-19 pandemic to SMEs. The project will be implemented by Bangladesh's central bank, Bangladesh Bank
- NDB - up to US$1 billion equivalent *COVID-19 Emergency Program Loan* to the Russian Federation for financing its healthcare response to the pandemic to be used for supporting frontline health workers, including doctors, nurses and junior medical staff
- NDB - RMB 7 billion Yuan *Emergency Program Loan to the PRC for Supporting China's Economic Recovery from COVID-19*. The Program is to support China's priorities for economic recovery efforts in response to COVID-19.

Aggregate committed amounts of AIIB COVID related loans in Q1 were US$780 million (26% pro rata US$202.8 million) and US$2 billion for NDB loans (China's pro rata of US$400million) for a total of US$608 million for the quarter. However, US$ 1 billion of the NDB amounts were to China thus netted off the adjusted totals of US$608 million of multi-lateral commitments, China showed a net gain from multi-lateral banks in Q1.

Q2 Government Related Loans

In Q2 2021, Government Related Loans include 5 AIIB loans (3 healthcare and 2 financial) and one NBD COVID loan, showing an uptick in volume and amounts, but with the balance shifting more towards recovery than healthcare with one policy bank loan.[45]

- US$500 million loan from CDB, part of a financing signed in March 2020. This loan had the effect of lowering Sri Lanka's yields on existing public debt.

Q2 Multi-lateral Bank COVID related loans

- AIIB - US$500 million to Indonesia's Ministry of Health to support the costs of expanding activities of the Emergency Response to COVID-19 Program (parent program), under the COVID-19 Crisis Recovery Facility, as well as to enable safe and effective deployment of COVID-19 vaccines. AIIB's US$500 million matches the World Bank's US$500 million.
- AIIB - US$100 million to Rwanda. The Project is supported under AIIB's COVID-19 Crisis Recovery Facility and will be co-financed with the World Bank (project lead). The Project will provide financial support to Rwanda's own Economic Recovery Fund (ERF)

[45] http://www.xinhuanet.com/english/2020-11/21/c_139533609.htm

- AIIB - US$21 million to Mongolia. The Project is proposed to be supported under AIIB's COVID-19 Crisis Recovery Facility and co-financed with the ADB under its *APVAX facility*. The Project will provide Mongolia (which plans to vaccine 60% of its population) with immediate financing support to purchase vaccines through *APVAX*.
- AIIB - US$250 million credit line to EXIM bank, the largest development bank in Turkey to provide liquidity to SMEs affected by the pandemic.
- AIIB - US$100 million COVID-19 Credit Line Project loan to TBC Bank, the largest bank in Georgia to provide funding for liquidity for SMEs affected by the pandemic in Georgia.
- NDB -US$ 1 billion COVID-19 Emergency Program Loan to the Government of South Africa for supporting South Africa's efforts to contain the economic fallout from the pandemic and start economic recovery.

AIIB Q2 loans totalled US$971 million in Q2 (26% pro rata is US$252.5 million) and US$1 billion by NDB (20% pro rata of US$200 million), so a Q2 total of US$452.5 million for multi-lateral banks.

NDB COVID Performance

In a Q2 report NDB commented on how its Emergency Assistance Facility, launched in April 2020, had performed as designed. At launch, its goal was to provide up to US$10 billion in crisis-related assistance to its five member countries, including US$5 billion for financing healthcare and social safety-related expenditures, as well as US$5 billion for supporting economic recovery efforts. By the end of H1 2021, the NDB Board had approved nine COVID-19 related emergency assistance programs with a total amount of around US$9 billion. As such, NDB has been able to accomplish its COVID goals while still managing its traditional business of non COVID infrastructure loans.

At a speech on May 21st, 2021, at the Global Health Summit, Chinese President Xi Jinping stated that China will provide an additional US$ 3 billion in international aid over the next three years to support COVID-19 response and economic and social recovery in other developing countries.[46]

In the analysis shown above, over the past 3 quarters, multi-lateral banks in which China owns a minority stake have averaged US$535 million/quarter in COVID related financing. At this rate, China would exceed President Xi's target of US$3 billion within 18 months, instead of 36 months. Even at the Q2 rate of US$425 million/quarter, the US$3 billion cap would be reached in just 7 quarters (excluding pure trade related loans). However, taking into account that only 3 AIIB COVID loans, with US$621 million aggregate value were made after May 24th, changes the total to US$161 million/quarter, much closer to the average monthly rate over the next 36 months to stay under the US$3 billion cap.

The current stage of development is focused on production and distribution of vaccines along the BRI cooperation

[46] http://www.xinhuanet.com/english/2021-05/21/c_139961512.htm

from Q4 2020 until Q2 2021. It shows that the investment focus of AIIB and NDB loans has shifted from infrastructure to providing healthcare and liquidity to supply the domestic economies instead.

VII.

Conclusion

Our previous report on Health Silk Road 2020: A Bridge to the Future for Health to All[47], which was published in February 2021, tracks the clinical trials of COVID-19 vaccine developed by Chinese drug companies and anti-epidemic assistance between China and BRI countries from Q3 2019 to Q3 2020. When the authors set out on this study in Q2 of 2021, in addition to continuing to track the production and distribution of vaccines along the "Belt and Road" cooperation from the fourth quarter of 2020 to the second quarter of 2021, we also hope to utilize the data to address vaccine global governance issues, in particular, related to COVID-19 vaccine production and distribution, in order to allow the world to be adequately vaccinated to return to normalcy to a certain degree by the end of year 2022, which the WHO calculated to be circa 11 billion doses.

Effectively controlling the epidemic and restoring the normal economic and social life of human society are the common aspirations of humankind. Only international cooperation can achieve global governance. Governments of various countries are the primary actors in fighting the epidemic and protecting the people from the virus. However, the isolated anti-epidemic actions of various countries can neither guarantee global security nor achieve the goal of self-protection by each country's own force. While individual countries have made progresses in dealing with the COVID-19, gaps in uneven distribution of healthcare resources between developing countries and developed countries show poor global health governance. Global governance in response to the COVID-19 epidemic includes two important measurement dimensions. The first measurement dimension is how to minimize the impact of the epidemic on established global governance goals. The epidemic since 2020 and the measures taken to combat the epidemic have severely affected economic activities around the world. There has been massive unemployment around the world, with more than 100 million people returned to poverty. Economic difficulties have led some countries to reduce green investment,

[47] Henry Tillman, Ye Yu and Yang Jian, Health Silk Road 2020: A Bridge to the Future for All, February 28 2021, http://www.siis.org.cn/Research/EnInfo/5278.

and even have economic contraction and debt crises. In some regions, the original SDGs global goals have been delayed. The second important measurement dimension of goal-based governance is that under the premise that the epidemic is basically under control, the goal is to restore normal international exchanges at a suitable point in time, and set up priorities and international cooperation guidelines corresponding to this goal. Goal-based governance should not only give full play to the enthusiasm of the countries with economic and technological advantages, but also enhance the sense of rights and gains of the vast number of developing countries. More countries should be able to participate in the construction of global health mechanisms, such as the WHO and other international mechanisms. At the same time, it is necessary to encourage the private sectors with the advantages of resources, concepts, and organizations to complement and improve the global governance of epidemic prevention, and ultimately achieve resource sharing, responsibility sharing, and joint governance.

The uneven distribution of vaccines and the lower-than-expected vaccination rate in the world reflect the failure of the international health governance mechanism centered on the WHO and the rise of the country's self-interest-first mindset. In the long run, countries need to find an appropriate balance between fighting the epidemic and ensuring the normal operation of the economy. Increasing vaccination rates and mutual recognition of vaccines produced in different countries are critical to reopening national borders and the free movement of people and goods. The international community should adopt financial support, exemption of patent fees, and technical assistance to accelerate the localized production of vaccines and anti-epidemic materials and increase the availability of vaccines and anti-epidemic materials.

This study discusses the experiences of Europe and China. The significance of the discussion on European experience is that the EU is a supra-national actor, and the EU countries must consider the conditions and measures for the reopening of borders while fighting the epidemic, and try to make relevant institutional arrangements. The significance of China's experience is that it provides anti-epidemic materials and vaccines to developing countries through the "Belt and Road" cooperation. Chinese leaders announced that they would provide vaccines and anti-epidemic materials as public goods to low-income countries, and at the same time facilitate countries along the “Belt and Road” with relatively good technical and logistics conditions as hubs for local production of vaccines. China’s experience is not only conducive to achieving a higher global vaccination rate, but also enabling developing countries to gain bargaining power with many internationally renowned vaccine manufacturers.

The European Union, as a supra-national international organization, has made efforts in harmonizing border control requirements of various member states in respect of vaccine mutual recognition. The digital green certificate demonstrates a policy compromise between human being’s freedom and social order. It aims to facilitate the citizen’s right to free movement during the pandemic and contribute to the gradual lifting of the restrictions.

In order to reopen the Schengen borders, The EU's maximum harmonization on digital vaccine passport provides a harmonized border control ensuring the free movements of EU citizens while offering the member states the flexibility to recognize vaccines outside the list of EMA. It also sets a good example as to how minimum personal information can be exchanged in a cross-border context while leaving the essential personal information within the specific person's host nations. Nevertheless, it could be argued that a more open and transparent vaccine listing standard should be adopted by the EU to avoid vaccine discrimination and promote international movement.

The outbreak and spread of the epidemic will often accidentally disrupt our original plans. As Q2 of 2021 progressed, reality over-rode our governance designs. Beginning with India's own COVID outbreak in Q2 of 2021, which disrupted prior vaccine flows to numerous lower income countries, forced India to divert its export of over 1 billion doses to lower income countries to banning all vaccine exports for at least the remainder of 2021. Shortly thereafter, the U.S. launched a program to supply 500 million U.S.-manufactured doses to be distributed to lower income countries by mid-2022. Later in June, the G7 agreed to distribute G7-manufactured vaccines to 870 million people primarily in lower income countries, a small fraction of the 28 billion doses western companies plan to produce by the end of year 2022. This market clout has been evidenced in pricing power. Meanwhile, China, despite explosive prior growth in Chinese biotech and global investor interest in this sector, has only 8.5 billion expected production capacity through year end 2022, with only 3.1 billion available in 2021. By early July, China had delivered 1.5 billion jabs domestically and 500 million doses internationally.

Via the hub countries of the BRI, China is trying to build local partners in the production of vaccines and anti-epidemic materials in developing countries. Practice has proved that helping other countries build their own facilities and produce vaccines locally can not only save vaccine costs, but also provide a faster and more efficient distribution network. Local vaccine production and distribution will reduce the vaccine dependence of developing countries and international organizations on developed countries.

Although many of the BRI hubs have only started local production with relatively low production volume in 2021, they played a base role to predict the future production capacity of Chinese vaccine partners and their potential role for independent local supply chain. Moreover, the future expansion of the global vaccine supply also depends on the authorization of promising vaccines of various partner nations and the production capacities of pharmaceutical companies.

As H1 ended, China announced a 29 country BRI vaccine partnership, which affects 2.7 billion of the world's population. The program is designed as a partnership between Chinese vaccine producers (supported by the BRI's unique funding structure) and local partners in these countries, in which localized vaccine production would lead to vaccine independence by the end of year 2022, and with vaccines in which they could control the pricing (not the western majors) which would also strengthen existing BRI Health Silk Road ties.

The center of our H1 2021 study report is the concept of competing global powers working together to minimize the future COVID-19 deaths on a non-wartime emergency footing. There is previous experience

between competing global powers working jointly to reach a common goal for the humankind. Following the disintegration of the Soviet Union, about 39,000 nuclear, chemical and biological weapons were stored across numerous Eurasian sites. In order to prevent any of these weapons from falling into the control of corrupted states, terrorists or crime organizations, a team was established by Russian and U.S. scientists cooperated in safeguarding the global security. By 2012, every one of the nuclear weapons in Ukraine, Kazakhstan, and Belarus had been deactivated and returned to Russia, leaving no nuclear weapons in any other state of the former Soviet Union. Two keys to the success of this joint partnership were: information sharing with all members of the team at all times and with all countries involved and personal relationships building with the members of the team.

The precedent exists, therefore, for us to apply this model to forestall COVID-19's equal threat to the health and economic fabric of our world today. By early July 2021, the worldwide COVID-19 deaths had already exceeded 4 million. A strategic opportunity exists for Presidents Xi, Biden and the EU leaders, to assemble and lead a global coalition to utilize and replicate the success and hope of the denuclearization program and work with each other today, in collaboration with the WHO, UN and COVAX, to bridge the vaccine gap that exists across the globe today, and prevent the worst scenario of COVID-19's global health and economic crisis.

Appendix

Appendix I. BRI Vaccine Partners List

BRI Vaccine Partnership Initiative List

June 2021

Region	*Country Name*	*Population (millions)*	*World Ranking*
Southeast Asia	Indonesia	276	4
	Philippines	109	13
	Vietnam	98	15
	Thailand	70	20
	Malaysia	33	45
	Cambodia	16	71
	Laos	7	105
	Singapore	5	114
	Brunei	0.4	176
South Asia	Pakistan	212	5
	Bangladesh	168	8
	Myanmar	54	26
	Nepal	29	49
	Sri Lanka	21	58
	Maldives	0.5	174
Central Asia	Afghanistan	38	37
	Uzbekistan	33	42

	Kazakhstan	18	64
	Tajikistan	9	95
	Turkmenistan	6	113
	Kyrgyzstan	6	111
MENA/GCC	Saudi Arabia	35.3	41
	UAE	10	93
LAC	Columbia	51	29
	Chile	19	63
Oceania	Fiji	1	161
	Solomon Islands	0.7	166
North Asia	China	1440	1
	Mongolia	3	136
Totals	**29**	**2,763*(1)***	**35.0% *(2)***

(1) Total population of countries on this list

(2) % of the world's 2021 population of 7.9 billion

Appendix II. Capital Raising of Chinese Biopharma Industry

Biotech/Healthcare Capital Raising GBA

2018-H1 2021

- In April 2018, HKEX instituted major rule changes which permitted IPOs for pre-revenue biotech companies. In 2018, six of the world's top 10 biotech IPOs listed on the HKEX
- Since the 2018 HKEX changes through to Feb 2021, roughly 25% of all biotech capital raised globally was via HKEX; some $13.5 billion
- At the end of 2020, the 28 biotech companies listed on HKEX had a collective market capitalization of almost $90 billion
- Through the first six months of 2021, HKEX raised $27.3 billion capital (ranking it #3 in the world); 5 of the 10 largest deals were Chinese biotech/healthcare
- Both ChiNext in Shenzhen and Star Market in Shanghai, two NASDAQ style tech exchanges, followed HKEX's 2018 reforms targeting "red chip companies"; advantages include listing approval times and (frequently) VAL levels
- During the period from 1st January 2018 through to 30th June 2021, there were 217 biotech issues which raised $19.4 billion new capital

Sources; Charltons Law September 2019; Skadden; KPMG December 2020; Wind

Selected GBA Exchanges Biotech Capital Raises

2020-2021

- In August 2020, CanSino Biologics Inc., which developed its vaccine jointly with the Beijing Institute of Biotechnology (part of the PLA's Academy of Military Medical Sciences) launched its $748 million IPO in Shenzhen's high tech STAR market, after previously IPOing in Hong Kong in 2019. CanSino's share price rose by 88% on its first day of trading
- In September 2020, BeiGene, Ltd., a China and USA based biotechnology company focused on innovative medicines worldwide, announced that its shares, which trade on the HKEX, will now be included in the *Shanghai-Hong Kong Stock Connect and Shenzhen-Hong Kong Stock Connect*
- In April, Sichuan Clover Biopharmaceuticals, a China based biotech start-up, submitted an IPO application to the HKEX. Goldman Sachs and CICC were named co-sponsors for the deal
- On 30th June, AIM Vaccine, China's 2nd largest private vaccine maker, filed its IPO application with the HKEX to finance its vaccine R&D and the build-out of new production facilities. AIM kicked off its IPO tutoring on the STAR market in Shenzhen in December 2020
- Also on 30th June, Hutchmed Ltd. (Hong Kong), already listed in the US and London, completed its 3rd IPO, this one on the HKEX, that raised $537.2 million. Shares increased 53% on the first day of trading

(GBA: Guangzhou-Hong Kong-Macau Greater Bay Area)