



Policy Research Institute
नीति अनुसन्धान प्रतिष्ठान



COVID-19 Pandemic, Vaccine Diplomacy and the Recommended Course of Action for the Government of Nepal

Research Report

**Dr. Mahesh Kumar Maskey
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Kathmandu, Nepal

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ACRONYMS

ACT	Access to COVID-19 Tools
ARDS	Acute Respiratory Distress Syndrome
AMC	Advance Market Commitment
CEO	Chief Executive Officer
COVID-19	Coronavirus Disease 2019
EU	European Union
GDP	Gross Domestic Product
GHD	Global Health Diplomacy
HDU	High Density Unit
HICs	High Income Countries
ICMR	Indian Council of Medical Research
ICU	Intensive Care Unit
MENA	Middle East and North Africa
MOHP	Ministry of Health and Population Nepal
PCR	Polymerase Chain Reaction
PHEIC	Public Health Emergency of International Concern
PPE	Personnel Protective Equipment
PRI	Policy Research Institute
QUAD	Quadrilateral Security Dialogue
SII	Serum Institute of India
UK	United Kingdom
US	United State
VLP	Virus Like Particle
VOI	Variants of Interest
WHA	World Health Assembly
WHO	World Health Organization

FOREWORD

From December 2019, the COVID-19 virus has brought about a frightening situation all over the world. The virus, which was first detected in Wuhan, the capital and major industrial and commercial city of Hubei province of China, has now spread all over the world. It has caused the deaths of millions of people, has ruined economies, stalled the development process, and has severely affected peoples' lives and livelihoods throughout the world. In fact, it has challenged the existing world order. And still, there are no signs that the world will get rid of this virus anytime soon.

The disease caused by the virus, which was named Coronavirus Disease 2019 (COVID-19) by the WHO, has necessitated multiple measures and innovations. It has been widely believed that vaccination would be one of the most effective remedies for Covid-19. Many countries, including China, India, Russia, UK and the USA, have been producing the vaccines and inoculating their people. Other countries, too, have started to produce, or purchased or availed the vaccines through different other means. And, there are many countries and peoples all over the world, especially in the developing countries, who are restlessly waiting to receive the vaccines.

The COVID-19 vaccines are not only the remedies for viral infections, but have introduced new political economy and have also been used by powerful countries as effective tools of their foreign policy objectives. Many countries have been engaged in undeclared competitions to achieve their foreign policy objectives or to minimize the influence of their rivals using vaccines as their tools. Small and weak countries are being made playgrounds by the powerful countries. Their concerns now are not only how to get vaccines for their people but also how to protect themselves from the power-play of vaccine diplomacy. Nepal is also working hard to get the required doses of vaccines but has not yet been able to achieve them. Under such a situation, the role of diplomacy has become more crucial than ever in this regard.

With a realization of this situation, the Policy Research Institute decided to commission a study on COVID-19 Vaccine Diplomacy. The objective is to make Nepali people better aware of COVID-19 and ongoing vaccine diplomacy as well as to provide policy recommendations for the Government of Nepal on how to stand up to the challenges and use vaccine diplomacy to the country's benefit.

In our assessment, Dr. Mahesh Kumar Maskey is one of the best-suited persons for such a study. Dr. Maskey is a well-known health professional as well as a former Ambassador of Nepal to the People's Republic of China. A person with knowledge of both healthcare and diplomacy, Dr. Maskey has brought unique strengths required for this research. Dr. Maskey was assisted by Mr. Ashok Pandey, Associate Research Fellow in the PRI, who has experience in the field of healthcare.

I sincerely thank Dr. Maskey for accepting our request, and making this research project successful and producing an excellent report. The hard work of Mr. Pandey is appreciated. I also express sincere appreciation to Dr. Khaga Nath Adhikari, a Senior Research Fellow and Coordinator of the Research Cluster on National Interests, Foreign Policy and Strategic Affairs of the PRI, for his very efficient and effective coordination to successfully accomplish this research project and to bring this report in this form. The report gives good details about Covid-19, the efforts taken up in Nepal and other countries, different countries' diplomatic moves regarding vaccines, and also recommendations for the Government of Nepal as to how to face the challenge and use the situation to the country's benefit.

I appreciate the review team for their valuable suggestions for further refining the document. I am confident that this report would be useful for every stakeholder, especially the Government of Nepal. I cordially invite readers to give constrictive comments and feedback on the report.

Dr. Bishnu Raj Upreti
Executive Chairperson
June 2021

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Throughout the writing of this research work “A study on COVID-19 Vaccine Diplomacy and Recommended Course of Action for the Government of Nepal” we have received kind suggestions, guidance, help and co-operation from many individuals and institutions. We would like to acknowledge them all with sincere thanks.

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We are grateful to the Nepal Public Health Foundation (NPHF) for granting permission to use its graphs on the COVID-19 situation and trends in Nepal prepared by Ms. Kripa Pradhan and her team. We highly appreciate the assistance of Mr. Kiran Paudel, NPHF, who has helped us prepare different graphs included in this study, find relevant information and properly laying out the footnotes and references of this document.

Dr. Mahesh Kumar Maskey
Principal Investigator

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EXECUTIVE SUMMARY

Vaccine diplomacy has emerged as a predominant form of global health diplomacy and has become a buzzword of international relations these days. Historically vaccines became a symbol and vehicle of goodwill and friendship among states, which could function even when countries were engaged in war. COVID-19 vaccines have been used as soft power and an instrument of national interests. We have even seen the extreme form of vaccine nationalism. The spirit of friendship and goodwill was symbolized by the WHO's "COVAX" programme, a project which brought together many big institutions which worked in the field of vaccine development and supplies in cooperation with the governments of member states. The objective of this study is to explore the dynamics of Vaccine Diplomacy at global and national levels in relation to COVID-19 pandemic and its management, and to provide a recommended course of action for the Government of Nepal.

Nepal's vaccine diplomacy primarily focuses on ensuring the needed vaccine supply for full coverage of its people. Nepal received the first vaccine consignment as bilateral grants from India, which was a visible improvement in the relations between the two governments. The delay in the procurement thereafter, and the news of corruption in vaccine procurement began to have an adverse effect on public opinion towards India. China initially provided 800,000 doses of vaccine, and again the Chinese President granted 1 million doses of vaccine following a call from Nepal's President. The US has not made its support for Nepal public. The vaccines promised by the UK more than 3 months ago have not arrived yet. The western countries that have stockpiled vaccines are under pressure to provide support to the countries that are most in need. It seems that the countries which have hoarded vaccines are now willing to release some portion of it to the countries in need. The recent G-7 meeting has also focused on this issue and has promised 1 billion doses of vaccines for poor countries.

So far, Nepal's vaccine diplomacy is mainly geared towards vaccine grants and procurements. It does not suffer from vaccine nationalism either. Nepal may have to intensify its vaccine diplomacy to acquire vaccines needed for the people as well as to build its capacity to face COVID-19 and also for vaccine development in Nepal through scientific collaboration with other manufacturers. Besides, Nepal needs to have a long-term vision of self-sufficiency in COVID-19 vaccines, by supporting pharmacological institutions that can manufacture vaccines with the technical support of collaborating countries and institutions. Nepal should also be vocal in supporting the temporary waiver of patency rights which is crucial for cheap mass production of vaccines for low-income countries.

CHAPTER ONE

INTRODUCTION

1.1 Background

The COVID-19 has emerged as one of the most serious challenges for the whole world now. The disease, which was first detected in China, has now spread throughout the world and has caused hundreds of thousands of deaths, economic downturns, and social and mental disturbances. Questions such as how to control the spread of the infections, how to treat the infected people and how to vaccinate the people against the virus have drawn the attention of world leaders, academics, professionals and scientists alike.

The world faces two-pronged problems. First, controlling the virus and treating the infected people has presented a daunting task for most countries. Second, inoculating the people against the Corona virus has surfaced as a major diplomatic challenge for weak and poor countries. The vaccines have been used by powerful countries as a tool of foreign policy agenda. Vaccine nationalism, vaccine hoarding and using vaccines for achieving foreign policy objectives have complicated the availability of vaccines for many poor and developing countries. Under such a background, this study focuses on the COVID-19 as a whole, vaccines and vaccine diplomacy of major powers. It also provides policy recommendations for the Government of Nepal to deal with the situation effectively, and to use the ongoing developments to the country's benefit.

1.2 Objectives of the Study

General Objectives: To Explore the dynamics of Vaccine Diplomacy on a global and national level in relation to the COVID-19 pandemic and its management, and to provide recommended course of action for the Government of Nepal.

1.2.1 Specific Objectives

1. To provide an overview of the global and national COVID-19 situation, trend analysis, and mitigation efforts,
2. To explore the dynamics of Vaccine diplomacy in terms of Vaccine nationalism and Vaccine internationalism on a global scale between the vaccine producer countries and vaccine recipient countries,
3. To study vaccine diplomacy in Nepal and provide a recommended course of action for the Government of Nepal in view of the global dynamics of vaccine diplomacy,

1.3 Research Methodology

The research method adopted in this study is primarily an online literature review of the relevant articles and documents covering a period of 18 months, from December 2019 to June 9, 2021, on:

- a. Global and national situation of COVID-19 pandemic,
- b. Common and multifarious strategies to deal with this pandemic,
- c. Scientific collaboration and competition among nations to develop testing kits, medicine and vaccines,
- d. Different kind of vaccines, their efficacy, and their usefulness for developing countries,
- e. 'Mask diplomacy' and 'Vaccine diplomacy',
- f. Vaccine Nationalism and Vaccine as 'soft power',
- g. Vaccine procurement, vaccine hoarding and Vaccine corruption,
- h. Impact of COVID-19 pandemic on global and national economies,
- i. The roles of the World Health Organization and COVAX Initiative,
- j. Measures taken by Government of Nepal to deal with COVID-19 pandemic,
- k. Vaccine diplomacy of Nepal and Vaccine Diplomacy in Nepal.

All together 105 scientific and press articles and reports were searched using above mentioned keywords, out of which 35 were excluded, mostly press articles because of repetition of similar topics. Seventy were subject to in-depth review along with reports from the World Health Organization (WHO) and other agencies. Fifty-one articles were selected for reference, others had similar information or not worth quoting.

An effort has been made to present a comprehensive picture of the topic of research presented in the global and national scenario, and where the diplomatic interplay between various countries was explored in relation to COVID-19 management and vaccine, views of both sides have been presented as far as possible to minimize investigator bias. Discussions have been done with many public health experts regarding COVID-19 and vaccination in Nepal, but are not quoted in the draft. They were immensely helpful to understand the issues at hand.

CHAPTER TWO

COVID-19 PANDEMIC: THE GLOBAL SCENARIO

“International collaboration among scientists has boomed during the COVID-19 pandemic. However, now that COVID-19 vaccines have been developed, we are leaving the realm of scientific investigation and entering that of geopolitics.”

Pannu and Barry, ‘The State Occulate’, The Lancet, March 2021.

In December 2019, several cases resembling severe acute respiratory syndrome (SARS) were first detected in Wuhan, China. The novel virus was isolated, its gene sequence was swiftly deciphered by the Chinese Scientists and made public for the benefit of global research collaboration. It was named the SARS-COV2 virus, because of its close resemblance to the SARS coronavirus infection which had plagued China and some other countries seventeen years ago. The World Health Organization (WHO) coined the term Coronavirus Disease-19 (COVID-19) replacing the names in common use until then such as “Wuhan Virus”, or worse, “Chinese Virus”. In a period of one year and six months, the COVID-19 pandemic became the most formidable global health challenge, costing millions of lives and wrecking the economies of the countries affected. In a span of one and a half years, the COVID-19 pandemic spread to almost every country in the world causing 182,204,645 cases and 3,945,728 deaths (Worldometer, 2021).

In the initial period, China alone braved against the onslaught of this highly infective novel virus, which could lead to severe pneumonia, blood coagulation, acute respiratory distress syndrome (ARDS) and death. The Chinese government took drastic measures of containing the virus, locking down the whole City of Wuhan with a population of 10 million people and adjoining places of the Hubei province. Such drastic steps were reinforced with public health safety measures such as wearing masks, physical distancing, hand cleaning and disinfection. It built a temporary hospital for COVID-19 patients in a matter of weeks to provide care for the rising number of cases. However, despite these measures, COVID-19 fast became an epidemic in China, and in a month, it had already spread to many Asian, European and American countries. Nepal was one of the first countries to detect a COVID-19 case on January 23, 2020, in a Nepali student returnee from Wuhan. The early hotspots were Italy and Iran outside China.

In subsequent months the epidemic began to subside within China. But the number of cases were rising in South Korea, Japan, Europe and later in the United States and some parts of Latin America such as Brazil and Peru. It was spreading unabated worldwide, the scale of which was unprecedented in the 21st century, or even in the last

100 years after the Spanish Flu of 1918. It overwhelmed the service capacity of health systems even in high-income countries (HICs). The WHO declared it as Public Health Emergency of International Concern (PHEIC) on 30th January 2020 and COVID-19 pandemic on March 11, 2020. All the protocols to deal with this global crisis were developed accordingly (WHO, 2020a).

The world has gained much deeper knowledge about this deadly virus by now. However, controversy still continues to this date about the origin of the virus and how it might have transmitted to humans. The ‘Lab-leak theory’ has gained prominence again based on the unsubstantiated claim that three people from a viral lab in Wuhan were infected and hospitalized. China has refuted such claims as baseless, saying no one is hospitalized.

WHO holds that the so-called ‘Lab-leak Theory’ or that COVID-19 virus infection originated from Lab as ‘extremely unlikely. The US chief medical advisor Anthony Fauci had concurred with this view for about a year, but now has changed his position stating ‘he is open to full investigation about it’. And US president Joe Biden has asked for a report whether ‘it emerged through human contact with an infected animal or from a laboratory accident’. China has called it a smear campaign, ‘political manoeuvring and blame shifting’. The Chinese position is that the virus might have been entered China from other countries through frozen meat. In support of such a position, they present the evidence that the COVID-19 virus was detected in wastewater of Spain and Italy much earlier than in China. Cambridge geneticist Peter Forster’s research also indicates that “COVID-19 may have been circulating among humans and animals before the reported first case in China as far back as Sept. 13, 2019”. (US. News, 2020) Characteristically, even before the launch of a fresh inquiry, Mr. Trump had lost no time in asserting that he was right: “To me, it was obvious from the beginning but I was badly criticized, as usual,” he said. “Now they are all saying: ‘he was right’ (BBC, 2021b).

2.1 Scientific Collaboration and Political Mistrust

The global crisis precipitated by the COVID-19 pandemic called for an intensive effort of the international scientific community. Scientists all over the world began a tireless search for appropriate medicine and vaccine against this disease (Pandey et al., 2021). But this pandemic has also exacerbated the preexisting political mistrust between some countries, casting a shadow on WHO itself. On May 19, at a time when the World Health Assembly was being convened, US President Donald Trump made a threatening statement against the WHO with warnings of stopping the funding and walking out of the organization. In a four-page letter to the WHO Director-General, Tedros Adhanom Ghebreyesus, the content of which was claimed to be based on a ‘United State (US) investigation on WHO’, Trump had accused the organization of showing an “alarming lack of independence from China, of missteps extremely costly for the world and its failed response to the COVID-19 outbreak” (BBC, 2021a).

This letter came as a huge setback in the fight against this deadly pandemic and international collaboration. It also set in motion multifarious overt and covert diplomatic power play between the US and China. The Trump administration had accused China of hiding information regarding the COVID-19 related infections and death and castigated for its ‘undemocratic’ and ‘authoritarian’ measures of lockdown. He put forward a theory that the virus was leaked from a viral lab in Wuhan. The US was also one of the first countries to ban Chinese citizens from entering the US. China on the other hand was refuting all the charges levelled against it. In this context, the first fact-finding mission of WHO, led by Dr. Bruce Aylward, had visited China and came out with a detailed report which clarified many contending issues (WHO, 2020b). It appeared to support China’s position, hence the ire of President Trump directed against WHO.

It was a time when the first wave of COVID-19 was subsiding in Asian countries while Europe was reaching its peak and the United States COVID-19 curve was ascending exponentially. The world media was full of flooded hospitals, dead bodies, lack of masks, personal protective equipment and essential items of daily use. Such images continued even after COVID-19 cases started to decline in Europe but increased in the US, Brazil, Peru, India and African countries. The number of cases in Nepal also began to rise as more and more people started to return to Nepal from India and other countries.

The rising wave of the COVID-19 pandemic was increasingly showing the value of international cooperation and collaboration. Scientists recalled the series of sanitary conferences and international gatherings convened by the Ottoman Empire two centuries ago when the 19th-century pandemics followed the colonial pursuit of commercial and military activities. In modern times, the neo-liberal push for the exchange of goods and the surge of people travelling around the world for business and tourism had created a similar conducive environment for highly infectious diseases to spread quickly across the globe. In those global conferences, the countries assembled had agreed to fight infectious diseases collectively. The World Health Assembly (WHA) convened successfully in this spirit despite the admonition from the US President and passed a resolution that exhorted “the need for solidarity, resource redistribution, and collective action” (BBC, 2021b).

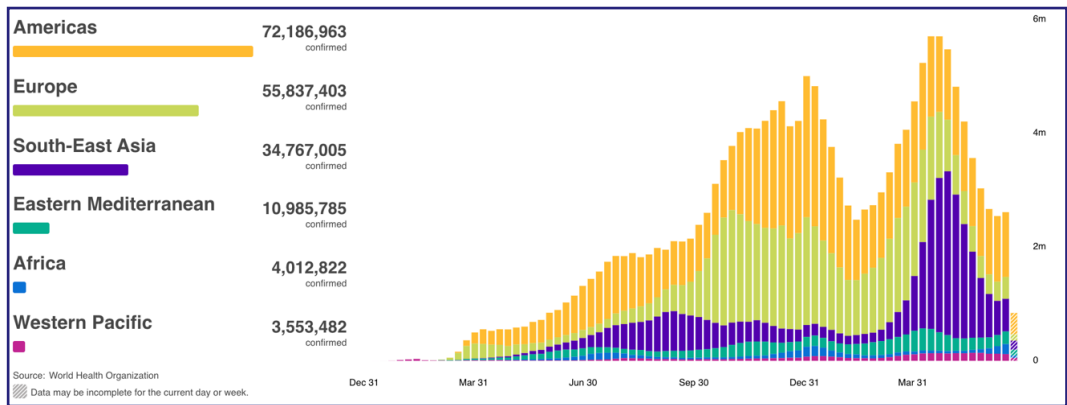


Figure 1. Weekly COVID-19 Cases by WHO Region, as of 30th June 2021

Source: WHO

Figure 1 shows the weekly cases of COVID-19 by the WHO region and reveals that the highest number of cases are reported from the Americas and followed by Europe.

The WHO did succeed in some front work. It co-launched the Access to COVID-19 Tools (ACT) Accelerator, a global collaboration to accelerate development and equitable access to diagnostic tests, treatments, and vaccines. It established the COVID-19 Solidarity Response Fund and the external independent WHO Foundation to raise the issue of equity in dealing with pandemic. It embarked upon global solidarity clinical trials which involved many developing countries, and which came out with important findings of treatment and management of COVID-19 patients. It produced a wide range of technical guidance and called for solidarity of its member states.

2.1.1 Weakening of the WHO

The WHO call for solidarity was also echoed by the public opinion polls conducted by the European parliament where most citizens believed that their governments should show greater solidarity in the COVID-19 era. However, a substantial number of countries that were also major actors other than the US suffered from various kind of self-centred approaches to COVID-19 pandemic. As a result, the WHO itself became a prime example of the seat of discordant views leading to the weakening of its coordinating and supervisory role. On the one hand effort were made for intensified scientific and international collaboration. On the other, varied forms of “nationalism” prevailed in dealing with this pandemic. The latter tendency was influenced by the drive to gain a scientific edge, economic advantage and priority to protect their people only.

The WHO did warn about an increasingly powerful wave of nationalism including

‘vaccine nationalism’ which was bound to lead to “catastrophic moral failure.” It also had expressed concern about the rising politicization of pandemic response and has warned that greater collaboration by member states is needed in this crucial hour. It was a plea that went mostly unheard, the scientific collaboration being taken by scientific competition. Bump et al. put it succinctly: “Against WHO’s strongest advice, vaccine nationalism has risen to the fore, with nations and regional blocks seeking to monopolize promising candidates. Similarly, nationalistic competition has arisen over existing medicines with the potential to benefit patients with COVID-19” (Bump et al., 2021).

The World Health Organization kept on warning against vaccine nationalism throughout the year. In February 2021, it was using the harshest language “either world abandon vaccine nationalism or face increased mutation of COVID-19 virus” (Eaton, 2021). But as it turned out, the global competition set in motion in the past continued with full speed, shadowing the coordinating role of WHO. In this competitive environment efficacy of medicines such as dexamethasone was validated and oxygen became the mainstay of supportive treatment. Research in some antivirals, Chinese and Ayurvedic medicines also took momentum.

Controversies followed when some medicines were granted permission for use without a WHO mandate, for example, Hydroxychloroquine and Remdesivir. Supply of effective medicine, PPEs, rapid diagnostic kits, Polymerase Chain Reaction (PCR) testing machines and other essential medical equipment were increasingly acquiring a geopolitical and business character even before the Vaccines were developed and granted emergency approval for use. China has emerged as almost the sole supplier of these very essential goods to the whole world as it has controlled the COVID-19 pandemic at home and its industries were in full gear to produce anti-COVID-19 protective gears and equipment. It used this leverage to have good relations, particularly with European countries while doing business with them. Such activity of China was seen by many as “mask diplomacy” (Wong, 2021).

For Nepal Chinese support for these essential goods at this stage was crucial and it could hence avoid the scarcity of supplies that was seen in many European countries as well as the US. It appeared that the diplomatic power play of China was to win over Europe and the rest of the world and isolate the US position in the global community. When the US withdrew financial support to the WHO, China stepped in and provided an amount of \$50 million to this organization. Different countries adopted different means to deal with the COVID-19 pandemic within the limit of their resources. In want of necessary cooperation and collaboration between the nations in dealing with COVID-19 pandemic, a tragic drama costing 3.5 million lives unfolded right before our eyes, the poor, malnourished, older age and people with comorbidities making the majority of those who became seriously critical and lost their lives.

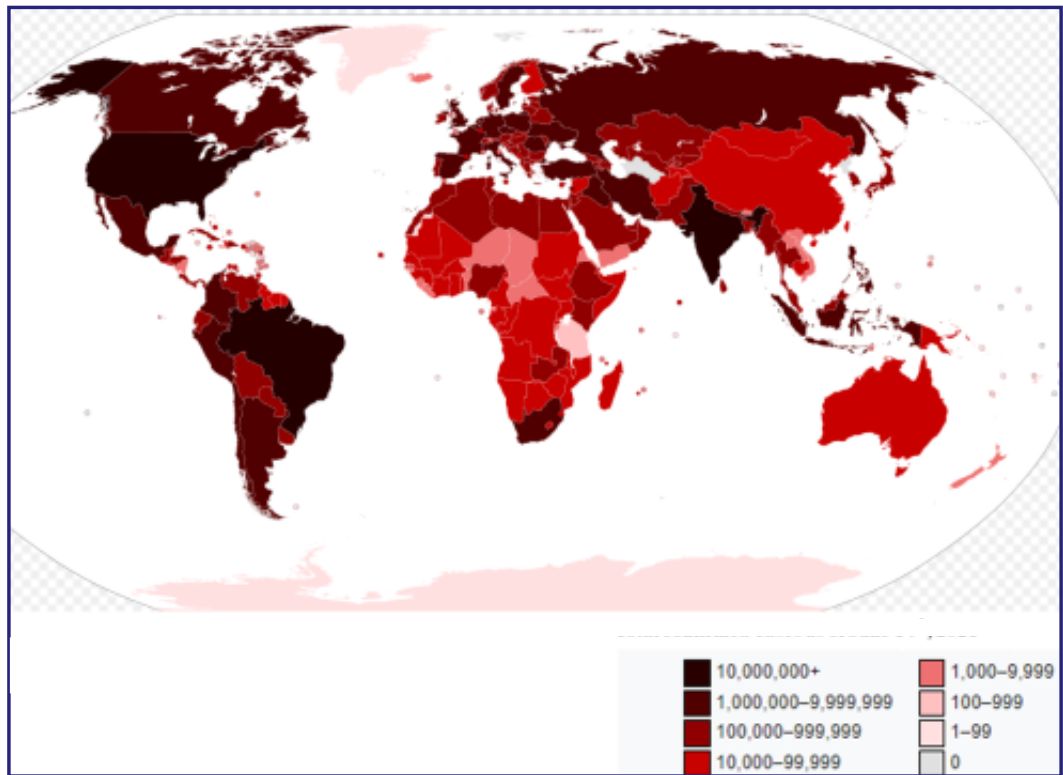


Figure 2. Countries with Confirmed Cases of COVID-19, as of June 14th 2021

Source: Centre for Disease Control, CDC

Figure 2. shows the spread of COVID-19 across the world which affected 220 countries and territories and the increasing trend of corona virus cases around the world. There are altogether 15 countries and territories with no reporting of COVID-19 cases including North Korea. Figure 3 shows that it took about 10 weeks for cases to go from 30 to 60 million but about six weeks to go from 120 to 150 million.

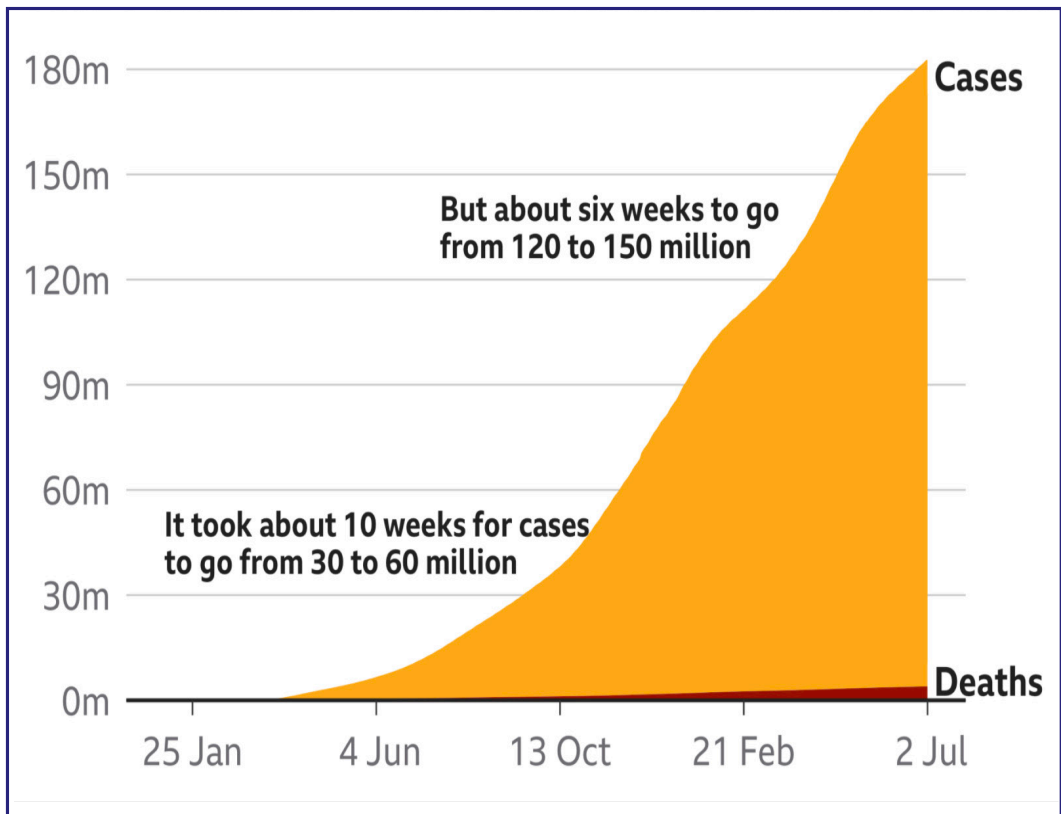


Figure 3. Increment Trend of Cases of COVID-19, as of June 14th 2021

Source: John Hopkins University

CHAPTER THREE

COVID-19'S IMPACTS ON GLOBAL ECONOMY

COVID-19 pandemic forced countries to keep physical distancing of their population, restrict the movements within and between countries, and if needed variable periods of lockdown where people were encouraged to stay at home. All social activities were reduced to the minimum as all of them had the potential to become hotspots for COVID-19 transmission. Therefore, there was a general consensus among economists that COVID-19 will have severe negative impacts on the global economy. The early prediction was that major economies may lose at least 2.9% of their gross domestic product (GDP) over 2020, which later restated to a GDP loss of 4.5 per cent. This is equivalent to a loss of about 3.94 trillion U.S. dollars (Szmigiera, 2021). The loss of human lives and misery generated from the socio-economic crisis has made COVID-19 pandemic the greatest disaster after the second world war.

The huge cost of treatment of COVID-19 patients and vaccine coverage to their population implies that poor countries are extremely vulnerable and may be subjected to economic recession and food scarcity, while the vaccine producer countries may also fail to recover their economy if inequity persisted in handling COVID-19 globally. The world bank data in October 2020 suggested that Nepal's economy is projected to grow by only 0.6 per cent in 2021, from an estimated 0.2 per cent in 2020 as lockdowns caused by COVID-19 disrupt economic activity, The lockdowns have continued in 2021, hence the growth rate may be revised downwards, its impact mostly felt at "informal sector where a large number of people may enter into extreme poverty" (World Bank, 2021a). However, the recent forecast from World Bank has predicted an uneven 5.6 growth rate in the year 2021, with the rich countries' growth upscaling and that of poor countries down sliding (World Bank, 2021b).

CHAPTER FOUR

COVID-19 VACCINES

Vaccines came as a great relief in the struggle against the pandemic and gave peoples hope for viable herd immunity. Both the speed of research in developing COVID-19 vaccines and their efficacy in the prevention of moderate and serious critical cases of COVID-19 infection was an example of shining success in scientific advances of modern times. While average vaccines against infectious diseases usually take several years, and an efficacy above 60% is considered quite an achievement, the COVID-19 vaccines were developed in a period of one year and their efficacy reached a maximum of 95%. Fifteen such vaccines have been approved for emergency use so far. There are 124 vaccine candidates, 35 in phase I trials, 48 in phase II and 36 in phase III trials, and 5 vaccines are no longer progressing. So far, 18 vaccines have been approved. (Vaccine tracker, 2021)

The COVID-19 vaccines are categorized into six groups according to their mechanism of action in developing immunity in the host they include:

- a. Non replicating viral vector e.g., Oxford AstraZeneca (AZD1222, Covishield), Russian Gamaleya Sputnik V, Janssen,
- b. Inactivated whole virus e.g. Sinopharm verocell BBIBP, Bharat Biotech COVAXin,
- c. mRNA technology e.g. Pfizer and Moderna,
- d. Protein Subunit: EpivacCorona, RBD dimer,
- e. DNA technology: Inovio Ino-4800,
- f. VLP (virus like particles): Medicago Plant-based VLP.

4.1 Non-replicating Vector Vaccines

These vaccines utilize different adenoviruses as ‘vectors’ to carry the spike protein of the COVID-19 virus into the cells of the host. Oxford AstraZeneca, Russian Sputnik V vaccine and Janssen (Johnson and Johnson) vaccine fall into this category. All three have received approval from a substantial number of countries including Nepal. They are suitable for vaccine cold chains for storage and transportation in developing countries. Since these vaccines have important implications in the vaccination campaign of the world and vaccination programme in Nepal, a brief introduction of their specific characteristics is presented here.

4.1.1 Covishield Vaccine

Covishield vaccine is the Oxford AstraZeneca vaccine manufactured by the Serum Institute of India. It uses modified Chimpanzee adenovirus as the vector or “viral postman” to carry the COVID-19 virus spike protein components inside recipients’ cells. It has received emergency approval from 99 countries so far, and also from the WHO and Africa Regulatory Task Force. It is one of the vaccines approved for the WHO COVID-19 Vaccines Global Access (COVAX) programme. Its side effects are rare and considered suitable for the old age group. In vaccine trials, people below 18 years and pregnant women were not included.

In the initial period of vaccine roll out there were palpable concerns about its efficacy and confusion about its dose interval. The United Kingdom, the first to start this vaccination on January 4, 2021, opted for a longer second dose interval of 12 weeks revising its initial announcement of 28 days. India and Nepal, even though their vaccination programme began after United Kingdom (UK), had adopted a 28 days interval schedule.

The findings of phase 3 clinical trial published in *The Lancet* on Jan 9, 2021, put rest to this confusion, boosting the confidence of the UK that it had taken the right decision. The efficacy was 62% when given in 28 days interval and it was 82% when given after 12 weeks.

Now as the researchers have more time to observe the efficacy of a single dose, the interval for the second dose has been extended from 12 to 16 weeks. And it is quite probable that as time passes by, the duration of efficacy of the single dose may extend further since the researchers will have a longer time for observation of its effect. In the present scenario of vaccine shortage, this finding has come as a relief and many countries including India, Canada and Spain are adopting 16 weeks interval for the second dose (Taun et al., 2021).

In contrast to a lowered efficacy of two doses in a short interval, a single dose was found to be 76% efficacious for a period of 4 to 12 months. The breakdown of an interval is like this: if a second dose is given between 4 to 6 weeks the efficacy is only 55%, between 6 to 8 weeks 60% and 9-11 weeks (64%) (Voysey et al., 2021). The different efficacies in different dose intervals of the Covishield vaccine had presented a dilemma and confusion to the policymakers. Another puzzling finding was the enhanced efficacy (90%) of an accidental first half dose followed by a second full dose regimen (Voysey et al., 2021).

Underneath these seemingly contradictory findings, it was found that the same logic worked for the enhanced efficacy of a single dose, a longer dose interval and one half

and a full dose regimen. It is because the immune response produced by the first dose of vaccine could destroy or inhibit some of the viral vectors of the booster second dose if given early before it can deliver the spike protein to the cells for antibody production, thus diminishing the effect in short interval. If the interval is longer then the immune response would not affect the viral vector and spike proteins are delivered to boost antibody production, thus enhancing its efficacy. The same reasoning is applied to explain the higher efficacy of reduced first dose and full second dose regimen since the first half dose may not allow for a strong anti-vector immune response. Based on this information, a 12-week interval for the second dose of Covishield was also recommended for Nepal (Maskey, 2021a).

Side effects were found to be minimal, and it was safe for the old age group also. However, there was a small risk of blood clotting in the vaccine group which was less than its incidence in the general population.

4.1.2 The Gamaleya Sputnik V Vaccine

The Russian Gamaleya vaccine uses inactivated human adenovirus for the same purpose. Hence these vaccines are categorized as viral-vector-vaccine where the inactivated virus vectors act as “viral postman” to deliver the COVID-19 virus genetic code to the cells of the recipient subject.

The high efficacy of the Russian Sputnik ‘V’ vaccine (91 to 97%) is ascribed to its success in avoiding the immune response destroying the vector virus in the second dose. It uses two different human adenovirus vectors, Ad26 and Ad5 so that the immune response against one adenovirus may not affect the viral vector of the second dose which is given after 3 weeks. Later findings established the efficacy of a single dose of 91.6% in 3 weeks after the first dose. But how long this efficacy lasts is under investigation. The efficacy of two doses “in real-life setting” where 3.8 million people were vaccinated has been claimed to be 97.6% (Reuters, 2021).

Because the same logic operates for enhanced efficacy in these two vaccines, Oxford AstraZeneca and Gamaleya are collaborating for a hybrid dose schedule of one vaccine each. The likelihood of adversely affecting the viral vector should be even less between human and chimpanzee viruses. If found safe and efficacious such a hybrid vaccine may be the preferred choice of economically poor countries (Maskey, 2021b).

4.1.3 Janssen (JNJ-78436735) Vaccine

Janssen (JNJ-78436735) vaccine is developed in Leiden, Netherlands by Janssen Pharmaceuticals, a subsidiary of Johnson and Johnson company in the US. It is a

single dose viral vector vaccine that also uses human adenovirus to carry the genetic code of the spike protein of the COVID-19 virus to host cells. It is given for people above 18 years of age. The vaccine has been approved for emergency use by the US Food and Drug Administration, European Medical Agency, and UK Medicine and Healthcare Products Regulating Agency. Its efficacy in preventing COVID-19 infection is 67% and in preventing severe disease and hospitalization is 85%.

4.2 Inactivated COVID-19 Virus

Chinese Sinopharma BBIBP and Indian Bharat Biotech COVAX used more traditional and tested methods of inoculating the inactivated virus. The COVID-19 virus is inactivated or killed so that it is not infective but retains its antigenic character.

4.2.1 Sinopharm BBIBP-CorV Vaccine

Chinese Sinopharm's Beijing Institute of Biological Products (BBIBP-CorV) uses a technology that is similar to the inactivated polio vaccine. A virus capable of rapid multiplication was selected and grown using Vero cells- a cell culture derived from the Kidney epithelial cells of green monkeys. The virus is inactivated with the help of beta- Propiolactone which leaves viral particles intact for immune response. It has emergency approval in 42 countries and from the WHO. It is part of the WHO COVAX programme. Clinical trials done in different countries came out with different efficacy results. It is a two-dose vaccine given in a short interval of 21 to 28 days. Its average efficacy has been established as 79% in preventing COVID-19 infection and preventing hospitalization also 79 % (WHO, 2021b).

Because of the whole virus particle, it is also expected to generate not only the spike protein but also antibodies to different proteins of its cell body, thus increasing the probability of providing effective protection from emerging variants of the COVID-19 virus. The cold chain requirements are suitable for developing countries, but it appears to be relatively expensive compared to other vaccines suitable in these countries. The cost has been an issue since this is one of the costliest vaccines available so far.

4.2.2 Bharat Biotech BBV152

Indian BBV152 is also called Covaxine produced by Bharat Biotech in association with the Indian Council of Medical Research. It has been given emergency approval in 9 countries. It is an inactivated whole virus and works in the same principle as Chinese Sinopharm BBIBP-CorV. A few side effects have been reported. It is a two-dose jab that showed 78% efficacy in preventing mild, moderate and severe disease and highly efficacious at preventing severe COVID-19 and hospitalizations, according to a joint

statement from Bharat and co-developers, the Indian Council of Medical Research (ICMR). It is also a relatively expensive vaccine.

4.3 RNA Vaccines

The Pfizer and Moderna vaccines are examples of RNA vaccines. They are among the first to complete phase III trial and roll out for vaccination of the general population in the US and Europe. It uses an advanced mRNA technique to carry the genetic code of COVID-19 virus spike protein into the nucleus. These vaccines teach the host cells to make the spike protein of COVID-19 Virus, which then mounts an immune response inside the body producing antibodies against COVID-19 virus. Its efficacy was established as 95% and 94% simultaneously. Both vaccines are permitted for emergency use by the WHO. Pfizer BNT162b2 has received emergency approval from 85 countries and Moderna mRNA-1273 from 42 countries. However, its extreme cold chain requirements (-70C, -50C) for vaccine storage and transportation make it unsuitable for developing countries.

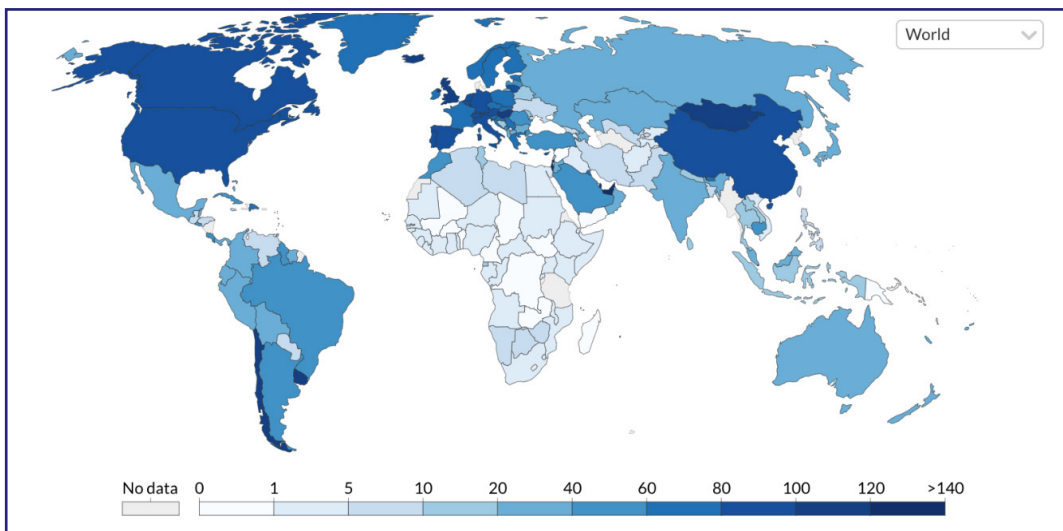


Figure 4. Global COVID-19 Vaccine Rollout, as of June 29 2021 by Continents (per 100 people)

Source: Official Data Collated by Our World in Data

4.4 Protein Subunit Vaccine

These vaccines use protein subunits either taken from the virus or produced in a lab by recombinant gene technology. They are considered very safe but at the same time less efficacious because of only a part of the protein being used. To enhance efficacy

chemical adjuvants are added. The UK-made Novavax vaccine is an example of a protein subunit vaccine. Its SARS-CoV-2 components are created in a laboratory by growing large amounts of the SARS-CoV-2 spike protein in insect cells. The proteins then undergo purification from the insect cells, after which another process converts them into nanoparticles. The Novavax includes an adjuvant to ensure the immune system reacts strongly to the injection. It is considered safe because the vaccine candidate cannot cause COVID-19 because it does not contain enough SARS-CoV-2 components to allow our bodies to assemble the entire virus.

4.5 DNA Vaccine

INOVIO's INO-4800 is an example of the DNA vaccine. Still, in phase 3 clinical trial, it has demonstrated that DNA vaccine can directly enter into cells to safely produce a robust immune response. The advantage of the INOVIO vaccine is the stability of the product, which does not require frozen storage and transport, and its robust immune response as well as favourable safety and tolerability profile.

4.6 Virus Like Particle (VLP) Vaccine

The virus-like particle vaccine uses particles that resemble the SARS-CoV-2 virus. The VLP is constructed incorporating key structural proteins and mirrors the molecular structure of coronavirus. It lacks the genetic material that helps its replication like a natural virus, hence cannot cause infection. VLPs can be produced using mammalian cells, insect cells, bacteria, yeast and plant cells. Animal studies have found out that vaccines based on VLP induce an immune response, providing protection against COVID-19 infection, but they are still in the preclinical phase of vaccine research. Medicago is taking lead in Plant-based VLP production.

CHAPTER FIVE

VACCINE DIPLOMACY

With the coming of vaccines, the phrase “Vaccine Diplomacy” became the buzzword in international relations. Several shades of meaning were ascribed to this phrase—friendship and international goodwill through vaccine holding it as a public good, an object of soft power and instrument of national interests, and the extreme position of ‘vaccine nationalism’. The spirit of friendship and goodwill was symbolized by the WHO “COVAX” project which brought together many big institutions who worked in the field of vaccine development and supplies in cooperation with the governments of member states. It has the connotation of international duty of the rich, powerful and capable countries to supply vaccine to those who would not be able to afford. With the agency of Access to COVID-19 Tools (ACT) Accelerator of which COVAX is the vaccine ‘pillar’, the WHO tried to relive the history of bridging nations by sharing scientific knowledge and products.

On the other hand, there is a strong tendency in some countries to prioritizing vaccines first and foremost to their population only. This “Vaccine nationalism” has been exhibited by rich and powerful countries and is subjected to much criticism. The contention between these two tendencies, i.e., vaccine internationalism and vaccine nationalism, one overpowering the other, has been a drama on the world stage with serious implications for human lives. The vaccine has already become a preferred economic means of vaccine-producing countries to bring their countries out of the economic slump caused by the COVID-19 pandemic. Anticipation of such potential of the vaccine was one of the reasons for fierce competition between nations to gain upper hand in its production and procurement, thus becoming a prime agenda of foreign affairs. The prestige of scientific and technological clout associated with vaccine development was also palpable.

The whole spectrum of tendencies related to vaccine diplomacy needs to be visualized in perspective and historical settings. Vaccine diplomacy is a predominant form of global health diplomacy (GHD) which falls under the category of Science Diplomacy. Global health diplomacy takes place, as the WHO puts it, when “the art of diplomacy juggles with the science of public health and concrete national interest balances with the abstract collective concern of the larger international community in the face of intensive lobbying and advocacy” (Kickbusch et al., 2007).

5.1 History: Vaccine as a Bridge of Friendship

Historically vaccines became a symbol and the vehicle of goodwill and friendship which could function even when countries were engaged in War. “The sciences are never at war”, the British Doctor Edward Jenner had proclaimed when he was elected as a foreign member of the National Institute of France (NIF) in 1811 AD. It was a time when England and France were engaged in a war against each other. Doctor Jenner had developed a vaccine against smallpox from the cowpox virus in 1796 and in two years it was used widely in England and was also shipped across to France. But by the time he was elected the member of NIF the Anglo-French war had begun and his participation in the use and development of the smallpox vaccine in France occurred during this period of conflict (FP News, 2021).

More than a century later in the early 1950s, polio epidemics raged in the US and Russia and Europe, particularly affecting young children. After going through a period of polio menace Soviet virologists collaborated with U.S. researcher Albert Sabin to develop a “live” polio vaccine. The history records that the Sabin polio vaccine which heralded increased risk of side effect because of a living virus was introduced in the United States only after its safety and efficacy had first been tested in Soviet children. Peter J Hotez writes: “To this day, many Americans are astonished to learn that the Sabin polio vaccine was introduced into the United States only after its safety and efficacy had first been tested in millions of Soviet children” (FP News, 2021).

It is obvious that by this time vaccine diplomacy was entering into a domain of an unequal relationship based on which the country is in desperate need of vaccine, and the first hint of soft power diplomacy may be visible here i.e. “to shape what others want”.

5.2 Vaccine Science Diplomacy

Vaccine diplomacy is often attributed to the diplomatic activities involved in the procurement and distribution of vaccine supplies after the vaccines are ready to roll out. Diplomacy also intervenes in creating a conducive environment for scientific collaboration or shaping competition between the nations for vaccine development which is expressed by another term “Vaccine Science Diplomacy”. This vaccine science diplomacy was already failing when the world could not pull scientific, technical and financial resources to develop commonly agreed selected vaccines against COVID-19, instead, almost all countries who can produce vaccine opted for their own national effort to make it, the national governments supporting huge amount for their production, or in collaboration with their close partners. For example, UK’s Oxford University, Swedish AstraZeneca and India’s Serum Institute.

The prestige of technological advancement and the promise of economic gain were hard to miss in individual countries' race to become first in producing an efficacious and applicable vaccine. The private sector also chose to support one or more of these vaccine productions that have the potential to return the profit for them. And, at a crucial time when a humanitarian urgency needed to get the patency right waved for the production of selected vaccines like Covishield, it demonstrated the real interest of investors. Billionaire-philanthropist Bill Gates, who had built a reputation in Public Health, stuck to patency rights, thus creating hurdles for mass production of the needed vaccine.

Once the vaccines were produced, both bilateral and multilateral mechanisms became active for their distribution. India and China were the most influential in providing their homemade vaccines to other countries. The Pfizer and Moderna vaccines produced by the US were mainly reserved for the US, Europe and its allies such as Australia. India manufactured the Covishield vaccine in association with Oxford-AstraZeneca and received WHO approval before the Chinese Sinoharm BBIBP vaccine, and it became a huge contributor to the WHO COVAX programme. The Chinese received emergency approval from the WHO only in April and became part of the COVAX programme. Both countries provided vaccines to neighbouring countries and developing countries through bilateral mechanisms also. The Russian vaccine, after recent approval from the WHO, has also become a big attraction for developing countries and European countries alike.

5.3 Vaccine Nationalism

The undercurrents of internationalism and nationalism were expressing themselves in responding to COVID-19 pandemic, in a scientific endeavour to develop appropriate medications and vaccines and within the global body of the WHO itself. However, with the coming of Vaccines as the lasting solution to ensure herd immunity in the population, vaccine nationalism became the most dominant tendency. This term is ascribed to a situation where countries push to get first supplies of the vaccine, and potentially hoard key components of vaccine production.

It was quite obvious that the rich and powerful countries would want to vaccinate their population first in a sufficient number before they turn their sights to the other countries who were most in need but lacked the resources. The essence of this stream of thinking was something like this - if I get vaccinated then others will be safe, too. The US and its allies became the prime example of vaccine nationalism.

Vaccine nationalism became the foremost cause for glaring inequity in global vaccine access. As of now, more than 75% of total vaccines produced are used by just 10 countries. Some countries advocated vaccine nationalism from the very outset. Some are compelled to switch from one position to another because of a changed situation. India is the prime example of the latter which made a large contribution of its vaccine to COVAX and directly to some countries including Nepal. It was thus hailed as the icon of vaccine internationalism. But currently, it has to ban its vaccines for export because of the crisis generated by the massive second wave of COVID-19 infection and insufficient reserve to inoculate its own population. The situation has tragically reversed, India becoming the largest recipient of vaccine aid and also a buyer of a large consignment of vaccines from different countries.

Researchers in Rand Corporation Europe conducted a multi-country macro-economic model to find out what would happen to the global economy if some countries miss out on vaccines because of vaccine nationalism, apart from the cost to human lives. Their analysis showed that the worldwide economic impact of COVID-19 would have been \$3.4 trillion a year if there were no vaccines. But, even with a vaccine, the unequal allocation could cost the global economy up to \$1.2 trillion a year in GDP. If some countries manage to immunize their population against the virus, but if the virus is not under control all over the world, the global economic cost associated with the COVID-19 pandemic will still continue in both the rich and the poor countries (WHO, 2021b). The Rand Corporation research calculates an average loss of US\$ 28 billion for the low-income countries including Nepal, even when all high and middle income plus vaccine nations have access to the vaccine (Hafner et al., 2020).

If the poorest countries are not vaccinated the world would still lose about \$153 billion a year of GDP: EU will lose \$40 billion a year, the US\$ 16 billion and the UK between \$2 and \$10 billion. On the other hand, all countries will benefit economically if the world's poorest nations have access to any COVID-19 vaccines developed. High-income countries would get back about \$4.8 for every \$1 spent on supplying vaccines- a more than four-fold profit scenario (Hafner et al. 2020).

But it takes an even more serious turn when looked at from the lens of herd immunity and virus mutations. A perspective piece in New England Medical Journal pens: “with the current range of 6.7 million vaccination per day it will take 4.6 years to achieve worldwide herd immunity against COVID -19. And this lengthy time gap may allow variants of the virus to develop and spread, potentially rendering current vaccines ineffective” (Katz et al., 2021). There are already 5 variants of concern circulating in the world, and many more may come into existence this year (see appendix).

Therefore, it cannot be emphasized more that vaccines be treated as a public good rather than market commodities to ensure vaccine equity. This involves both upscaling vaccine production and distribution and temporarily waiving vaccine

patent protection. India and South Africa, supported by 55 other countries, had already submitted to the WTO for a temporary waiver of patency rights so that the vaccine could be mass-produced at a cheap price (WTO, 2021).

However, the profit motive of investors stuck to patency rights, the prime example being the public statement of Bill Gates, the billionaire-philanthropist who had invested a tremendous amount of money in vaccine production. When asked in an interview whether patency right should be waived, his answer was a categorical ‘no’. and with that answer, he found himself on the wrong side of history, severely criticized all over the world. But he insisted on it for some time and behind him was the Gates Foundation. Mr. Gates also met with U.S. Trade Representative to make the case for protecting these patents, but US President Joe Biden supported waiving intellectual property protections temporarily for COVID-19. Hence Gates Foundation had to retract from his earlier position.

This changed position was expressed in a statement by Mark Suzman, the Chief Executive Officer (CEO) of Gates Foundation, affirming that the Foundation is ready to lift the ban temporarily. His statement that “no barriers should stand in the way of equitable access to vaccines including intellectual property”, was an about-face for the world’s largest private foundation (Bill & Melinda Gates Foundation, 2021”).

5.4 Vaccine Hoarding

In spite of an uncomfortable mix of plea and warnings from global health leaders against it, the world has seen how strong the pull of vaccine nationalism is. Almost all-powerful countries exhibited it. Well-off countries not only managed to stockpile vaccines for full immunization of their people, but they also hoarded it many times more of that requirement when other countries did not have a single shot of vaccine. It is a fact that advanced countries accounting for only 16% of the world population have secured for themselves 60% of global vaccine supplies. Bishwaji Dhar writes: “Canada heads the list of ‘vaccine nationalists’ having assured its vaccine supplies that is nine times its population while the United Kingdom has stocked enough doses to vaccinate every citizen six times. Other countries to secure vaccines well beyond their domestic requirements are Australia, Chile, United States and members of the European Union” (Dhar & Joseph, 2019).

It is interesting to note here that the European Union defended itself and denied vaccine nationalism charges while accusing the UK and the US of such misconduct. In the first week of March, the EU was criticized when its member country Italy blocked the shipment of 0.25 million Oxford AstraZeneca vaccine to Australia. In retaliation, the European Union made it public that it has approved the export of more than 34

million vaccines to countries like Britain, Canada, Mexico and Israel, “while UK and US imposed an outright ban on the export of vaccines or vaccine components produced in their territory”. Such Spat from the EU Council President strained the diplomatic relations between the EU and UK to the extent that a top EU official was summoned by the British foreign ministry. UK Prime Minister lost no time in refuting such statement by asserting that “not a single COVID-19 vaccine or vaccine components has been blocked” and as if such strong assertion was not enough, he continued: “we oppose vaccine nationalism in all its forms (Post, 2021).

The irony of such response from British Prime Minister Boris Johnson was that it was coming at a time when Duke University’s Global Health Institute had made public its findings of the UK’s possession of vaccines six times its population. Indeed EU, UK and US were all major investors in vaccine production and also contributors to the WHO COVAX programme. US President Joe Biden had committed \$4 billion to the COVAX initiative after the election victory. But, there is another side of the reality highlighted by Andrea Taylor: “the EU has secured the rights to 400 million doses for member countries, with future agreements under discussion, potentially raising that number to almost two billion. The United States (US), which is not part of COVAX, already has agreements to purchase enough doses to cover 230% of its population and could eventually control 1.8 billion doses - about a quarter of the world’s near-term supply” (Duke, 2020).

The US response to EU comments was to reiterate their policy of ‘making vaccines accessible to every American’. The EU’s stance seemed plausible since both immediate neighbours Canada and Mexico had not received any vaccine from the US at that time, while the accused EU was providing a substantial supply to them. The US later promised to send 4 million doses of Pfizer and Moderna to Canada and Mexico in the third week of March. It is also interesting to note that the row over vaccine supply between these rich and powerful countries was focused on supplies to their allies rather than the poor nations which needed vaccine desperately.

Even within the orbit of their allies, US support has been questioned. The story of a small South American country Paraguay is telling here. Paraguay is the only country in South America and one of the 15 countries in the world that have diplomatic relations with Taiwan instead of China. It was the only country, which did not receive the Chinese vaccine in the continent, and also denied needed support from its allies notably the US. It seems there were obvious hints that if Paraguay requests Beijing, the latter would be happy to oblige.

Apparently, the US had urged Paraguay not to switch to the Chinese side, but the desperate expression of its foreign minister Euclis Roberto Acevedo is a testimony of

this difficult choice. Sending a message to its allies that Paraguay wants “more than words of support” he lashed out on television: “We ask these strategic allies for proof of their love. Before holding hands, you have to take us at least to the movies. He continued “President Xi Jinping has a lot of interest in a tie-up with us” (Quartz, 2021). Such expressions were the indication of a major shift in thinking of political leaders of Paraguay, which culminated in submitting a bill in the parliament which they lost.

The bill's proponents argued that Paraguay's fight against COVID-19 has a better chance if cooperation with China is ensured. India's assistance to Paraguay at this juncture even though the number of doses was not enough to make a huge difference, was widely covered in global media. The Paraguayan Senate voted against the proposal, 25 to 16. However, the debate is not definitively over and rethinking this issue in Paraguay appears to be continuing.

Amidst these bitter spats hurled against each other primarily within the Western alliance, it should not be forgotten that it was the President of the European Commission, Dr. Ursula von der Leyen, who coined the loftiest expression of vaccine internationalism. “None of us will be safe unless everyone is safe” (WHO, 2021a). Many countries tried in earnest to follow this spirit, and its flag bearer became the WHO COVAX initiative.

5.5 Vaccine Internationalism: The WHO COVAX Initiative

The WHO perceived early that in an unequal world the equity in vaccine distribution will also be severely affected. The rich and powerful countries may opt for having the lion's share of the produced vaccines. Hence it launched the COVAX programme to call for the international responsibility of its member countries. COVAX programme is the vaccine pillar of ACT Accelerator and is co-led by the Global Alliance for Vaccine and Immunization (GAVI), the Coalition for Epidemic Preparedness Innovations (CEPI) and the WHO. Its main delivery partner is UNICEF. It is embedded in both vaccine science diplomacy and vaccine diplomacy since it aims to accelerate the development and manufacture of COVID-19 vaccines and to guarantee fair and equitable access for every country in the world (COVAX, 2021).

The COVAX rapidly expanded its membership. A total of 165 countries- representing 60% of the world population- had joined COVAX. Ninety-two countries are eligible to receive the vaccine free of cost. And it aimed to provide a total of 1.2 million doses of the Pfizer-BioNTech vaccine and 336 million doses of the Oxford-AstraZeneca vaccine in the first half of 2021 to the 145 COVAX facility participant.

In his opening remarks in the World Health Assembly held on May 24, WHO Director-General Dr Tedros Adhanom Ghebreyesus said 72 million doses have been sent to 125 countries so far which constitute barely 1 per cent of their combined total population. The goal is to vaccinate at least 10 % of the population of every country by September and 30% of the population by the end of this year, which translates to 250 million doses in 4 months and 750 million doses by the end of December.

COVAX utilized two mechanisms to ensure its supply: 1) Advance Market Commitment (AMC) financing instrument, 2) Self Financing Partner. Those who wanted to donate vaccines to COVAX are AMC donors. Those who receive only are AMC recipients. Some countries are both AMC donors and receivers such as India. Some countries contribute by purchasing the vaccine of COVAX, thus become self-finance participants (SFP). This mixed approach has benefited the COVAX programme. But it has also created some problems. For example, Canada as SFP tried to buy oxford-AstraZeneca vaccine from COVAX which affected adversely the vaccines' supply to economically poor countries who required these vaccines.

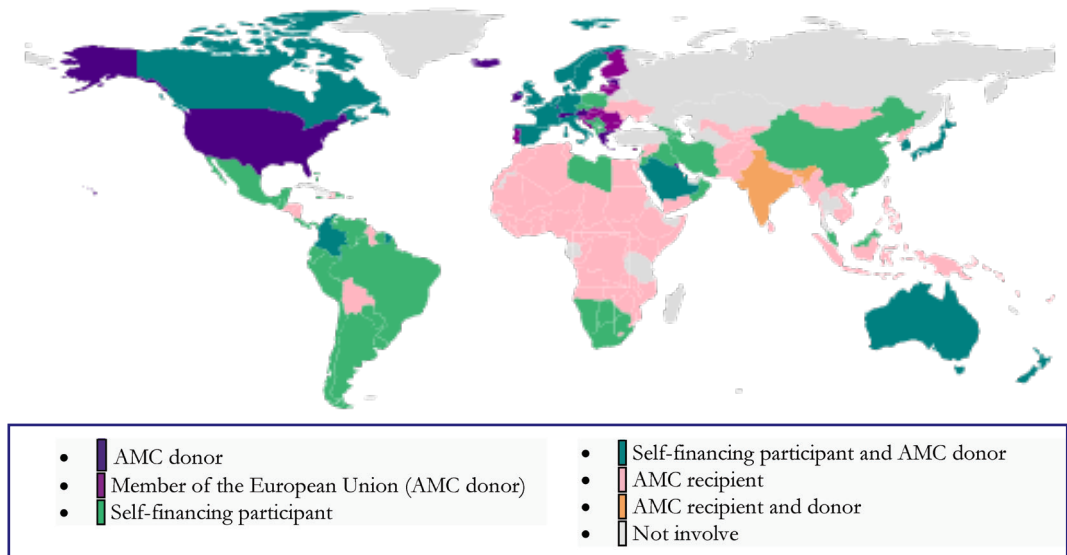


Figure 5. COVAX Donor, Recipients and Self-Financing Partner Countries, as of May 2021

Source: Gavi.org

The inability to keep the promise by the COVAX programme arose mainly because India, its main supplier, has largely stopped exporting the vaccine. India's own need to vaccinate its people because of the massive second wave of COVID-19 infection combined with a lowered production capacity of SII swung India tragically from its

spirit of “Vaccine Maitri or Friendship” to “Vaccine Nationalism”, even though the Federal Government is trying hard to overcome this sentiment. The other reason being the purchase of vaccines supplied in COVAX by self-financing participants.

5.6 Vaccine as Soft Power

Vaccine internationalism is a benevolent and lofty international spirit. However, there is another vantage point to it. Questions are being raised by the analysts of international relations whether the countries who are out to help others are using the vaccine as soft power. In other words, whether vaccine distribution was guided by a considered approach “to shape what the recipient country wants” in relation to the national interest of the vaccine provider countries in political, economic or security realms.

In international relations, soft power implies the ability to attract and co-opt rather than coerce, in shaping the preferences of others. Joseph Nye Jr. introduced the concept of soft power and elaborated the idea in his works, which according to him, is the “ability to influence the behaviour of others to get the outcomes you want” (Nye, 2004). It can be contrasted with hard power which is the use of coercion and force, including military intervention.

Soft power has also been criticized as being an ineffective concept, and some dismiss it outrightly as they assert that “actors in international relations respond to only two types of incentives: economic incentives and force” (Ferguson, 2018). However, the concept of soft power prevails in international diplomacy and is gaining increasing popularity.

Whether vaccine distribution was upheld as “Public Good” or “International Friendship”, global media are full of opinions and perspectives that may be simply driven by the motive of soft power. On a more serious note, Pannu and Barry observe in *The Lancet*: “The inequity of global vaccine access has also turned vaccines into diplomatic bargaining chips. China, India, and Russia have all seized the opportunity to use access to their COVID-19 vaccines to curry favour with friends and foes. Their wish to persuade and attract through the soft power of vaccines should be considered an all-around improvement compared with the use of military hard power (Pannu & Barry, 2021). But power imbalances in these deals cannot be ignored. On one side is a low-income country snubbed by countries with higher incomes, facing a worsening pandemic and tired of waiting for COVID-19 vaccine doses, and on the other are large countries that have nationalist political agendas” (Pannu & Barry, 2021).

Such observations may be carrying some truth, but they could also be a one-sided judgment. The recipient countries’ point of view about who came to their help and at what cost at the most needful time would be the most important in a fair assessment

of such act of donor countries, as highlighted by Chatham House Report in the case of the Middle East and North African countries (MENA) to China's help (Chatham 2021).

5.6.1 China, India and Russia

China, India and Russia together provide the largest consignments of vaccines to the low-income countries whether through bilateral mechanism or COVAX. Vaccines produced by these countries are the most suitable to Low-Income Countries (LICs) in terms of storage and cold chain transportation. Nepal has already rolled out the India-manufactured Covishield vaccine and Chinese Sino-pharm vaccine. It has given emergency approval to the Russian Sputnik V vaccine as well. These countries have raised the banner of vaccine internationalism but their contributions are also questioned as soft power in play. It is quite reasonable to assume that these three countries have conceived their advantage in vaccine production to increase their influence and prestige in the recipient countries. The competition between India and China was quite evident. India's outward priority for vaccine supply, while its domestic coverage was abysmally low, could be taken as indicative of gaining upper hand in this vaccine race against China and other potential competitors. Russia on the other hand seems to make inroads in European and Asian countries counterbalancing the influence of the US in these countries. Therefore, the vaccine diplomacy of each of these countries is presented in more detail below.

5.6.1.1. India's Vaccine Diplomacy

In the initial phase of the vaccine race, India emerged as the country with the greatest potential for the production and distribution of vaccine to the world. The Serum Institute of India collaborated with Oxford AstraZeneca to produce the Covishield vaccine whose production capacity was claimed to be 1.5 billion vaccine doses per year. Indian Bharat Biotech also developed a native but less known in-active virus vaccine called COVAXin in association with the Indian Council of Medical Research.

From the very beginning, the vaccine diplomacy of India raised the flag of "Friendship through vaccine" and stood true to the axiom "None of us is safe until everyone is safe". It was the largest contributor of vaccines to the COVAX programme. India was also making economic gains by selling vaccines to well-off countries. It was the most heard of voice against vaccine nationalism. It had already established itself as the Pharmacy of the World, and it was poised to be the World's number one vaccine producer. However, just like other countries who preferred to help certain countries and leave others based on the closeness of their bilateral relations, India too opted to exclude Pakistan from the list, while all other south Asian countries received the

vaccine, including Nepal. This was against the lofty ideal of vaccine friendship.

How would Pakistani people react if India had offered its vaccine to Pakistan is a question left to speculations. Perhaps it would be similar to how Indian people feel about the recent offer of help from China at this current crisis. It appears to be a missed opportunity for India to mend ties with Pakistan. This may be a lesson for learning when rethinking about friendship through vaccine diplomacy

A virtual meeting of Quadrilateral Security Dialogue (QUAD) countries to strengthen India's capacity to produce another one billion doses of the vaccine also needs to be looked at from this perspective. This move was widely understood as a joint effort to contain Chinese advances in vaccine diplomacy. Emphasizing that the Biden administration 'aims to counter Beijing's narrative while seeking to address the needs for vaccinations at home and around the world' Sheila Smith, a senior fellow at the Council on Foreign Relations is quoted in Voice of America print: "They want a coalition approach to bring all those pieces of the COVID-19 response together to make sure that we're not just thinking about ourselves, the rich countries of the region, but we're also thinking about countries that don't have the resources and providing an alternative to the Chinese approach" (Widakuswara, 2021).

However, the towering figure of India suddenly started to crumble when it was swamped by a vicious second wave of COVID-19 pandemic by different strains of mutant Corona virus whether imported or homegrown. It was found that India had miscalculated the possible need for vaccines within its own country and had a very low coverage of 6% of the total population. The vaccine production capacity also suffered because of the shortage of vaccine-producing materials, primarily due to the US ban on these materials. This is an irony given the QUAD commitment mentioned above of which the US is a part. Hence neither India could provide a sufficient number of vaccine doses to its own people, nor to the global orders, it has committed to. The CEO of Serum Institute of India, Mr. Poonawala fled to London to escape from its country because of alleged threats by 'powerful' people. And India took desperate measures to curb the export of vaccines and to import as many different candidates as possible.

Table 1. Vaccine Roll Out Rate in Selected Countries, End of May 2021¹

Location	Doses per 100 people	Total doses	Location	Doses per 100 people	Total doses
China	40.5	586,769,737	World	23.2	1,809,046,854
India	14.6	201,203,166	China	40.5	586,769,737
Indonesia	9.4	25,782,177	US	96.9	290,724,607
Japan	8.8	11,176,328	India	14.6	201,203,166
Bangladesh	6.0	9,901,717	Brazil	30.7	65,268,576
South Korea	13.2	6,757,397	UK	93.8	62,658,639
Pakistan	2.8	6,138,509	Germany	57.8	49,986,909
Singapore	63.7	3,728,869			
Thailand	4.6	3,208,882			
Kazakhstan	16.5	3,097,941			
Myanmar	5.5	2,994,900			
Mongolia	87.6	2,872,572			
Malaysia	8.8	2,859,864			
Nepal	9.4	2,741,964			
Sri Lanka	8.4	1,790,688			

Source: Our World Data

In this crisis, the public opinion in India swung to an extreme form of Vaccine nationalism. The Chief Minister of Delhi, Aravind Kejariwal, publicly expressed it in an interview in India Today and Aaam Aadmi Party sent a letter to the Prime Minister to this effect. (The Indian Express, 2021) But Indian government still holds onto its position and has tried to remind the critics and public that India has “no right to ask help from others if it shies away from helping others”. The Indian foreign minister, S. Jayshankar, has reiterated this position many times publicly (Raisina Dialogue 2021).

No matter how difficult it is for India to hold on to its principle of vaccine friendship and meet the requirements for it, not all is lost. There are strong opinions that the world should expect its come back after this ‘winter period’ of insufficient production of vaccines. Iwanek observes: “While the current crisis has showed New Delhi’s many mistakes on the domestic front, the earlier circumstances which led to it donating doses highlighted the country’s strengths. This can be grounds for a fruitful international health alliance in the future, with western countries sharing the know-how (including licenses) with India, a country with a massive workforce and cheap manufacturing conditions, in order to supply the world with affordable vaccines” (Iwanek, 2021).

India in the meantime is developing the production capacity of many other vaccine producing institutions as well. They include the Biological E, which is collaborating to

¹ The table shows the vaccine rollout around the world. The UK reported the highest doses per 100 people (93.8%) around the world and Nepal has only 9.4% doses per 100 people till the end of May.

produce Janseen vaccine, and Dr Reddy's Lab, which is collaborating with Russian Sputnik vaccine to be manufactured in India.

5.6.1.2. China's Vaccine Diplomacy

Though the world media are full of accusations about Chinese vaccine policy as soft power to "shape what the countries want", the Chinese government always held vaccines against COVID-19 as a public good and became the largest supplier of vaccine to the world. Over the past 6 months, it has supplied 300 million vaccines globally worth two billion dollars of which 80 resource-poor countries have received vaccines free of cost. Now it has pledged an additional \$3 billion to assist developing countries in their fight against COVID-19. It has proposed setting up a global forum on vaccines to ensure equitable distribution. In his address to Global Health Summit held by the G-20 and European Commission, President Xi Jinping underlined the Chinese position on vaccine nationalism.

"Today, the problem of uneven vaccination has become more acute. It is imperative for us to reject vaccine nationalism and find solutions to issues concerning the production capacity and distribution of vaccines, in order to make vaccines more accessible and affordable in developing countries" (Xinhua, 2021).

China stands out as the country which endured the first strike of the COVID-19 virus. But it managed not only to control the pandemic at home, it successfully avoided the second wave which engulfed many Western and Asian countries. It devised a strategy of economic restoration centred on the production of essential protective gears such as masks and Personnel Protective Equipment (PPEs), equipment such as Polymerase Chain Reaction (PCR) machines, rapid testing kits, ventilators, and vaccines, and thus elevated itself to a comfortable position to provide support to the global needs. Along with the restoring health of its economy, it also pushed the concept of the "Health Silk Road" to reach the countries which were part of the Belt and Road initiative. China's priority in vaccine support can also be traced to the countries which are connected to Health Silk Road. With its Asian neighbours, it organized a series of virtual dialogues, the most recent one being with Nepal (IDCC, 2021).

In contrast to those major Western powers which had stockpiled the vaccine doses far over their needs but contributed little to ease the vaccine needs of the developing countries, China's commitment to reach the unreached stands out. China has also been vocal to criticize the US for purchasing 2.6 billion doses- a quarter of the global total. This criticism is tied up with the suggestion that the most pressing task at hand for the developed countries is to "immediately lift export restrictions and increase supply to make up for the shortfall in developing countries" (IDCC, 2021) China has also been

criticized for its vaccine policy which makes Chinese vaccine mandatory to get entry permit to China, as a sort of “vaccine visa” which has been relaxed for the US vaccines now (China Briefing, 2021).

Allegations have also been levelled to China’s vaccine diplomacy as a way to embed its presence in recipient countries seeking China’s diplomatic and economic favours. A particular case in point is China’s presence and vaccine collaboration in the Middle East and North Africa (MENA) region. However, an independent think tank institution like Chatham House has come out with a report that draws attention from the perspective of the recipient countries. Acknowledging that Beijing’s vaccine diplomacy “bolsters its soft power and consolidates its influence” the report also highlights that “such narratives stifle positive responses from MENA countries towards China’s vaccine cooperation” (Chatham House, 2021).

The Middle East and North Africa governments appear to have strategically embraced the Chinese vaccine as their much-needed jabs for their populations given their assessment of the shortage of other vaccines. The UAE was the first country outside China followed by Bahrain, Egypt and Morocco which are testing and producing vaccines also in collaboration with China. The report says “In the eyes of many MENA countries, especially those facing severe economic crises, Western states have selfishly hoarded vaccines at the expense of developing countries (Chatham, 2021). In the backdrop of this scenario, it is no surprise that MENA views the Chinese support positively even though the vaccine may be relatively costly.

5.6.1.3. Russia’s Vaccine Diplomacy

Russia was the first country to declare a successful vaccine against COVID-19. The very name the Russian Gamaleya Institute picked up for this vaccine- “Sputnik V” is reminiscent of the Cold War competition between the US and USSR in the Space race and Russia’s first success in launching the artificial earth satellite. The vaccine did not receive a warm welcome from the scientific community even though pushed by non-other than the President of Russia Vladimir Putin himself. The reason is that the phase 2 clinical trials were done in very few individuals and the third phase clinical trial results were in waiting.

Once these results were published in the Lancet, the prestige of the Russian vaccine soared acquiring a diplomatic edge by Russia.

This was both in terms of helping the developing countries at the time of crucial need of vaccine, thus increasing its influence, and making a business deal with rich western countries. Europe and the Middle east looked particularly interested in the Russian vaccine and Dr. Reddy’s pharmaceutical company is collaborating with the Russian

Gamaleya Institute to manufacture this vaccine in India. It is a wide consensus now that with high efficacy and simple cold chain requirements, the Russian vaccine may be the choice of vaccine for developing countries. Already more than 60 countries have given approval and 50 countries have placed orders to buy this vaccine (Statista, 2021). And, from the perspectives of soft power diplomacy, when the major adversaries of Russia are looking inwards presenting themselves, perhaps inadvertently, as the symbol of vaccine nationalism to the world, the developing countries and Europe seem to be open and inviting for Russians to expand their influence through vaccine diplomacy.

CHAPTER SIX

COVID-19 PANDEMIC IN NEPAL

The first case of COVID-19 was detected in Nepal on January 23, 2020, in a student returnee from Wuhan, China. The second case was detected a month later, on February 24, in a student who returned from the UK. The Government enforced strict lockdown immediately. A few more cases were found in Kathmandu from people returning from abroad. Outside Kathmandu, the cases were mainly detected among people returning from India in the border districts and the interior.

Udayapur was the first district where a cluster of cases was detected followed by Nepalgunj, Birganj and Kapilvastu. In Udayapur these cases were found in a mosque-going Muslim community that had visited India recently. The whole community was put into strict vigilance, screened for COVID-19 infection with PCR testing. The cases identified were hospitalized, and the community of 150 households was repeatedly tested and finally declared free of COVID-19 infection. Thus, Udayapur became the first success story of “break the chain and stamp the fire”, which at that time meant breaking the chain of infection by preventive measures of wearing the masks, observing physical distance and hand washing, immediate hospitalization of test-positive cases and quarantine of suspected cases, and repeated testing of the community to assess whether the suspects were cleared of infection or not.

6.1 National and Local Measures to Manage COVID-19 Pandemic

Later, as in India, the Middle East and Western countries suffered from huge tides of COVID-19 infections, the migrant Nepali workers started returning homes in a large number by air or land. To manage such an influx, self-quarantine was made mandatory for the returnees and health screening mechanisms were instituted by the Ministry of Health and Population (MoHP) in all 43-border connecting areas of the country. Then a few days later all entry visas were suspended, international flights were stopped and ground crossing points of entry were shut down.

In spite of these measures, the cases kept increasing with the increase in the influx of migrant workers. Then, it started to decrease to the lowest of 50-60 cases a day in the middle of July as the number of migrant workers decreased. Hence, the rise and fall of the COVID-19 cases were determined by people returning from outside and not from community transmissions within. The pressure on the health system was quite heavy but it was also getting strengthened because of the COVID-19 challenge. The total number of laboratories in the country had reached 70, including both government and private labs, from a single facility in January 2020 (MoHP, 2021). Bed and service

capacity building was put in a fast forward mode in all government hospitals, including the local municipality hospitals.

On a national level, a High-Level Coordination Committee under the chairmanship of Prime Minister K.P. Oli was established on March 1, which was transformed into the COVID-19 Crisis Management Centre headed by Deputy Prime Minister Ishwar Pokharel. The government activated the Infectious Disease Act 2020 (1964) to fight the pandemic “which enabled the government to take ‘necessary action’ and ‘issue necessary orders applicable to the general public or a group of any persons’ to ‘root out or prevent’ the development or spread of an infectious disease” (MoHP, 2021). The Ministry of Health and Population also began issuing press briefings and daily situation briefs for the benefit of the press and the public and which became an important source of COVID-19 data in Nepal.

6.2 First Wave of COVID-19

The first wave of the COVID-19 pandemic gained momentum in the first week of August 2020 and peaked in October. Looking at the exponential speed of transmission and wide distribution all over Nepal, it was clearly an expression of community transmission which could not be stopped by lockdown alone, a multi-prong approach was needed to arrest the speed of COVID-19 transmission.

The most plausible explanation for the meteoric rise of cases appears to be the influx of Nepali people from India, silently transmitting COVID-19 infections in the community far and wide in different parts of Nepal. Thus, even though the number of new cases decreased with the decrease in immigration, the bulk of the people who entered served as the source of infection to others causing a silent community transmission of COVID-19. Hence, in a two weeks’ interval after the lowest number of cases recorded, new cases began to increase rapidly to attain a maximum of about 5700 cases daily in the third week of October 2020.

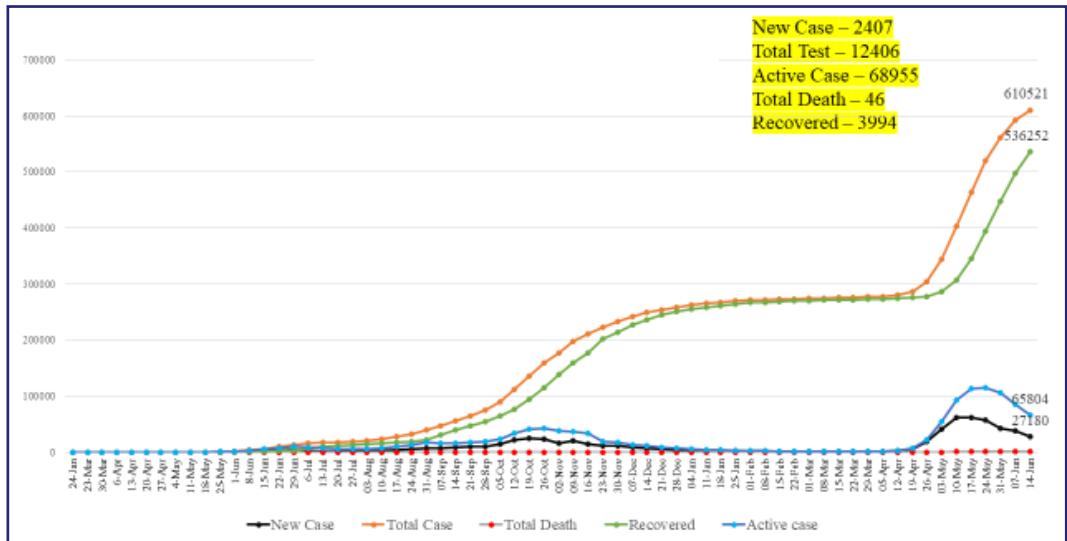


Figure 6. Trend Analysis of COVID-19 Cases in Nepal

Source: MoHP, Nepal

The border districts were affected first, but the control measures were effective to bring down the rate of infection and transmission in these districts. It was Kathmandu valley that turned out to be a major hotspot of the first wave of COVID-19 pandemic in Nepal. And, since the quarantine, home isolation and institutional isolation all lacked the standard quality of care and supervision, the need for hospital beds, intensive care units (ICU) and ventilators increased tremendously.

Measures taken in Kathmandu valley also appear to have created opportunities for increased transmissions of infection inadvertently. Instead of temporarily turning private hospitals and medical colleges into fully isolated COVID-19 dedicated hospitals, as practised by some district of Nepal, the policy of enforcing the government and private hospitals to combine treatment of COVID-19 patients' treatment in the same premises with non-COVID-19 patient appears to have had many adverse outcomes. The increased risk of hospitals themselves turning into seats of infection, and demotivation of the non-COVID patient to attend such hospitals because of the fear of contracting COVID-19 were the most serious ones. The health staff in those hospitals were being infected in large numbers compared to dedicated hospitals such as Sukraraj Tropical Hospital in Teku, thus affecting the performance of the institutions themselves.

After 11 weeks, the cases started to decline from October 22nd onward, and it continued to do so in festival times and the winter period. It kept on decreasing even when large

mass gatherings and demonstrations were organized for and against the government in response to a political crisis triggered by the dissolution of the House of Representatives by Prime Minister Oli. Such a state of affairs could only be explained by the attainment of some level of herd immunity in Kathmandu valley because of the high rate of infection and the possibility of a large number of unreported or untested asymptomatic cases. The seroprevalence survey pointed out a substantial percentage (22%) in Bagmati Pradesh, people having the presence of protective antibody while the national total was about 14% (Kantipur, 2021). However, those who did not have antibody levels remained susceptible to infection and the second wave of infection has most likely spread in such population and those who were not vaccinated. And, even if the vaccinated people contract COVID-19 infection, the vaccine has been found to protect people from becoming serious and critical cases and may lower the hospitalization rate.

6.3 The Second Wave

The vaccine coverage started in January 2021. For a period of three months, the daily number of cases was very small; so was the pool of active cases. The second week of March 2021 had the lowest number of cases, but in this period, India was having an exponential rise of the second wave of COVID-19 because of UK (Alpha) variant and homegrown Indian (Delta) variant as well. Nepali people returning from India and UK in February and March carried these viruses to border districts, Kathmandu valley and the far reaches of Nepal. So, Nepal also saw a meteoric rise of cases from the second week of April suggesting that the community transmission has already taken place all over Nepal, mostly because of the Indian Delta variant.

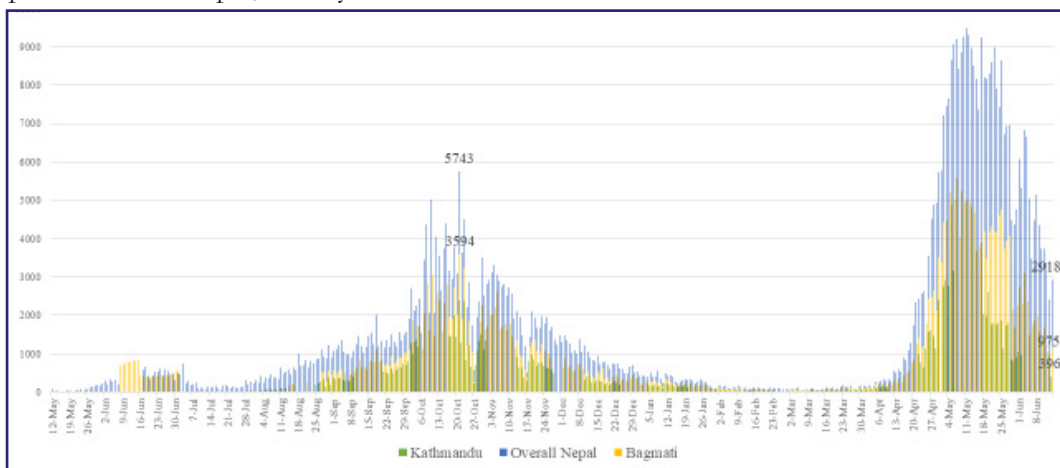


Figure 7. Daily COVID-19 New Cases in Kathmandu District, Bagmati Province and All Over Nepal Comparing First and Second Waves, as of 14th June 2021

Source: MoHP, Nepal

The result was a vicious second wave which quickly rose to the peak in the third week of May. Then, it started to decline. But, the rate of infection and virulence causing serious critical cases and deaths were much higher in the second wave. Because of the scarcity of oxygen supply and hospital and ICU ventilator beds, the death toll also increased many times than the first wave. From the past three weeks, however, new cases have started to decline and the recovery rate has also superseded the infection rate with an impressive margin.

As a result, the pressure on hospital beds has eased a bit. But, since the cumulative pool of active cases is high (~ 64000) the chances are that a certain percentage of people from this pool may become seriously critical and may even die. The ongoing trend suggests that the occupation of High-density Units (HDU), ICU and Ventilators and the number of daily deaths may be expected to decrease, but at a relatively slow pace than the new cases. In order to achieve a fast reduction in the occurrence of seriously critical cases, there needs to be sufficient oxygen supply for all the hospital beds, easy availability of HDUs, ICUs and Ventilators and their functioning at optimum levels, proper care and supervision of quarantines, home isolations and institutional isolation centres with oxygen support, and increased number of HDUs.

These are important lessons to be learned because a third wave is not unlikely if a new variant enters Nepal or if the COVID-19 virus does mutate within Nepal. The mutation capability of this virus needs to be taken seriously, the latest example being the Delta variant of India having some additional mutation in Vietnam. The health system capabilities of Nepal need to be continually upgraded and backed up by intensive public health measures and wide vaccination coverage.

6.4 Vaccine Coverage in Nepal

Vaccine rolls out in Nepal started with the Covishield vaccine on January 27, 2021. Its emergency use was approved by the Nepal Government on January 15. The first lot of 1 million doses was received as a bilateral grant from India and the second lot of 1 million was received about a month later as part of the purchase deal of 2 million with the SII which cost \$4 per dose. It also received 348000 doses of the Covishield vaccine through the WHO COVAX programme about the same time in February 2021.

In the first phase, vaccination was prioritized to frontline health workers, female community health volunteers, security personnel, sanitation workers, elderly people living in care homes, and prisoners. Approximately 438000 people were vaccinated in the first phase. Journalists and foreign diplomats based in Kathmandu were also provided vaccine opportunities in this phase. In the second phase, all people over 65 years were prioritized for vaccination from the second week of March. This time 1.3 million people were inoculated.

Nepal also received 800,000 doses of the Chinese Sinopharm BBIBP Cor-V vaccine on March 29. It started to roll out from April 7, first to essential workers more prone to exposure to COVID-19 virus within the age bracket of 18-59 years. Then, it was extended to all the people of age group 40-59 years. Around 289,000 people were vaccinated in this first phase. The second phase was also completed on May 25. Another lot of 1 million vaccine grant received from China is being rolled out for the people in the age group 60-64 years.

Nepal needs 44 million doses to vaccinate 22 million people, and as the probability of receiving vaccine from India is very low, it is proactively seeking vaccine grant and procurement from different countries of the world. Nepal has earmarked US\$ 260 million for vaccine procurement in the health budget for the next fiscal year. It has expressed its wish to purchase 5 million Janssen vaccines from the US. It has also expressed willingness to buy vaccines from China and Russia but the exact number of doses are not clear. It has already proceeded to buy 5 million Covishield doses from India which was stalled because of the adverse situation in India and also the apparent play of commission agents. The UK ambassador to Nepal herself had made it public of 2 million Oxford AstraZeneca vaccine worth 550 million pounds as a grant to be delivered by March first week. It has not reached yet. The US administration has recently declared to donate at least 80 million doses by the end of June to priority countries which includes Nepal.

So far about 7.4% of Nepal's population has been covered with the first dose of vaccination. And, about 2.5 per cent has received a full dose of either Covishield or Sinopharm vaccines. Full vaccine coverage of a minimum of 70% of the population remains a huge challenge in Nepal as is the case all over the world for low-income countries. Nepal Government has embarked upon an ambitious plan to vaccinate all people above 18 years of age within 6 months from now. Such a grand plan is shadowed by the fact that similar promises in the past were not fulfilled because of regional and global constraints in vaccine procurement. If 40 % of the Nepali population is vaccinated in this time period that would be considered a huge success by all parameters.

6.5 Vaccine Science Diplomacy of Nepal

The manufacturers of the vaccines that were going to play an important role globally and in Nepal, had incidentally approached Nepal for participation in phase III clinical trial. Such request was made by China's Sinopharm, Russia's Sputnik V and UK's Oxford AstraZeneca. Russia came with an additional offer of help to manufacture vaccines in Nepal with their technical support. However, at that time the Nepal Government had made it public that the pharmaceutical company with whom the manufacturers wanted to collaborate was not properly registered in Nepal. Nevertheless,

these were opportunities for vaccine science diplomacy, which Nepal mused over for a considerable period of time. It was initially positive for participating in the clinical trial. The Rising Nepal even carried a news item on August 24 that clinical trial may begin soon for these vaccines. Around the same time, the discussion about which vaccine is appropriate in Nepal had also become a matter of urgent importance. The government had to decide which vaccine to purchase from among the many candidate vaccines that would be available in the market. In view of this situation, Nepal Health Research Council took the lead to get feedback from experts for both issues at hand.

The experts in Nepal at that time had reservations about each of these vaccines because of the news of side effects, a low number of trial subjects and lack of publication in reputed journals of phase I and II clinical trials. Such state of affairs led to the suggestion of separating vaccine procurement from vaccine trials arguing that it is not necessary to participate in a clinical trial to import the vaccine when ready. The opinion was divided whether to participate in clinical trials or not, but considering many issues related to safety and post-trial compensation, the consensus went in favour of not participating in the clinical trial for any of the vaccines offered for that purpose, but to engage in a diplomatic effort to import vaccine either on grant or by purchase.

In the hindsight, one can see that it was a missed opportunity for several reasons. 1) Nepal could have gathered important experience to conduct phase III clinical trial; 2) it would have gained a preferential position for access to purchase of vaccines compared to those nations that had not participated in the trial; 3) rather than spending huge sum of money in purchasing vaccines only it would also have taken a decisive step in laying the infrastructural foundation for vaccine production in its own soil with the technical support of the countries willing to do so, thus building its own capacity to fight different waves of COVID-19 pandemic. Such vaccine production capacity would have helped Nepal to fight other epidemics of infectious disease as well.

6.6 Diplomacy of Vaccine in Nepal

Nepal's vaccine diplomacy primarily focused on ensuring the needed vaccine supply for full coverage for its people. Nepal had a geographical advantage of being situated between the two largest vaccine-producing countries, and both countries were willing to help Nepal. But, the bilateral relations with India at that time was under strain because of several contending issues, the most prominent among them being Nepal's claim of its territory granted by the "Sugauli Treaty" with British India. The Oli Government had also dissolved the House of Representatives and there was a strong wave of opposition movements while the fate of such action was waiting for the Supreme Court decision. It was in this situation that Nepal was successful to receive the first vaccine consignment as bilateral grants during the visit of Foreign Minister Mr. Pradeep Gyawali to India on January 14, 2021. And as the vaccine arrived in Nepal

and began to roll out, there was a visible improvement in the relations between the two governments as well as Nepali public opinion towards India.

Nepal-China relations on the other hand have become stronger during the COVID-19 pandemic as China became the bulwark of support for Nepal at a time of desperate need. For medical supplies such as masks, PPE, PCR machines, RDT kits, China was the sole supplier of these necessities because India was facing a huge pandemic on its own soil at that time. But, India had ensured the medicine supply to Nepal even in such an adverse situation. There was an early promise for the Chinese vaccine as a grant; however, there was a hesitation on Nepal side because the vaccine was not yet approved by WHO for emergency use and its third phase trial findings were not yet published in scientific journals. In spite of such hesitation, the Nepal Government approved for emergency use before the WHO's nod and vaccination programme started on April 7. Recently, on May 28, 2021, at the request of President of Nepal Bidya Devi Bhandari, the Chinese President granted another 1 million vaccine doses, winning the hearts of the Nepali people.

In the crisis of the second wave, when diplomatic missions of the whole world were competing to secure the purchase of vaccines to meet their local needs, the Embassy of Nepal in China and the Embassy of China in Nepal were quite active in making Sinopharm vaccine available to Nepal commercially. The Chinese Embassy of Nepal sent a letter to this effect to the Ministry of foreign affairs, and the letter was then forwarded to Health Ministry. But, it was put on hold for a long time by the latter. Only recently, just before another grant of 1 million vaccine doses from the President of China, the Health Ministry appears to have agreed to purchase the Chinese vaccine. Just a few days back, Nepal has approved another Chinese vaccine Sinovac for emergency use following the WHO's approval.

The Russian vaccine has emerged as another most promising vaccine in the global scenario. Though Nepal was one of the first countries to have been approached by the Russian diplomatic mission in Kathmandu, there was a delayed response from the Nepal side for the reason mentioned above. Now it also appears to have given a green signal to purchase the Russian Sputnik Vaccine, and also the Janssen vaccine from the US.

The decision to purchase the Russian vaccine along with the vaccine from the US appears to be a balancing act of Nepal, though it is justified to have as many suitable vaccines as possible to achieve wide vaccine coverage in the country. Nepal is requesting the western countries to provide vaccine to it from their reserve. Both US and UK have large reserves of the Oxford AstraZeneca vaccine. It should be counted a diplomatic success of Nepal that the UK has promised to send 2 million doses of Oxford AstraZeneca vaccine to Nepal. The Embassy of Nepal in the US also was actively pursuing with the US government to send the same vaccine to Nepal from its reserve, which seems to have been heard partially by the recent declaration to provide 80 million vaccines to the needy country including Nepal.

It is yet to be seen under what terms and conditions, and price the vaccines, other than the grants from rich countries, are sold to the needful countries and whether it sets an example of humanitarian gesture or soft power in action.

6.7 Impacts of Global Vaccine Diplomacy in Nepal

Because of Nepal's geo-strategic location between China and India, it has the potential to attract the attention of these two countries as well as global vaccine diplomatic efforts. All the vaccine-related activities mentioned in the foregoing sections are suggestive that it indeed has. India's grant of 1 million vaccines to Nepal had a visible impact on improving soured relations between the two countries. It is to be noted that India, the biggest contributor to a vaccine in the world at that time, had supplied vaccines to other countries mainly through the COVAX programme. Only a few countries received it bilaterally, Nepal being one of the first such recipient countries. Indian think-tanks now openly admit about this 'intent' of vaccine diplomacy of India in recent publications (Bhattarai, 2021).

The arrival of another 1 million vaccines further strengthened Nepal –India relations, but the delay in the procurement thereafter, and the news of corruption in vaccine procurement began to have an adverse effect on public opinion towards India. At the same time, Nepali people had sympathized with the situation in India, and Nepal Government started looking for other sources of vaccine supply and gained some success in mobilizing support from different countries. In this context, Nepal had received 1 million doses from Chinese President Xi Jinping in response to a request made by President Bidya Devi Bhandari. Such a gesture from China was widely appreciated at a time when Nepal was in a dire need of the vaccine. The US has not yet made its support public despite Nepal's request and the vaccines promised by the UK more than 3 months ago have not arrived in Nepal yet.

However, such proactive steps taken by President Bhandari was not seen in a good light by India as is evident by the visit of Bharatiya Janata Party (BJP)'s leader,

responsible for the Party's foreign affairs, to the Embassy of Nepal in India to express Party's viewpoint. Indian President had also received a similar letter from President Bhandari, but the Indian side thought it was not a proper diplomatic gesture because presidents of both countries do not hold executive powers. To receive a request at a time when India could not entertain may have put India in a difficult position. It was not clear as to why Nepal did so, it was seen as a balancing act of request to both of its neighbours for help. However, in his recent interview with an Indian media, PM Oli explained that since Nepal and India have a unique situation in COVID-19 transmission because of free and open borders, from where disease can transmit to both countries even if one country is successful in controlling it, India's priority should be helping Nepal. He did thank India for providing the vaccine for the first time and other healthcare supplies but also regretted "that Nepal did not get as much help as it needed from India". Such expression is suggestive that PM Oli thinks India is in a position to help but it is not coming as expected (PTI, 2021).

China, on the other hand, has consistently provided support throughout the difficult time of the COVID-19 pandemic by providing essential goods, equipment and vaccines. It held such support as the response to a reliable friend in the time of need. However, China's readiness to help also may have limitations as they always use the phrase that "China will help within their capacity". They cannot always provide vaccines and essential support free of cost. This is something Nepal has to think about in advance. For a sustainable supply of vaccines, it is quite obvious that the Chinese side would be more comfortable if Nepal enters into a business contract in vaccine procurement rather than asking for a grant only.

Nepal has not yet procured a vaccine from Russia but it is one of the first to offer and it is the only country, which came with the proposal of producing vaccine in Nepal. Since the Russian Sputnik vaccine has good stature in the scientific community, such a proposal gives a diplomatic advantage to Russia while helping Nepal for self-sufficiency in vaccine supply. Even though Russia is quite far distance-wise, such diplomatic gestures have brought it closer to Nepali people.

As the second wave hit hard Nepal, increasing serious critical cases and deaths tremendously, it has become a priority country, along with India, to get support from the world community. The western countries that have stockpiled vaccines are under pressure to provide support to the countries that are most in need. Because of this international pressure, generated by all international health organizations, UN systems and even celebrities, it seems that the countries which have hoarded vaccines are now willing to release some portion of it to the countries in need. The recent G-7 meeting's main agenda was also focused on this issue. They have promised 1 billion COVID-19 vaccine doses to poor nations (BBC, 2021c).

6.8 Vaccine Corruption

The term “vaccine corruption” also gained prominence in relation to vaccine purchases in Nepal. The Ministry of Health and Population of Nepal had made a deal with Serum Institute of India back in February to purchase 2 million doses of vaccines of which 1 million have arrived. But the second lot of vaccines did not arrive on time. It kept lingering on for months until the news came that it will not be delivered. India was already swamped by the second wave of COVID-19 by then and its vaccine policy was widely criticized domestically, which prompted India to ban the export of vaccines to other countries. But, it was difficult to understand why it was delayed in the early period when there was no such restriction until the Health Minister of Nepal himself made it public that this failure was because of some powerful commission agents. A public statement of similar nature was given by the department of health services officials (TKP, 2021).

From such utterances and rejoinders, it was clear that the commission agents wanted a 10% cut from the remaining 1 million doses purchased by the MOHP. And, on top of that, they wanted the same percentage cut from another 5 million vaccine doses the Nepal Government wanted to purchase from SII. When SII was asked to deliver the remaining 1 million doses of the purchase deal, they have reportedly asked the government to come through the ‘Hukam Distributors and Logistics’ of the commission agents! It was a perplexing situation because the MOHP had sealed the deal directly with SII and the commission agents wanted to have their cut on a deal made by the government. The fact that the SII supported commission agents and ignored the request of the Government of Nepal showed how strong the Indian connection of these agents was. In a recent press conference on May 11, the health minister has changed his earlier position and shifted the blame of not receiving consignments to the COVID-19 situation within India and not to the commission agent’s firm (Onlinekhabar, 2021).

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

The foregoing overview of the global and Nepali situation of COVID-19 pandemic and vaccine diplomacy highlights certain important factors to bear in mind. The COVID-19 virus has already caused tremendous damage to human health and life along with an economic downturn which will take a long time to recover unless a concerted multi-pronged effort is carried out to manage this pandemic. It is quite obvious now that this virus is here to stay and because of its mutation capabilities, several waves of a pandemic may come before it becomes a less harmful endemic disease. This scenario is aggravated by the fact that, as warned by the WHO Director-General, the inequity in vaccine distribution in the world may generate many more COVID-19 mutants in coming years, posing an even greater challenge to our efforts to deal with this pandemic. So far Nepal has adopted balanced vaccine diplomacy which is mainly geared towards vaccine grants and procurements. It does not suffer from vaccine nationalism either. Nepal may have to intensify its vaccine diplomacy to strengthen its friendship with other countries and to build its capacity for scientific collaboration for vaccine development in Nepal. For this the following Recommendations have been made:

1. High level of alert and preparedness be exercised starting from the stock-keeping of essential medicines and oxygen supplies, quarantine facilities for suspected people, testing facilities, home isolation and institutional isolation centres, telemedicine and mobile health units, increased hospital beds, HDU, ICU and ventilator capacity, and proper training of health professionals. The capacity of oxygen production should be such that every ward should have a well-functioning oxygen bank to support COVID-19 patients in isolation or in hospitals within their defined area. The preventive measures of wearing masks, physical distancing and hand washing are crucial but not enough. This virus can wriggle through such a defence system. Therefore, the capability of the health system for treatment needs to be increased to a maximum level.
2. Converting private hospitals and medical colleges into temporary COVID-19 dedicated hospitals is a much-preferred solution than subjecting all hospitals to mandatory COVID-19 care. In both the first wave and the second wave the rapid increase in cases has been followed by a rapid decrease also, and therefore such arrangement is needed only for a temporary period. If people know which hospital to go to when they have COVID-19 infection the delay in health care can be shortened, increasing the chance of survival, hence a fast decline in the infection rate also. Such temporary hospitals should be additional support for the chain of

infectious diseases hospitals in every district of Nepal. In rural areas without private hospitals and medical colleges, upgraded isolation centres with oxygen facilities, HDUs and professional healthcare can be constructed with ambulance or transportation facilities for referral to higher centres.

3. Ensuring the service for non-COVID-19 patients, particularly mental health patients, is crucial at the time of the COVID-19 pandemic. The services for non-COVID-19 patients have suffered because of mixing up of COVID-19 patients with non-COVID-19 patients, as non-COVID-19 patients are reluctant to go to those hospitals for fear of contracting the disease. Lockdown is the single most cause for disruption of healthcare services, hence needs to be used judiciously and with massive transportation support for those who need hospital care. It should be remembered that in Nepal people die from heart and lung disease, stroke and diarrhoea far more in excess than COVID-19 infections.
4. Since this virus has the potential to penetrate even the remotest corner of Nepal, the COVID-19 management needs to be devolved to ward leadership with the support of local civil society organizations. The ward has to be equipped with all the essential infrastructure of a team of health professionals, oxygen bank, quarantine and isolation centres, ambulance and quota system of hospital beds for that particular ward. So that the infected persons may simply inform the ward and the ward takes care of that person from home to hospital.
5. Every ward should have a COVID-19 dashboard of its own with a connection to the central data information system. All municipalities should prepare a spot map of COVID-19 cases as has been done for Kathmandu and some major cities. The same recording system should be in place for the vaccination programme which needs to be launched through the ward to monitor the side effects of vaccination and provision of appropriate care without delay. Every ward should also strive for food production and food security as prolonged COVID-19 pandemics with recurrent waves may lead to an extreme shortage of food.
6. The public health research capacity of Nepal needs to be increased in order to make sense of data generated every day. Like hospitals, epidemiology and public health institutions need to be strengthened so that government gets feedback about the trends of disease progression in the country as well as in the region and the world. The capacity of the Nepal Health Research Council needs to be enhanced to deal with overall research challenges posed by COVID-19 and other infectious diseases including vaccine research. Nepal should engage without hesitation in clinical trials of vaccines and medicines. The mutation capability of this virus needs to be taken seriously in the context of the Delta variant of India having further mutations in Vietnam. It is possible that in Nepal also the COVID-19 virus is mutating. Nepal's scientists should be vigilant for this possibility and Labs' capacity needs to be developed for gene sequencing of virus.

7. Nepal's diplomatic missions have been active in diversifying vaccine procurement whether by grant or purchase. This effort needs to be doubled in the coming days. The Rt Hon. President of Nepal herself is active in vaccine diplomacy which has brought both criticism and praise. Nepal should raise its voice against vaccine nationalism, especially among the western countries which have stockpiled vaccines many times more than the need of their population, so that vaccine equity could be addressed regionally and globally.
8. Apart from concentrating only on vaccine procurement, Nepal needs to have a long-term vision of self-sufficiency in COVID-19 vaccines, by supporting pharmacological institutions that can manufacture vaccines with the technical support of collaborating countries/manufacturers. Nepal already produces vaccines for live stocks. Now is the time to take step towards human vaccines. Such institutions also produce vaccines for other infectious diseases as and when necessary. The possibility of such collaboration exists for all three Russian, Chinese and Oxford AstraZeneca vaccines whether with the UK or India, but primarily with Russia. Nepal should also be vocal in supporting the temporary waiver of patency rights which is crucial for cheap mass production of vaccines for low-income countries.

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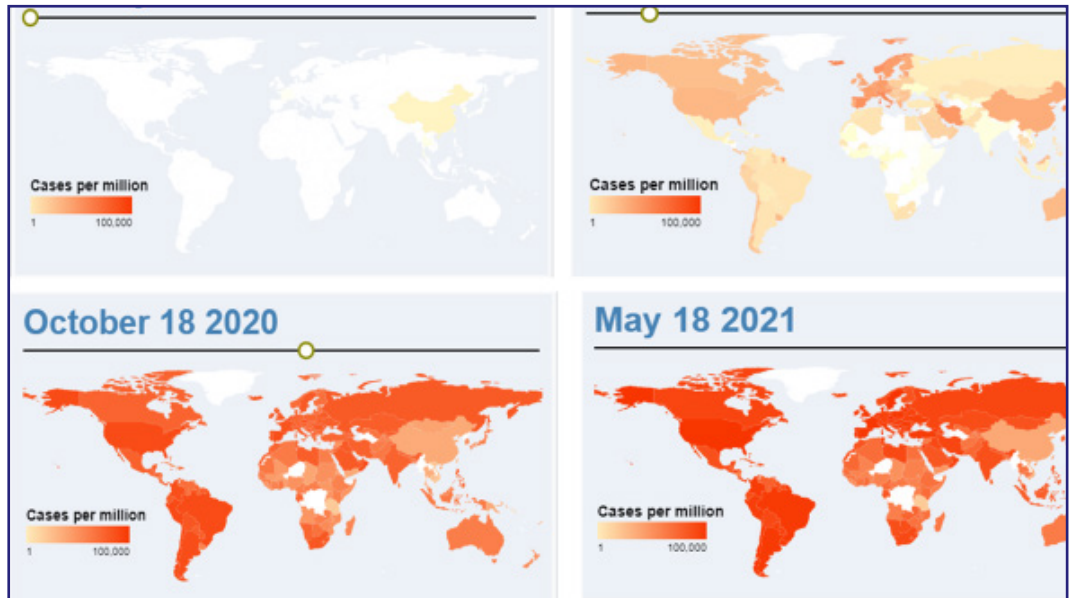
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APPENDICES

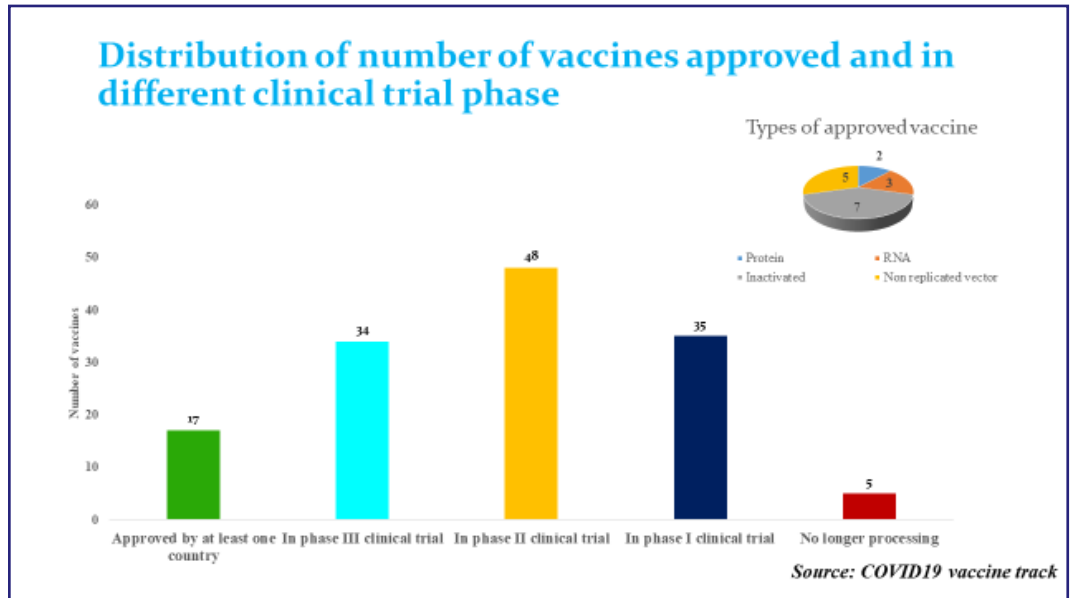
Appendix 1: Map of the Global COVID-19 Pandemic at Different Time Periods and Also of the Variant of Concern and Variant of Interest



Variant of concern						Variant of interest					
WHO label	Pango lineage	GISAID clade/lineage	Nextstrain clade	Earliest documented samples	Date of designation	WHO label	Pango lineage	GISAID clade/lineage	Nextstrain clade	Earliest documented samples	Date of designation
Alpha	B.1.1.7	GRY (formerly GR/501Y.V1)	201S/501Y.V1	United Kingdom, Sep-2020	18-Dec-2020	Epsilon	B.1.427/B.1.429	GH/452R.V1	20C/S.452R	United States of America, Mar-2020	5-Mar-2021
Beta	B.1.351	GH/501Y.V2	20HS/501Y.V2	South Africa, May-2020	18-Dec-2020	Zeta	P.2	GR	20B/S.484K	Brazil, Apr-2020	17-Mar-2021
Gamma	P.1	GR/501Y.V3	201S/501Y.V3	Brazil, Nov-2020	11-Jan-2021	Eta	B.1.525	GH/484K.V3	20A/S.484K	Multiple countries, Dec-2020	17-Mar-2021
Delta	B.1.617.2	GH/452R.V3	21A/S.478K	India, Oct-2020	VOC: 11-May-2021	Theta	P.3	GR	20B/S.265C	Philippines, Jan-2021	24-Mar-2021
						Iota	B.1.526	GH	20C/S.484K	United States of America, Nov-2020	24-Mar-2021
						Kappa	B.1.617.1	GH/452R.V3	21A/S.154K	India, Oct-2020	4-Apr-2021

Source: WHO

Appendix 2: Distribution of the Number of Emergency Vaccines Approved, Different Clinical Trial Phases and Vaccine Efficacy

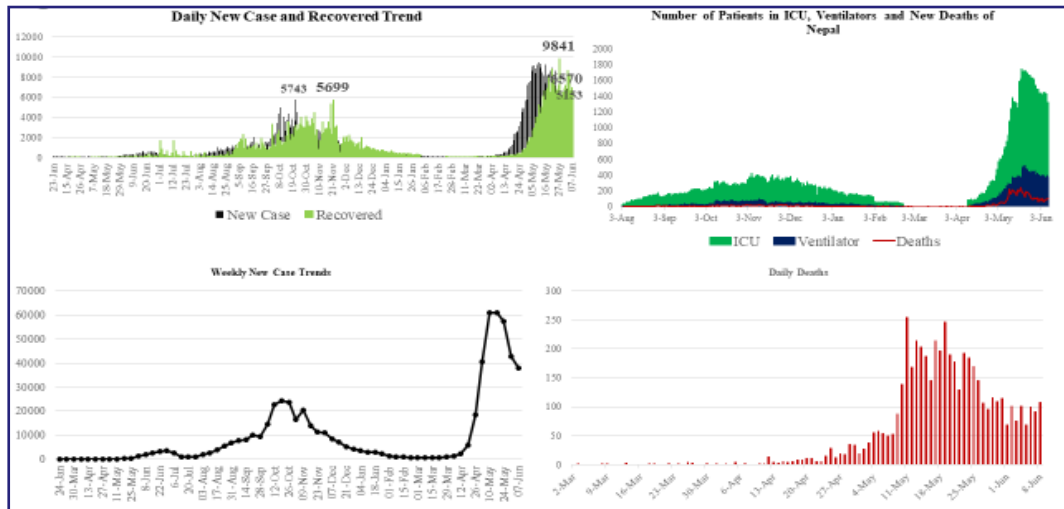


Efficacy of Vaccine against COVID-19

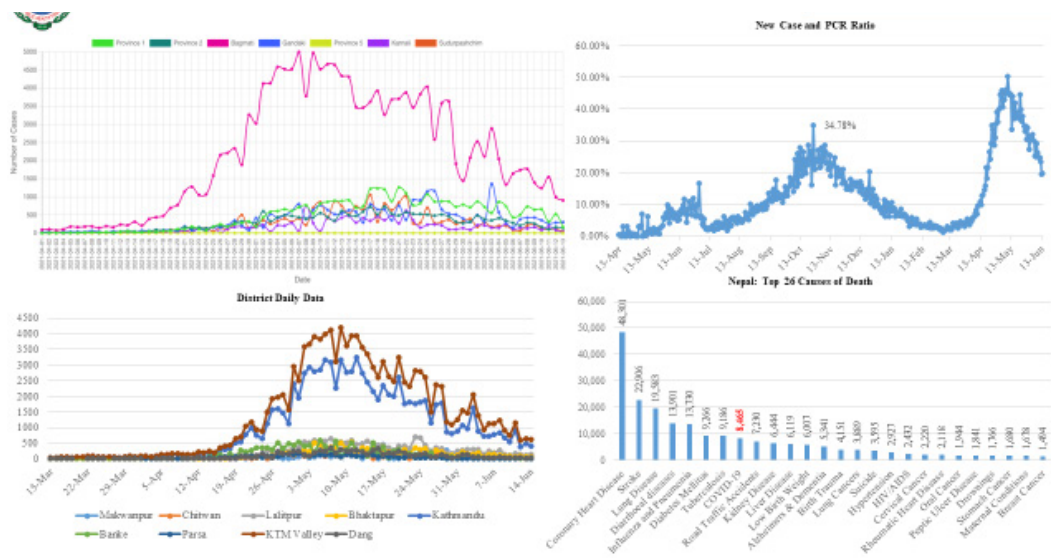
Vaccine	Preventing disease: D614G & B.1.1.7	Preventing infection: D614G & B.1.1.7	Preventing disease: B.1.351, P.1, B.1.617	Preventing infection: B.1.351, P.1, B.1.617	Approval Date
Pfizer/BioNTech	91%	86%	86%	82%	mRNA-1273 (Moderna) Nov 30, 2020
Moderna	94%	89%	89%	85%	Gam-COVID-Vac Sputnik V (Gamaleya Scientific Research Institute) Feb 02, 2021
AstraZeneca	74%	52%	35%	31%	NVX-CoV2373 (Novavax) Jan 28, 2021
Johnson & Johnson (Janssen)	72%	72%	64%	57%	ChAdOx1 nCoV-2019* (University of Oxford/AstraZeneca) Nov 23, 2020
Sputnik-V	92%	81%	59%	52%	JNJ-78436735 (Johnson & Johnson & Janssen Pharmaceuticals) Jan 29, 2021
Novavax	89%	79%	49%	43%	Coronavac (Sinovac) Jan 12, 2021
CoronaVac	50%	44%	32%	28%	
Sinopharm	73%	65%	47%	41%	
Tianjin CanSino	66%	58%	42%	37%	
Covaxin	78%	69%	50%	44%	

Source: IHME Health data

Appendix 3: Nepal COVID-19 Graphs Showing the Comparison of the First and Second Wave of the Pandemic till 14th June 2021



The graphs show new cases are declining since the past 3 weeks and the number of people recovered has superseded the number of new infections. The Test/case ratio is decreasing consistently and the daily number of deaths are also decreasing. The decrease in the total new cases daily is mainly affected by the decrease in Kathmandu valley and Bagmati province.



Appendix 4: Vaccination against COVID-19 has now Started in 212 Locations

Location	Source	Last observation date	Vaccines
Afghanistan	World Health Organization	Jun. 27, 2021	BBIBP-CorV, Oxford/AstraZeneca, Pfizer/BioNTech
Albania	Ministry of Health	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac, Sputnik V
Algeria	Ministry of Health	Jun. 6, 2021	Oxford/AstraZeneca, Sputnik V
Andorra	Government of Andorra	Jun. 21, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Angola	World Health Organization	Jun. 28, 2021	Oxford/AstraZeneca
Anguilla	World Health Organization	Jun. 25, 2021	Oxford/AstraZeneca
Antigua and Barbuda	Ministry of Health	Jun. 26, 2021	Oxford/AstraZeneca
Argentina	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Sinopharm/Beijing, Sputnik V
Armenia	World Health Organization	Jun. 20, 2021	Oxford/AstraZeneca, Sinovac, Sputnik V
Aruba	Government of Aruba	Jun. 29, 2021	Pfizer/BioNTech
Australia	Government of Australia via covidlive.com.au	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Austria	Ministry of Health	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Azerbaijan	Government of Azerbaijan	Jun. 29, 2021	Oxford/AstraZeneca, Sinovac, Sputnik V

Bahamas	Pan American Health Organization	Jun. 19, 2021	Oxford/AstraZeneca
Bahrain	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V
Bangladesh	Directorate General of Health Services	Jun. 29, 2021	BBIBP-CorV, Oxford/AstraZeneca, Pfizer/BioNTech
Barbados	Ministry of Health	Jun. 28, 2021	Oxford/AstraZeneca
Belarus	World Health Organization	Jun. 13, 2021	BBIBP-CorV, Sputnik V
Belgium	Sciensano	Jun. 28, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Belize	Ministry of Health	Jun. 23, 2021	Oxford/AstraZeneca, Sinopharm/Beijing
Benin	Ministry of Health	Jun. 28, 2021	Oxford/AstraZeneca, Sinovac
Bermuda	Pan American Health Organization	Jun. 29, 2021	Pfizer/BioNTech
Bhutan	World Health Organization	Jun. 20, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Bolivia	Ministry of Health	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V
Bonaire Sint Eustatius and Saba	World Health Organization	Apr. 9, 2021	Moderna, Pfizer/BioNTech
Bosnia and Herzegovina	Public Health Institute	Jun. 25, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac, Sputnik V

Botswana	Ministry of Health and Wellness	Jun. 21, 2021	Oxford/AstraZeneca
Brazil	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
British Virgin Islands	World Health Organization	Jun. 25, 2021	Oxford/AstraZeneca
Brunei	Ministry of Health	Jun. 26, 2021	Oxford/AstraZeneca, Sinopharm/Beijing
Bulgaria	Ministry of Health	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Burkina Faso	World Health Organization	Jun. 28, 2021	Oxford/AstraZeneca
Cambodia	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Sinopharm/Beijing, Sinovac
Cameroon	World Health Organization	Jun. 28, 2021	BBIBP-CorV, Oxford/AstraZeneca
Canada	Official data from provinces via covid19tracker.ca	Jun. 29, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Cape Verde	World Health Organization	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Cayman Islands	Cayman Islands Government	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Central African Republic	Africa Centres for Disease Control and Prevention	Jun. 23, 2021	Covaxin, Oxford/AstraZeneca
Chad	Africa Centres for Disease Control and Prevention	Jun. 23, 2021	BBIBP-CorV

Chile	Ministerio de Ciencia, Tecnología, Conocimiento e Innovación	Jun. 27, 2021	CanSino, Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
China	National Health Commission	Jun. 29, 2021	CanSino, Sinopharm/Beijing, Sinopharm/Wuhan, Sinovac
Colombia	Ministry of Health	Jun. 28, 2021	Johnson&Johnson, Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
Comoros	World Health Organization	Jun. 8, 2021	Covaxin, Oxford/AstraZeneca, Sinopharm/Beijing
Congo	Africa Centres for Disease Control and Prevention	Jun. 23, 2021	BBIBP-CorV, Moderna, Oxford/AstraZeneca, Sputnik V
Cook Islands	SPC Public Health Division	Jun. 29, 2021	Oxford/AstraZeneca
Costa Rica	Costa Rican Social Security Fund	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Cote d'Ivoire	Ministry of Health and Public Hygiene	Jun. 29, 2021	Oxford/AstraZeneca
Croatia	Ministry of Health	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Cuba	Ministry of Health	Jun. 27, 2021	Abdala, Soberana02
Curacao	Government of Curacao	Jun. 29, 2021	Moderna, Pfizer/BioNTech
Cyprus	Ministry of Health	Jun. 24, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech

Czechia	Ministry of Health	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Democratic Republic of Congo	World Health Organization	Jun. 28, 2021	Oxford/AstraZeneca
Denmark	Statens Serum Institute	Jun. 28, 2021	Johnson&Johnson, Moderna, Pfizer/BioNTech
Djibouti	World Health Organization	Jun. 23, 2021	BBIBP-CorV, Oxford/AstraZeneca, Sinovac, Sputnik V
Dominica	Pan American Health Organization	Jun. 25, 2021	BBIBP-CorV, Oxford/AstraZeneca
Dominican Republic	Ministry of Public Health	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sinovac
Ecuador	Government of Ecuador via Ecuacovid	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
Egypt	World Health Organization	Jun. 27, 2021	BBIBP-CorV, Oxford/AstraZeneca, Sinovac, Sputnik V
El Salvador	Ministry of Health	Jun. 25, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
England	Government of the United Kingdom	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Equatorial Guinea	Ministry of Health	Jun. 28, 2021	Sinopharm/Beijing
Estonia	National Health Board	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech

Eswatini	Government of Eswatini	Jun. 26, 2021	Oxford/AstraZeneca
Ethiopia	Ministry of Health	Jun. 27, 2021	Oxford/AstraZeneca
Faeroe Islands	Government of the Faeroe Islands	Jun. 28, 2021	Moderna, Pfizer/BioNTech
Falkland Islands	Government of the Falkland Islands	Apr. 14, 2021	Oxford/AstraZeneca
Fiji	SPC Public Health Division	Jun. 29, 2021	Oxford/AstraZeneca
Finland	Finnish Institute for Health and Welfare	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
France	Public Health France	Jun. 28, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
French Polynesia	SPC Public Health Division	Jun. 29, 2021	Oxford/AstraZeneca
Gabon	Africa Centres for Disease Control and Prevention	Jun. 23, 2021	BBIBP-CorV
Gambia	Africa Centres for Disease Control and Prevention	Jun. 23, 2021	BBIBP-CorV, Oxford/AstraZeneca
Georgia	Government of Georgia	Jun. 29, 2021	Oxford/AstraZeneca
Germany	Robert Koch Institut	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Ghana	World Health Organization	Jun. 20, 2021	Oxford/AstraZeneca, Sputnik V

Gibraltar	Government of Gibraltar	Jun. 29, 2021	Pfizer/BioNTech
Greece	Ministry of Health	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Greenland	Government of Greenland	Jun. 29, 2021	Moderna
Grenada	World Health Organization	Jun. 25, 2021	Oxford/AstraZeneca
Guatemala	Ministry of Health	Jun. 28, 2021	Moderna, Oxford/AstraZeneca
Guernsey	Government of Guernsey	Jun. 29, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Guinea	National Health Security Agency	Jun. 27, 2021	Sputnik V
Guinea-Bissau	World Health Organization	Jun. 28, 2021	BBIBP-CorV, Oxford/AstraZeneca
Guyana	Ministry of Health	Jun. 25, 2021	Oxford/AstraZeneca, Sputnik V
Honduras	World Health Organization	Jun. 24, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Sputnik V
Hong Kong	Government of Hong Kong	Jun. 29, 2021	Pfizer/BioNTech, Sinovac
Hungary	Government of Hungary	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V
Iceland	Directorate of Health	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
India	Government of India	Jun. 29, 2021	Covaxin, Oxford/AstraZeneca, Sputnik V

Indonesia	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Sinovac
Iran	World Health Organization	Jun. 21, 2021	BBIBP-CorV, Covaxin, Oxford/AstraZeneca, Sputnik V
Iraq	World Health Organization	Jun. 20, 2021	BBIBP-CorV, Oxford/AstraZeneca, Pfizer/BioNTech, Sputnik V
Ireland	Heath Service Executive	Jun. 20, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Isle of Man	Isle of Man Government	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Israel	Government of Israel	Jun. 29, 2021	Moderna, Pfizer/BioNTech
Italy	Extraordinary commissioner for the COVID-19 emergency	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Jamaica	Pan American Health Organization	Jun. 25, 2021	Oxford/AstraZeneca
Japan	Prime Minister's Office	Jun. 29, 2021	Moderna, Pfizer/BioNTech
Jersey	Government of Jersey	Jun. 23, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Jordan	Government of Jordan	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V
Kazakhstan	Government of Kazakhstan	Jun. 29, 2021	QazVac, Sinopharm/HayatVax, Sputnik V
Kenya	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Sputnik V

Kosovo	Ministry of Health	Jun. 20, 2021	Oxford/AstraZeneca
Kuwait	Ministry of Health	Jun. 20, 2021	Pfizer/BioNTech
Kyrgyzstan	Ministry of Health	Jun. 23, 2021	Sinopharm/Beijing, Sputnik V
Laos	Government of Laos	Jun. 28, 2021	Sinopharm/Beijing, Sputnik V
Latvia	National Health Service	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Lebanon	Government of Lebanon	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V
Lesotho	World Health Organization	May. 21, 2021	Oxford/AstraZeneca
Liberia	World Health Organization	Jun. 28, 2021	Oxford/AstraZeneca
Libya	World Health Organization	Jun. 23, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac, Sputnik V
Liechtenstein	Federal Office of Public Health	Jun. 27, 2021	Moderna, Pfizer/BioNTech
Lithuania	Ministry of Health	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Luxembourg	Government of Luxembourg	Jun. 29, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Macao	Government of Macao	Jun. 29, 2021	Pfizer/BioNTech, Sinopharm/Beijing

Madagascar	World Health Organization	Jun. 28, 2021	Oxford/AstraZeneca
Malawi	Ministry of Health	Jun. 28, 2021	Oxford/AstraZeneca
Malaysia	Government of Malaysia	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
Maldives	Presidency of the Maldives	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing
Mali	World Health Organization	Jun. 24, 2021	Oxford/AstraZeneca
Malta	COVID-19 Malta Public Health Response Team	Jun. 28, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Mauritania	Africa Centres for Disease Control and Prevention	Jun. 23, 2021	BBIBP-CorV, Oxford/AstraZeneca
Mauritius	World Health Organization	Jun. 24, 2021	BBIBP-CorV, Covaxin, Oxford/AstraZeneca
Mexico	Secretary of Health	Jun. 28, 2021	CanSino, Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac, Sputnik V
Moldova	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V
Monaco	National Council	Jun. 24, 2021	Pfizer/BioNTech
Mongolia	Ministry of Health via ikon.mn	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V

Montenegro	Government of Montenegro	Jun. 29, 2021	Oxford/ AstraZeneca, Pfizer/ BioNTech, Sinopharm/ Beijing, Sputnik V
Montserrat	World Health Organization	Jun. 25, 2021	Oxford/ AstraZeneca
Morocco	Ministry of Health	Jun. 28, 2021	Oxford/ AstraZeneca, Sinopharm/ Beijing
Mozambique	World Health Organization	Jun. 24, 2021	BBIBP-CorV, Oxford/ AstraZeneca
Myanmar	World Health Organization	May. 13, 2021	Oxford/ AstraZeneca
Namibia	Ministry of Health and Social Services	Jun. 26, 2021	Oxford/ AstraZeneca, Sinopharm/ Beijing
Nauru	SPC Public Health Division	Jun. 29, 2021	Oxford/ AstraZeneca
Nepal	Government of Nepal	Jun. 29, 2021	Oxford/ AstraZeneca, Sinopharm/ Beijing
Netherlands	RIVM via European CDC	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/ AstraZeneca, Pfizer/ BioNTech
New Caledonia	SPC Public Health Division	Jun. 29, 2021	Pfizer/ BioNTech
New Zealand	Ministry of Health	Jun. 29, 2021	Pfizer/ BioNTech
Nicaragua	World Health Organization	May. 21, 2021	Oxford/ AstraZeneca, Sputnik V
Niger	World Health Organization	Jun. 24, 2021	BBIBP-CorV, Oxford/ AstraZeneca
Nigeria	World Health Organization	Jun. 28, 2021	Oxford/ AstraZeneca
North Macedonia	Government of North Macedonia	Jun. 29, 2021	Oxford/ AstraZeneca, Pfizer/ BioNTech, Sinopharm/ Beijing, Sinovac, Sputnik V

Northern Cyprus	Ministry of Health	May. 27, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
Northern Ireland	Government of the United Kingdom	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Norway	Norwegian Institute of Public Health	Jun. 28, 2021	Moderna, Pfizer/BioNTech
Oman	World Health Organization	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Pakistan	National Command and Operation Centre	Jun. 23, 2021	CanSino, Oxford/AstraZeneca, Sinopharm/Beijing, Sinovac, Sputnik V
Palestine	Ministry of Health	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Panama	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Papua New Guinea	World Health Organization	Jun. 21, 2021	Oxford/AstraZeneca, Sinopharm/Beijing
Paraguay	Government of Paraguay	Jun. 24, 2021	Covaxin, Oxford/AstraZeneca, Sinopharm/Beijing, Sinovac, Sputnik V
Peru	Ministry of Health	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing
Philippines	Government of the Philippines	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac, Sputnik V
Pitcairn	SPC Public Health Division	Jun. 21, 2021	Oxford/AstraZeneca
Poland	Ministry of Health	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech

Portugal	Directorate General for Health via Data Science for Social Good	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/ AstraZeneca, Pfizer/ BioNTech
Qatar	Ministry of Public Health	Jun. 29, 2021	Moderna, Pfizer/ BioNTech
Romania	Government of Romania via datelazi.ro	Jun. 28, 2021	Johnson&Johnson, Moderna, Oxford/ AstraZeneca, Pfizer/ BioNTech
Russia	Official data from local governments via gogov.ru	Jun. 29, 2021	EpiVacCorona, Sputnik V
Rwanda	World Health Organization	Jun. 6, 2021	Moderna, Oxford/ AstraZeneca, Pfizer/ BioNTech
Saint Helena	Government of Saint Helena	May. 5, 2021	Oxford/ AstraZeneca
Saint Kitts and Nevis	Government of Saint Kitts and Nevis	Jun. 22, 2021	Oxford/ AstraZeneca
Saint Lucia	Ministry of Health	Jun. 29, 2021	Oxford/ AstraZeneca
Saint Vincent and the Grenadines	Ministry of Health	Jun. 26, 2021	Oxford/ AstraZeneca
Samoa	SPC Public Health Division	Jun. 29, 2021	Oxford/ AstraZeneca
San Marino	Social Security Institute	Jun. 25, 2021	Pfizer/ BioNTech, Sputnik V
Sao Tome and Principe	World Health Organization	Jun. 28, 2021	Oxford/ AstraZeneca
Saudi Arabia	Saudi Health Council	Jun. 29, 2021	Oxford/ AstraZeneca, Pfizer/ BioNTech

Scotland	Government of the United Kingdom	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Senegal	World Health Organization	Jun. 28, 2021	BBIBP-CorV, Oxford/AstraZeneca
Serbia	Government of Serbia	Jun. 20, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sputnik V
Seychelles	Extended Programme for Immunisation	Jun. 24, 2021	Oxford/AstraZeneca, Sinopharm/Beijing
Sierra Leone	World Health Organization	Jun. 20, 2021	BBIBP-CorV, Oxford/AstraZeneca
Singapore	Ministry of Health	Jun. 28, 2021	Moderna, Pfizer/BioNTech, Sinovac
Sint Maarten (Dutch part)	World Health Organization	Jun. 25, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Slovakia	Ministry of Health	Jun. 29, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Slovenia	National Institute of Public Health via covid-19.sledilnik.org	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech
Solomon Islands	SPC Public Health Division	Jun. 29, 2021	Oxford/AstraZeneca
Somalia	World Health Organization	Jun. 28, 2021	BBIBP-CorV, Oxford/AstraZeneca, Sinovac
South Africa	Ministry of Health	Jun. 29, 2021	Johnson&Johnson, Pfizer/BioNTech
South Korea	Korea Centres for Disease Control and Prevention	Jun. 29, 2021	Johnson&Johnson, Moderna, Oxford/AstraZeneca, Pfizer/BioNTech

South Sudan	World Health Organization	Jun. 28, 2021	Oxford/ AstraZeneca
Spain	Ministry of Health	Jun. 28, 2021	Johnson&Johnson, Moderna, Oxford/ AstraZeneca, Pfizer/ BioNTech
Sri Lanka	Ministry of Health's Epidemiology Unit	Jun. 29, 2021	Oxford/ AstraZeneca, Sinopharm/Beijing, Sputnik V
Sudan	World Health Organization	Jun. 28, 2021	BBIBP-CorV, Oxford/ AstraZeneca, Pfizer/ BioNTech, Sinovac
Suriname	Government of Suriname	Jun. 28, 2021	Oxford/ AstraZeneca
Sweden	Public Health Agency of Sweden	Jun. 29, 2021	Oxford/ AstraZeneca, Pfizer/ BioNTech
Switzerland	Federal Office of Public Health	Jun. 27, 2021	Moderna, Pfizer/ BioNTech
Syria	World Health Organization	Jun. 21, 2021	BBIBP-CorV, Oxford/ AstraZeneca, Sputnik V
Taiwan	Taiwan Centres for Disease Control	Jun. 29, 2021	Moderna, Oxford/ AstraZeneca
Tajikistan	World Health Organization	Jun. 20, 2021	Oxford/ AstraZeneca
Thailand	Government of Thailand	Jun. 28, 2021	Oxford/ AstraZeneca, Sinovac
Timor	World Health Organization	Jun. 22, 2021	Oxford/ AstraZeneca, Sinovac
Togo	World Health Organization	Jun. 10, 2021	Oxford/ AstraZeneca
Tonga	SPC Public Health Division	Jun. 21, 2021	Oxford/ AstraZeneca
Trinidad and Tobago	Ministry of Health	Jun. 29, 2021	Oxford/ AstraZeneca

Tunisia	Ministry of Health	Jun. 28, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac, Sputnik V
Turkey	COVID-19 Vaccine Information Platform	Jun. 29, 2021	Pfizer/BioNTech, Sinovac
Turkmenistan	World Health Organization	Apr. 4, 2021	EpiVacCorona, Oxford/AstraZeneca, Sinopharm/Beijing, Sputnik V
Turks and Caicos Islands	World Health Organization	Jun. 18, 2021	Pfizer/BioNTech
Tuvalu	SPC Public Health Division	Jun. 15, 2021	Oxford/AstraZeneca
Uganda	Ministry of Health	Jun. 27, 2021	Oxford/AstraZeneca
Ukraine	Ministry of Health	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
United Arab Emirates	National Emergency Crisis and Disaster Management Authority	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinopharm/Beijing, Sinopharm/Wuhan, Sputnik V
United Kingdom	Government of the United Kingdom	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
United States	Centres for Disease Control and Prevention	Jun. 29, 2021	Johnson&Johnson, Moderna, Pfizer/BioNTech
Uruguay	Ministry of Health via vacuna.uy	Jun. 29, 2021	Oxford/AstraZeneca, Pfizer/BioNTech, Sinovac
Uzbekistan	Government of Uzbekistan	Jun. 15, 2021	Oxford/AstraZeneca, RBD-Dimer, Sputnik V
Vanuatu	SPC Public Health Division	Jun. 21, 2021	Oxford/AstraZeneca

Venezuela	Pan American Health Organization	Jun. 25, 2021	BBIBP-CorV, Sputnik V
Vietnam	Government of Vietnam	Jun. 29, 2021	Oxford/AstraZeneca
Wales	Government of the United Kingdom	Jun. 28, 2021	Moderna, Oxford/AstraZeneca, Pfizer/BioNTech
Wallis and Futuna	SPC Public Health Division	Jun. 29, 2021	Oxford/AstraZeneca
Yemen	World Health Organization	Jun. 27, 2021	Oxford/AstraZeneca
Zambia	Government of Zambia	Jun. 27, 2021	Oxford/AstraZeneca, Sinopharm/Beijing
Zimbabwe	Ministry of Health	Jun. 28, 2021	Sinopharm/Beijing

(Source: <https://ourworldindata.org/covid-vaccinations>)

Dr. Mahesh Kumar Maskey

Dr. Mahesh Kumar Maskey is the Founding Chair and Executive Chief of the Nepal Public Health Foundation (NPHF), Kathmandu, Nepal. He has served as Ambassador of Nepal to the People's Republic of China (2012-2016); as Executive Chair, Nepal Health Research Council, Government of Nepal (2006-2009); as Chief Advisor to the Hon'ble Deputy Prime Minister and Minister for Health and Population, Mr. Amik Serchan (2006-2007); and as Executive Vice-Chair, New Health Policy Drafting Committee, Ministry of Health and Population, Nepal (2017). He has also served as Regional Vice President and Member of Executive Board of the International Physician for Prevention of Nuclear War (IPPNW), an organization of Nobel Laureate doctors and medical sector employees (2004-2005); as a Member of the Advisory Committee for Health Research (ACHR), WHO, SEARO (2007-9); and as Chair, South Asian Forum for Health Research, Nepal (2007-2009).



He has developed Motherhood Method for measuring maternal, perinatal, neonatal and infant mortality in developing countries. He is awarded twice the Distinguished Alumni Award by Boston University, MA, USA in 2017 and its School of Public Health in 2014.

He is Principal Investigator of National study in Burden of Disease in Nepal, Nepal Health Research Council, Kathmandu Nepal; Principal Investigator of Overcoming Barriers for Skill Birth Attendants, NPHF (2011-2012) funded by WHO, Geneva; Co-PI, Exemplar in Stunting Reduction, Nepal, NPHF, Sick Kids, Canada, funded by BGC3 (2017-2018); and, Co-PI, Exemplar in Under-five Mortality Reduction, NPHF, University of Global Health Equity, Rwanda, funded by BGC3 (2018). He is a published author in reputed international and national journals. He has travelled widely around the world to attend seminars and present papers.

Mr. Ashok Pandey

Mr. Ashok Pandey is an Associate Research Fellow in the Policy Research Institute. He successfully served as a researcher at Nepal Health Research Council for more than six years. In the year 2020, he was awarded Mirgendra Samjhana Medical Trust Young Researcher Award on the 6th National Summit of Nepal by NHRC. He is also the recipient of the FK Norway Research Fellowship in Child Sight Foundation Global, Dhaka, Bangladesh; Knowledge Action Change Research Fellowship, UK; and TERI Climate Change Fellowship, India. He has published more than three dozen research articles in peer-reviewed journals and authored more than a dozen of national-level research reports. He was a working group member of the global health forum Civil 20 (C20) held in Berlin, Germany in 2017. He has also served as the visiting faculty of public health in different universities of Nepal and Bangladesh.





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