

Forum: World Health Organization

Question of: Effective Distribution of COVID-19 Vaccines

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Introduction:

With its unprecedented arrival in early 2020, the COVID-19 pandemic has brought intractable changes to society and still to this day is sharply spreading across the globe. As a means to effectively tackle the damages of the global pandemic, it is of utmost importance for member nations to cooperate with one another to ensure the safe and prompt distribution of such remedies.

Resource Shortages

Personal Protective Equipment (PPE), also recognized as masks and gloves, has now become one of the year's most popular accessories.¹ Although positive demand shocks on masks have been reduced throughout the year, mask corporations still face shortages in their resources, and given the environmental consequences, it is also quite challenging for these industries to drastically increase their production to compliment the demand.

Environmental Damage

In fact, these PPEs, consisting of plastic polypropylene, are often thrown into environmentally invaluable areas endangering both the aquatic and terrestrial environment. Landfills and seas are now highly concentrated with microplastics to the point where marine mammals or birds cannot distinguish between real food and the substances or are instead entangled by them². Furthermore, as waste, immense amounts of plastic are incinerated, releasing inexplicable amounts of toxic chemicals into our atmosphere, thus inducing climate change and global warming.

Health Issues

¹ [Scott, Fiona Sinclair. "2020's Biggest Fashion Trends Reflect a World in Crisis." *CNN*, Cable News Network, 30 Dec. 2020.](#)

² ["Five Things You Should Know about Disposable Masks and Plastic Pollution || UN News." *United Nations*, United Nations.](#)

Yet, even with strengthened social distancing regulations, more than 95 million cases and 2 million casualties have been recorded worldwide as of January 18, 2021³. Dissipating itself through one's nose, eyes, and mouth, the coronavirus leaves chronic symptoms ranging from mild coughing to extreme muscle pain or depression even after full recovery⁴. However, with the complete shut down of public facilities, according to the International Monetary Fund (IMF), many member nations currently face unemployment rates with the United States of America of approximately 8.9% which has caused them to loosen their lockdowns, thus rendering themselves much more vulnerable to the detrimental side effects of the virus⁵.

Status of Vaccines

Despite the challenge in the rapid distribution of the COVID-19 vaccines, the rapid pace at which these medications are being clinically tested and approved truly merits attention and encouragement from the global community. Out of the 68 vaccine candidates which are being tested in the status quo, the leading models include Pfizer-BioNTech, Moderna, Gamaleya, AstraZeneca from Oxford, and CanSino⁶. Although a variety of remedies and solutions to this ongoing pandemic may be quite delightful, the drastically different conditions and requirements for each vaccine due to their composition may delay the process of the distribution of such vital resources.

Take the two vaccines—Pfizer-BioNTech and Moderna—for instance. Targeting the studded proteins of the SARS-CoV-2 virus, Pfizer-BioNTech with an efficacy rate of 95% consists of mRNA coated with lipid nanoparticles to secure the injection into the body without any fragmentation⁷. Due to such fragility, however, the vaccine requires quite demanding storage conditions: temperature levels at $-70^{\circ}\text{C} \pm 10^{\circ}\text{C}$. To such alarming news, the public has expressed their concern of whether it would be truly cost-effective to implement such product, and Pfizer has thus claimed to engender “temperature-controlled thermal shippers” which would allow vaccines to be stored for more than at least a week. On the other hand, Moderna with an efficacy rate of 94.1% is composed of the aforementioned substances for Pfizer-BioNTech, yet it can be stored at -20°C for a maximum of 6 months⁸.

³ [“WHO Coronavirus Disease \(COVID-19\) Dashboard.” World Health Organization, World Health Organization.](#)

⁴ [“Long-Term Effects of COVID-19.” Centers for Disease Control and Prevention, Centers for Disease Control and Prevention.](#)

⁵ [Lora Jones, Daniele Palumbo & David Brown. “Coronavirus: How the Pandemic Has Changed the World Economy.” BBC News, BBC, 24 Jan. 2021.](#)

⁶ [Zimmer, Carl, et al. “Coronavirus Vaccine Tracker.” The New York Times, The New York Times, 10 June 2020.](#)

⁷ [Corum, Jonathan, and Carl Zimmer. “How the Pfizer-BioNTech Vaccine Works.” The New York Times, The New York Times, 5 Dec. 2020.](#)

⁸ [Corum, Jonathan, and Carl Zimmer. “How Moderna's Vaccine Works.” The New York Times, The New York Times, 5 Dec. 2020.](#)

Definitions:

Coronavirus (COVID-19)

Coronaviruses are a group of related RNA viruses that cause diseases in mammals and birds. For humans and birds, they cause infections that are related to respiratory issues that range from mild ones to lethal ones. Mild illnesses in humans include some cases of the flu or the cold, whereas more lethal ones can cause death. The original start of COVID-19 was from Wuhan China at the end of 2019⁹.

RNA viruses

An RNA virus is a virus that has RNA (ribonucleic acid) as its genetic material. The most commonly known diseases caused by the RNA virus is the common cold, SARS, MERS, influenza, hepatitis C and E, Ebola virus disease, polio, measles and COVID-19¹⁰.

COVAX

COVAX is one of three pillars of the Access to COVID-19 Tools (ACT) Accelerator, which was launched in April by the World Health Organization (WHO), the European Commission and France in response to this pandemic. The aim is to provide the innovative and equitable access to COVID-19 diagnostics, treatments and vaccines. With more than two thirds of the world engaged, it has the world's largest and most diverse portfolio of COVID-19 vaccines. Bringing together governments, global health organizations, manufacturers, scientists, private sector, civil society and philanthropy, it puts in the effort to ensure that people in all corners of the world get access to vaccines. COVAX supply forecast also reveals the specifics to when and where the vaccine would be delivered. Further specific information regarding COVAX such as its partnership with CEPI and GAVI will be provided below.

Pfizer–BioNTech COVID-19 vaccine (RNA vaccine)

The Pfizer–BioNTech COVID-19 vaccine, also known as Comirnaty, is a vaccine developed by BioNTech in cooperation with Pfizer¹¹. It is both the first COVID-19 vaccine to be authorized by a stringent regulatory authority for emergency use and the first cleared for regular use. The most important feature of Pfizer vaccine is that it is given by intramuscular injection. Every function in the body is carried out by proteins, so cells are constantly manufacturing them. To do this, they make a single-stranded copy of DNA, that copy is called messenger RNA, or mRNA. Each strand of mRNA has the information on how to make one type of protein. The cell reads the mRNA, follows the instructions, and makes a protein like the protein of SARS-CoV-2, which is encapsulated in lipid nanoparticles. The vaccination requires two doses given three weeks apart.

Moderna (RNA vaccine)

⁹ Shors, Teri. "Coronavirus." *Access Science*, McGraw-Hill Education, 1 Jan. 1970.

¹⁰ Ball, Philip. "The Lightning-Fast Quest for COVID Vaccines - and What It Means for Other Diseases." *Nature News*, Nature Publishing Group, 18 Dec. 2020.

¹¹ Commissioner, Office of the. "Pfizer-BioNTech COVID-19 Vaccine." *U.S. Food and Drug Administration*, FDA.

Moderna COVID-19 Vaccine, also known as mRNA-1273, is also a COVID-19 vaccine developed by the United States National Institute of Allergy and Infectious Diseases (NIAID) with the Biomedical Advanced Research and Development Authority (BARDA), and Moderna¹². It is administered by two 0.5 mL doses given by intramuscular injection given four weeks apart. This is also a RNA vaccine made up of nucleoside-modified mRNA (modRNA) with a protein that includes SARS-CoV-2, which is also encapsulated in lipid nanoparticles.

Oxford–AstraZeneca COVID-19 vaccine

The Oxford–AstraZeneca COVID-19 vaccine, also known as vaccine AZD1222, is a COVID-19 vaccine developed by Oxford University and AstraZeneca¹³. Likewise of Moderna vaccine, it is given by intramuscular injection, using as a vector the modified chimpanzee adenovirus ChAdOx1.

Intramuscular injection

Often abbreviated as IM, this is the injection of a substance into a muscle. Intramuscular injection could be preferred because muscles have larger and more numerous blood vessels than subcutaneous tissue, leading to faster absorption than subcutaneous or intradermal injections¹⁴.

Key Events:

December 31, 2019 - Outbreak Of COVID-19

Around December 2019, patients with severe flu symptoms such as fevers and coughing began to appear in Wuhan hospitals, and as scientists began to analyze the origin of the virus, they witnessed the striking resemblance of the current coronavirus to the SARS virus throughout 2002 and 2003. Immediately, China closed Wuhan's Huanan Seafood Wholesale Market which was the origin of such virus and promptly reported such information to the World Health Organization¹⁵. Yet, with such transparency, China ordered to destroy the sample of the patients which may have been vital for further research on the virus, thus drawing suspicion from the global community.

January 31, 2020 - Travel Restrictions

Despite the fact that numerous member nations have implemented travel or entry restrictions due to sudden increases in their infection rate, the United States of America was first to prohibit the entry of foreign nationals in Wuhan to mitigate the spread of the virus; such action

¹² [“Statement from NIH and BARDA on the FDA Emergency Use Authorization of the Moderna COVID-19 Vaccine.” *National Institutes of Health*, U.S. Department of Health and Human Services, 19 Dec. 2020.](#)

¹³ [Kemp, Adrian. “AstraZeneca's COVID-19 Vaccine Authorised for Emergency Supply in the UK.” *AstraZeneca*, 30 Dec. 2020.](#)

¹⁴ [“Intradermal Injection.” *Novosanis*.](#)

¹⁵ [“Wuhan Lockdown: A Year of China's Fight against the Covid Pandemic.” *BBC News*, BBC, 22 Jan. 2021.](#)

was later followed by an extension applying such restrictions to Iran and cautioning citizens about travelling to Italy and the Republic of Korea along with other member nations mandating similar approaches or national lockdown measures.

March 18, 2020 - Solidarity Trial

Created and maintained by the World Health Organization (WHO), the Solidarity Trial is an international clinical trial with the purpose of discovering a feasible medical remedy against the SARS-CoV-2 virus. In its program, it prioritizes the following conditions: mortality and the duration of the patient's stay at the hospital¹⁶. Furthermore, one of the key roles of this institution is to enroll diverse patients into hospitals of many member nations to truly evaluate the effect of approved COVID-19 vaccines.

June 16, 2020 - Dexamethasone found to mitigate COVID-19 Death Rates

Dexamethasone—a medication utilized to treat conditions including blood disorders, allergies, and skin diseases—was first tested in a patient infected with the coronavirus in a clinical trial in the United Kingdom, proving that the substance was beneficial to mitigate the mortality¹⁷. In fact, in the trial, the mortality rate was found to be cut by one fifth, ranking it a prospective candidate for the COVID-19 vaccine¹⁸.

Previous attempts at resolving the issue:

Partnership with CEPI and GAVI

COVAX is a network led by the ACT- accelerator partnership of the World Health Organization (WHO), the Coalition for Epidemic Preparedness Innovations (CEPI), and GAVI with a set of goals it attempts to achieve by the end of 2021: the fair and equitable distribution of the 2 billion doses of vaccines and the acceleration of the production of vaccines¹⁹. In order to reach the target, the ACT accelerator organizes itself into 4 different segments: diagnostics, health system, inoculation, and treatment²⁰. In fact, COVAX has already set agreements with multiple nations and areas to access to vaccines for vulnerable populations by the half of 2021, thus meaning that at least 1.3 doses of vaccines will be available to 92 economies²¹. In the list of

¹⁶ [“‘Solidarity’ Clinical Trial for COVID-19 Treatments.” World Health Organization, World Health Organization.](#)

¹⁷ [“Dexamethasone Oral : Uses, Side Effects, Interactions, Pictures, Warnings & Dosing.” WebMD, WebMD.](#)

¹⁸ [“Coronavirus Disease \(COVID-19\): Dexamethasone.” World Health Organization, World Health Organization.](#)

¹⁹ [“COVAX.” World Health Organization, World Health Organization.](#)

²⁰ [“The Access to COVID-19 Tools \(ACT\) Accelerator.” World Health Organization, World Health Organization.](#)

²¹ [“Covax Announces Additional Deals To Access Promising Covid-19 Vaccine Candidates; Plans Global Rollout Starting Q1 2021.” World Health Organization, World Health Organization.](#)

vaccines that COVAX will equally distribute to the global community includes candidates from AstraZeneca and Johnson & Johnson.

In COVAX, the World Health Organization(WHO) serves multiple key roles. First and foremost, based on prior studies on each vaccine, WHO releases immunization policies to each nation which incorporates guidelines of vaccine usage and delivery.

In order to ensure such clear and prompt response from COVAX, financial support is absolutely crucial. According to the World Health Organization, COVAX needs approximately US\$ 6.8 billion in 2021—US\$ 800 million for research and development, at least US\$ 4.6 billion for the COVAX AMC and US\$ 1.4 billion for delivery support—and contributing to this purpose were member nations such as Norway, Canada, and Kuwait.

Briefing Sessions and Courses

Furthermore, the World Health Organization's deep involvement in this global pandemic also truly warrants continuous support and encouragement. In the WHO Health Emergencies Programme, the Director-General and Executive Director has conducted approximately 120 briefing sessions and 38 member state briefings regarding safety guidelines on the status of vaccines in the status quo which is available for anyone in the official webpage. Another key initiative which the World Health Organization established was the OpenWHO platform, an online course with unlimited access during health emergencies. In such program, WHO outlines specific measures to eradicate the pandemic which each individual can easily implement in their lives and has recorded an approximate 4.7 million course enrollments which are available in 44 languages²².

Positions of Member Nations:

United States of America

With the Trump administration's sudden announcement to withdraw from the World Health Organization (WHO) in July 2020, the United States of America has been relatively active and yet radical in its response to isolate its citizens from the virus. Although specific guidelines differed by each state, the nation initially had placed a mandatory quarantine period for a minimum of 14 days after their entry or a complete travel restriction to regions including China, Iran, and Europe. However, in early January, former President Donald Trump claimed that he would lift travel bans on Europe and Brazil which has received great public disapproval. Moreover, numerous protests against forced personal protective equipment such as masks have taken place, declaring that the practice threatens their freedom. In terms of the vaccine, the state

²² [“Listings of WHO's Response to COVID-19.” World Health Organization, World Health Organization.](#)

has rapidly stepped up its game as the FDA has authorized Pfizer-BioNTech and Moderna's candidates for emergency use in the nation, and approximately 26 million doses have been administered as of January 30, 2021, meaning that around 7.9 doses are available per 100 people²³.

United Kingdom

Amid times where nations were rigorously combating the global pandemic, the United Kingdom, in particular, encountered even more alarming news: the novel COVID variant. The mutated variant, in fact, has been reported to be 50% more contagious which is believed to have arisen from the structure of the protein²⁴. Overall, the United Kingdom initially implemented an approach quite different from that of nations such as the Republic of Korea which prioritized social distancing. Rather, the UK did not require any restrictions in social distancing nor in personal protective equipment (PPE), relying on herd immunity. However, with the surging number of cases, the nation in general has mandated national lockdowns and approved vaccines such as AstraZeneca for use, thus reaching approximately a vaccination rate of 11.9 doses per 100 people which around 11.2% of the entire population.

Russian Federation

Although the number of cases seemed to stabilize, remaining between the 4000s and 5000s from June, the number drastically escalated near the end of September to rapidly reach its peak of nearly 29,935 cases in December 24, 2020, ranking the Russian Federation as the nation with fourth highest number of COVID-19 infections²⁵. As a nation directly affiliated with this pandemic, the Russian Federation was the first state to authorize its vaccine, drawing fear and doubt from the public. Yet, Russia has been rather prompt in its response to this pandemic, investing great amount of resources and effort to successfully render a promising remedy for the global community, commonly recognized as the Gamaleya Sputnik V 2.

China

As the origin for the infamous Coronavirus, China especially Wuhan has received immense hatred from the global community for their lack of health regulations, blaming the pandemic solely on the nation. Despite its extraordinarily high number of cases at the inception of the virus, the member nation has experienced an abrupt decrease of daily infections; within a month, the number of cases plunged from nearly 7000 to 20 cases in merely a month. However,

²³ [Holder, Josh. "Tracking Coronavirus Vaccinations Around the World." *The New York Times*, The New York Times, 29 Jan. 2021.](#)

²⁴ [Suresh Dhaniyal Bayard D. Clarkson Distinguished Professor of Mechanical and Aeronautical Engineering, and Byron Erath Associate Professor of Mechanical Engineering. "How to Stay Safe with a Fast-Spreading New Coronavirus Variant on the Loose." *The Conversation*, 26 Jan. 2021.](#)

²⁵ ["Coronavirus Cases." *Worldometer*.](#)

such statistics have been deemed rather unrealistic and brought suspicion to the table regarding the nation's intransparent actions and claims of success²⁶.

France

Similar to Russia, France had maintained a relatively stable number of cases, averaging below 1000 but saw a spike in such numbers, reaching its peak on November 7, 2020 with 86,652 cases. The nation has also taken part in the inoculation of the citizens, reporting a vaccination rate of 2% as of January 31, 2021. However, as the mass of the citizens attempts to gain access to the vaccine, France now comes across shortages in their resources to supply the materials.

Republic of Korea

With numerous fluctuations in its cases, the Republic of Korea has implemented strict social distancing levels based on the cases. However, even with fluctuations, the nation has kept its numbers consistently below 1000 in most cases in contrast to other more economically developed countries and has been continuously praised by other member nations for their transparent and prompt response to prevent the spread of the virus.

Japan

Recovering from the damage due to the spike of cases in August, Japan is now once again encountering a flood of infections with new year. As a response, the nation has implemented entry restrictions to nations including those of Asia, North America, and Latin America²⁷.

Suggested Solutions:

Transportation in the Optimal Storage Conditions

As the optimal storage conditions vastly differ from each candidate, it is of utmost importance for member nations to prepare the appropriate temperature-controlled facilities which would require a classification system of the amount and type of vaccine prior to being transported. As a means to achieve this, it would be ideal for member nations to publish an official list of the approved vaccines and their route and method of travel and to notify manufacturers with the specific guidelines in advance as these valuable substances require special dangerous goods procedures. Moreover, governments of each member nation must also inform vaccine shippers of the substances of the vaccines to prevent any potential confusion in the shipment or the rejection of shipment.

²⁶ [“Coronavirus: Why China's Claims of Success Raise Eyebrows.” BBC News, BBC, 7 Apr. 2020.](#)

²⁷ [“Border Enforcement Measures to Prevent the Spread of Novel Coronavirus \(COVID-19\).” Ministry of Foreign Affairs of Japan.](#)

Transparent Reports on Availability of Vaccines

Prior to the distribution of vaccines, each member nation must inform its citizens of the specific doses of vaccines in entry, the targeted audience, the safety guidelines for the usage of each vaccine candidate. In the past, several member nations were affiliated with problems of their late release in information regarding the COVID-19 pandemic whether it be their social distancing policies or number of daily cases. In a state where communication and coordination is key, prompt and transparent reports on the member nation's resources and vaccines is of utmost significance for both their citizens and the global community.

Logistics and Authorization

Quite recently, the global community seemed as if it were making progress, authorizing multiple vaccines for emergency use for their citizens and investing great amount of time and research into each candidate. However, ironically, multiple member nations have been reported to have at least one quarter of their unused vaccines especially in Florida of the USA even with numerous patients who were expected to receive the treatment yet were not inoculated. The core of this problems lies on logistics. Government officials, in fact, fear that even with the sufficient amount of resources the vaccinations will be pushed far behind the schedule which may be worsened with continuous holidays that reduce vaccine administration²⁸.

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²⁸ [Robbins, Rebecca, et al. "Here's Why Distribution of the Vaccine Is Taking Longer Than Expected." *The New York Times*, The New York Times, 31 Dec. 2020.](#)

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