

# COVID-19 Vaccine Pricing Algorithm

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## Table of Contents

Introduction.....	1
Background.....	1
Policy.....	2
Implementation Framework.....	3
Impact and Evaluation.....	4
Conclusion.....	5
References.....	5



## Introduction

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered viral agent called SARS-CoV-2. The disease is mainly spread through close contact (within 6-feet) between an infected person and a non-infected person. People who are infected and do not show symptoms can also spread the virus. There are two ways to test for COVID-19, a viral test which tells you if you have an infection and an antibody test which might indicate that you had a past infection. Measures that have been prescribed to help stop the spread of COVID-19 include washing one's hands often, maintaining a safe distance with people outside of your household, covering your nose and mouth with a mask in situations where a safe distance cannot be maintained, and cleaning frequently touched surfaces daily.<sup>(1,2)</sup>

The COVID-19 pandemic has posed an unprecedented challenge to public health, food systems and the world of work so far. Tens of millions of people are at risk of falling into extreme poverty and nearly half of the world's billion workforce are at risk of losing their livelihoods. Countries dealing with existing humanitarian crises are particularly exposed to the effects of the pandemic. The battle against the pandemic requires a swift response which calls for global solidarity and support, especially in the emerging and developing world. It is only if we work together that we can overcome the complex mix of health, social and economic impact of this pandemic and prevent the potential loss of hard-earned developmental gains.<sup>(3)</sup> Immediately after the process of developing the COVID-19 vaccine started in January 2020, the financing of the vaccine became a major issue. Various international organizations, such as Gates Foundation, GAVI, and World Economic Forum, have come up with multiple techniques on how they will fund and distribute vaccines to middle-and low-income nations. Besides the money provided by these organizations, other external sources, including private citizens and the business community, should be considered to ensure many people can access the vaccines regardless of their economic position. Ticket prices of the COVID-19 vaccines, as well as the availability of funds, will directly affect the way the vaccine will be distributed.

## Background

The worldwide endeavor to find a safe and effective COVID-19 vaccine is beginning to bear some fruit. Scientists around the world have worked faster than ever to find vaccines that could stop the spread of this deadly pandemic. There are more vaccine candidates currently in the pipeline for COVID-19 than there ever has been for any infectious disease. The race for the COVID-19 vaccine has been marred by another debate about its pricing and distribution strategy. Currently, prices are said to range from around \$3 to over \$30 a dose. Drug manufacturers have outlined a number of factors that might determine the price of the vaccine, including efficacy, trial results, manufacturing costs, competition, demand and whether the buyers are private (such as insurance companies) or state bodies. AstraZeneca for instance has been reported to have sold its vaccine to the European Commission for \$3 to \$4 a dose, while Johnson and Johnson and the Sanofi/GSK vaccine is to come in at a price of \$10 a dose. At the heart of this discussion are ethical and practical questions on the pricing and distribution of the vaccine to ensure worldwide reach. The question remains whether pharmaceutical companies should work with rich countries to ensure that prices to poor nations are capped.<sup>(4)</sup> The UN Secretary-General, António Guterres has called for human rights to be put “**front and centre**” of the COVID-19 response globally.<sup>(5)</sup> The Director General of the World Health Organization, Tedros Ghebreyesus, has repeatedly emphasized the need for a collective response to the COVID-19 pandemic, emphasizing how important it is to prevent “vaccine nationalism” and stressing that “no one is safe until everyone is safe”.<sup>(6)</sup>

Experts regard Value-based pricing<sup>1</sup> as one of the strategies that policymakers should consider during the distribution of the vaccine. Hybrid pricing<sup>2</sup> technique is also likely to be used by other organizations because the cost of producing COVID-19 vaccines may differ, depending on the technology and innovation used by producers that may impact the pricing approaches.

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1 Value-based Pricing: Pricing based on the value obtained by user/customer rather than cost of development

2 Hybrid Pricing: A combination of usage based and fixed pricing, the former corresponds to being charged for usage of a product/service while the latter corresponds to a fixed price regardless of usage.

This policy statement is aimed at analyzing existing COVID-19 pricing strategies proposed so far and suggesting a pricing framework/algorithm that is centred on equity of access and distribution, and a collective response which guarantees sustained access to the vaccine for the most marginalized populations.

## Policy

The pricing and distribution policies regarding COVID-19 should be all-inclusive. Patient groups, stakeholders in the health policy, the media, community leaders, regulatory agencies, and private entities with an effective supply chain in developing states should be included in managing COVID-19 vaccine distribution. Individuals involved in crafting vaccine distribution strategies should have adequate knowledge on rural health policy and practice to ensure equity in distribution. In addition, it will ensure that proper structures are put in place, thus ensuring at-risk and marginalized populations can access the vaccine in the shortest time possible. Strong and effective supply chain will be required for the entire distribution system to attain its goals. The expertise and different distribution models adopted by various stakeholders should be considered. For the distribution policy to be effective and less costly, it will consider the involvement of various stakeholders who are motivated to implement it. The key stakeholders include ministries of health, country governments, civil society organizations, vaccine manufacturers, research agencies, private sector organizations, donor agencies, and vaccine manufacturers. Effective distribution of COVID-19 vaccines will be achieved through the help of experienced people in various areas.<sup>(6)</sup> These include health care providers, representatives from the health ministries, leaders of private organizations with effective supply chain systems, and leaders in innovation and technology on supply chain systems.

## Implementation Framework

Given the involvement of many stakeholders, it is possible that in the future, COVID-19 vaccines will be distributed equally in all countries. For better implementation of this policy, it is



vital to initiate strategies that will ensure individuals and communities have equitable access to the COVID-19 vaccines. One of the techniques that will be applied to avert a market failure is to encourage manufacturers to lower the vaccine prices in exchange for long-term, high volume predictable demand. In this way, the supply of the vaccine will be sustainable in developing countries. Mr Bill Gates, co-chair of the Bill and Melinda Gates Foundation has reportedly urged rich countries to subsidize vaccines so that poor nations pay \$3 or less for a dose. He proposed a 3-tier system where rich countries pay back a lot of the fixed costs, middle-income countries pay back some of the fixed costs and poor countries only pay a true marginal cost, so as to maximise human benefit. However, some drug manufacturers in India have criticized western drug companies for trying to prop-up the price of vaccines, by failing to meet demand and blaming this on higher production costs. With other candidate drugs still at different phases of development, the hope is that increasing competition will help keep prices down.<sup>(4)</sup>

Additionally, local manufacturers will require support from the government and individuals to produce high-quality vaccines. The vaccine distribution model will involve more distributors in conflict zones to ensure the population in those areas can access the vaccine. Integrating vaccination programs and vaccine delivery into the current health system delivery mechanism is another important technique used during the policy implementation.

So far, the COVAX facility holds the greatest promise of providing the regulatory and distribution framework that supports an equitable distribution of the vaccine worldwide. The COVAX initiative aims to accelerate the development and manufacture of COVID-19 vaccines and ensure equitable access to every country in the world. COVAX, coordinated by Global Alliance for Vaccines and Immunization (GAVI), the Vaccine Alliance, the Coalition of Epidemic Preparedness and Innovations (CEPI) and the World Health Organization (WHO), has the largest and most diverse portfolio of COVID-19 vaccines worldwide. COVAX serves as a lifeline for lower-income countries who are unable to afford these vaccines, as well as a number of high-income countries who have no bilateral deals with manufacturers. The facility aims to use the collective purchasing power of combining many countries to negotiate competitive prices from manufacturers. About 78 high

income countries have confirmed their interest to participate in this facility so far, with the COVAX Advance Market Commitment working to ensure that the 92 lower- and middle-income countries that cannot fully afford to pay for the vaccines get equal access at the same time through contributions from the private sector and philanthropy. Following regulatory approval, available doses are allocated to participating countries at the same rate and proportional to population size with a small buffer kept to support humanitarian organizations and refugees. COVAX provides an insurance policy to protect citizens of all countries by increasing chances of securing vaccine doses, and indirectly reduce the chances of resurgence by ensuring the rest of the world gets access as well.<sup>(7)</sup>

## Impact and Evaluation

The pricing context may change between vaccines. For example, Pfizer vaccine requires high investment to keep the vaccine cold, and Moderna vaccine requires less investment, ultimately affecting the production and distribution of the vaccines. The cost of procuring as well as maintaining cold chain equipment might increase the total cost of supplying vaccines to developing countries because the market dynamics for these equipment are different from those of the vaccine itself, even though they complement vaccine delivery. It is anticipated that the differences in context and terrain worldwide will affect not only pricing, but also distribution channels at regional and national levels. Governments and Civil Society Organizations at country level should be held accountable for ensuring an equitable distribution strategy is employed once the vaccines get to country level. The true impact of a fair and equitable vaccine pricing and distribution strategy will be felt when the most marginalized in societies worldwide are guaranteed access to the COVID-19 vaccine. The number of people from poor countries who will be vaccinated before June 2021 will be one of the main methods of evaluating the effectiveness of this distribution policy.



## Conclusion

The price of COVID-19 vaccines should be effectively managed to ensure widespread and equitable access. Stakeholders with adequate knowledge will be needed to ensure the distribution policy attains its goals, and all people can access the vaccines regardless of the level of economic development of their countries. Likewise, involvement of various stakeholders will ensure adequate resources are available for the distribution process to remain effective and sustainable. Given the fact that COVID-19 is still prevalent in countries experiencing conflict, the number of distributors in such countries will be increased to ensure the population in those countries access the vaccines. Among the current strategies being proposed to support vaccine pricing and distribution, the COVAX facility offers great promise in guaranteeing equity in distribution worldwide. The main strategy of evaluating the distribution process of COVID-19 vaccines will be checking the number of people from poor countries who will be vaccinated before June 2021 worldwide. Respective governments should also ensure loopholes that may result in loss of vaccines are closed.

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