

# COVID-19 vaccine: Challenges in developing countries and India's initiatives

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Dear Editor,

The COVID-19 pandemic has created a global health emergency. The pandemic generates more healthcare stress to the low-income countries with a Gross National Income (GNI) of USD >\$1,000 and medium-income countries with a GNI of USD <12,000. These countries are more vulnerable as they already suffer from the preexisting issues of unemployment, hunger, malnutrition, lack of healthcare and economic crisis [1]. There are several challenges related to the development and distribution of the COVID-19 vaccine for developing countries. Although pharmaceutical companies are in severe competition to bring their final vaccine products fast into the supply chain, who will supply the vaccine to low and medium-income countries remains unanswered [2]. It will cost lots of funds and healthcare resources to vaccinate over 3.6 billion people from the impoverished developing world.

The priority of all pharmaceutical companies in developed countries is to supply the vaccine immediately to the high-end needs since they can get better profit margins instantly. So, many of the economically weak developing countries are

wondering who will help them with the timely supply of vaccines. Therefore, there is an urgent need to produce millions of dosages of the vaccine for them and to do this, the development of a better action plan is necessary. The plan must include all pharmaceutical companies based in the developing countries must work with their governments to produce or obtain large volumes of the vaccine as soon as they come out.

Identifying the right group of people from the population who needs to be vaccinated first must be planned ahead of time. They should include the elderly, doctors, nurses, emergency and essential survive staff, etc. Over 90% of the population across the low and medium-income countries is mainly concentrated in rural areas so the primary health centres need to be strengthened to distribute vaccines at the grassroots level in villages. Also, those who live in remote regions with less accessibility cannot be forgotten in the vaccine distribution planning. Besides, millions of people earn less than USD 3/day in the low and medium-income countries so the production of low-cost vaccine is critical for them. Then only, the governments in developing countries can supply them free or for a lower fee than the people can afford. As a developing country, India is also facing several challenges. Among the developing countries, India has a focus to rapidly develop and distributes the COVID-19 vaccine. The Indian government has already taken steps from intellectual property right generation to distribution of the

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vaccine to its people. It has boosted funds for research and development of the COVID-19 vaccine through various departments such as Biotechnology Science and Technology, Indian Council of Medical Research and the Council of Scientific and Industrial Research. These agencies provide instant funds in support of the vaccine production initiatives. Also, a special fund has been proposed under the “PM CARES Fund” with 136 million USD to support vaccine development [3]. This is a special fund created by the Indian Prime Minister to help the people affected by COVID-19.

Moreover, pharmaceutical companies namely the Serum Institute of India, Bharat Biotech, and ZydusCadila are already engaged in vaccine production and they are preparing to meet the challenges to come up with millions of dosages with low-cost that can support low and middle-income countries. The Serum Institute of India is one of the largest vaccine manufacturers worldwide and it has an agreement with Oxford University to produce one billion doses of the vaccine. By the way, India has a long history of low-cost vaccine production. It has produced a very low-cost COVID-19 vaccine with a cost of at USD 3 per dose for the local population and it can be used in other developing countries [4, 5]. With an alliance of the Bill & Melinda Gates Foundation, the work to produce the low-cost vaccine is underway [6]. Two antiviral drugs such as remdesivir and favipiravir have been given emergency approval by India to treat COVID-19 patients [7]. A clinical trial of the vaccine is a priority to the government so the drugs and clinical trial rules have been amended in June 2020 to make the clinical trials to move faster. These initiatives can be adopted by other countries in the developing world to face the next pandemic more effectively.

India also has expertise in computer science, cloud computing, artificial intelligence, and the development of new software. With the technological advantage, India has initiated an electronic Vaccine Intelligence Network (eVIN) to provide real-time information about the storage, distribution and usage of vaccines on the ground. This network will make it easier to distribute the vaccine nationwide and it can be adopted in other developing countries as well. India has a good track record of vaccine development and distribution policy [8]. As part of the polio eradication,

India produced millions of dosages of the oral polio vaccine and distributed them free of cost across the nation. It also provided low-cost vaccines for Hepatitis B, and Measles, Mumps, and Rubella (MMR). With all these expertise, India has set its path clearly to vaccinate its citizens and there is no wonder why Prime Minister has recently promised the developing world that he will help them with cheaper vaccine production and distribution.

### Conflicts of interest

The authors declare no competing interests.

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