

Editorial

Global Disparity of COVID-19 Vaccine Distribution.

Introduction:

The devastating attack of COVID-19 has shaken the economy of the whole world. Millions of people of different parts of world have been suffered from this contagious disease. Vaccine against this coronavirus showed a glimpse of ray in the path of getting rid of this pandemic. After launch of vaccines by different manufacturers of the world a huge disparity has been observed regarding the distribution and availability of the vaccine.

The manufacturers of COVID-19 vaccines used different technologies in preparing the vaccines. Mostly three types of technologies have produced maximum vaccines of the world. They are:

- (a) Non-replicating viral vector based vaccines, developed by Oxford-AstraZeneca¹, the Sputnik V developed by the Russian Gamaleya Institute consisting of two components, a recombinant adenovirus type 26 (rAd26) vector and a recombinant adenovirus type 5 (rAd5) vector², and the Ad26.COVS developed by the Center for Virology and Vaccine Research at Harvard Medical School in collaboration with Janssen Vaccines and Prevention.

Gavi- Global Alliance for vaccines and immunization. Advantages and disadvantages of viral vector-based vaccines are-

- Well-established technology
- Strong immune response
- Immune response involves B cells and T cells
- Previous exposure to the vector could reduce effectiveness
- Relatively complex to manufacture vaccine.

(b) Nucleic Acid, DNA- or RNA- based vaccines that include the mRNA-1273 vaccine that is being developed by Moderna³, and a self-amplifying (saRNA) vaccine termed VGHsa111 developed by Imperial College, London as well as another co-developed by Pfizer and BioNtech. An example of a DNA based vaccine against COVID19 is INO-4800, which is being developed by Inovio Pharmaceuticals Inc.⁴ Nucleic acid vaccines use genetic material from disease causing virus to trigger protective immunity against it.

(c) Protein based vaccines are Acid-degradable protein, CoV RBD219-N1 Vaccine from Baylor College of Medicine, Texas that is based on a yeast-derived (*Pichia pastoris*) protein⁵ and from Anhui Zhifei Longcom Biopharmaceutical Co. Ltd.⁶

The 11th King Abdullah International Medical Research Centre (KAIMRC) Annual Research Forum themed "COVID-19 Vaccine: Global Challenges and Prospect Forum" discussed on the global challenges of COVID-19 vaccine and eventually led to sixteen recommendations⁷

1. Diversify types of vaccines,
2. Consider using boosters and adjuvants,
3. Continue to study the immune response,
4. Standardize immunoassays
5. Continue social distancing, using masks and sanitizers
6. Set up global consortium equipped with Artificial Intelligence platform to follow and assess the short and long term safety and efficacy COVID19 vaccine profiles,
7. Improve alignment between regulators and vaccine developers,
8. Increase transparency in vaccine development strategies,
9. Increase collaboration between industry and academia,
10. Offer education and awareness to enhance public confidence in vaccines,
11. Better not to label the vaccines based on the country of origin,
12. Increase measures for fair vaccine accessibility and affordability,
13. Work with local leaders to increase trust in vaccines,
14. Increase investment in basic research in infectious

diseases and vaccine development technologies, 15. Enhance cold-chain capabilities in developing countries and 16. Continue to host annual global forums.

The global vaccine inequity

The number of active cases has been decreased in most of the high-income countries (HICs), but in the low and middle-income countries (LMICs) the mortality is still high. Nearly 85% of the global vaccines have been used by the HICs and upper-middle-income countries and 75% of them have been administered in 10 countries. These countries include USA, UK, France and Germany.⁸

If we consider the world population then we'll find that only 5% of them have received a single dose and unfortunately these inequities are more pronounced in the African countries where only less than 1% people have received a single dose. Similar disparity was observed in the previous pandemic situations also. During the 2009 H1N1 pandemic, developed countries initially purchased and stockpiled all the manufactured vaccines. Even when WHO and UN intervened to try and secure vaccines for developing countries, donations to LMICs were often limited.⁹

The effects of global COVID vaccine inequity

Inequities in vaccine coverage can and square measure leading to each direct and indirect consequences, in affected countries and therefore the overall world community. Other than the direct sicknesses and loss of life, continued vulnerability to surges in cases leaves already troubled aid systems with restricted ability to supply take care of different health conditions. Health problem and deaths among aid staff impacts the human resources needed for continued response to COVID-19 and non-COVID-19 health burdens. Over the last year, rates of childhood vaccination have raised sharply because of delayed vaccination campaigns, delaying immunization to thirteen. Five million people in a number of the foremost vulnerable countries within the world.¹⁰ Lastly, continued transmission of COVID-19 creates a state of affairs contributive to continued virus evolution and development of latest mutations, a number of which can confer selective advantage

in terms of transmission or immune evasion as has already been occurring over the past year. These virus variants might cause a threat to people in HICs, significantly those are susceptible or those that cannot mount a high enough reaction to vaccination. As communities round the world handle the part of their economies, 95 million of people are pushed into extreme poorness, with another two hundred million foreseen to be in danger between current pandemic time and the year 2030. The pandemic has conjointly led to worsening food insecurity and has had prejudicial effects on world childhood education and women's authorization. The longer the COVID-19 pandemic continues as associate degree acute crisis in LMICs, the bigger the possible devastation to all or any the on top of indicators. However, the economic toll of unequal vaccine allocation is additionally getting to impact the complete world market. A RAND Europe report estimates that if the poorest countries cannot access the vaccines, the world would still lose \$153 billion a year in gross domestic product.¹⁰

COVID-19 Vaccines Global Access (COVAX) and vaccine diplomacy

Considering the experience of distribution disparity of H1N1 vaccines to LMICs in past WHO's COVAX was formed.⁹ COVAX is a partnership between World Health Organization (WHO), UNICEF, the Coalition for Epidemic Preparedness Innovations and the Global Alliance for Vaccines and Immunizations (Gavi). The aim of COVAX is both to support the research and development and also to make a proper use of financial commitment of purchase by rich countries to provide doses of successful vaccine candidates for 20% of the population in 92 of the poorest countries.⁹ COVAX has aimed to meet its goal by the end of 2021. First, COVAX faced a financial crisis of funding of \$3.7 billion USD immediately (which the US has promised to help cover in the short term) and an additional \$23.7 billion USD in the course of the next year. Second, COVAX has not been able to compete with HICs on the global market, which have already stocked a large portion of approved vaccines. Several HICs created their own bilateral agreements with vaccine producing companies despite joining COVAX.

As a consequence, further production of vaccines is currently stuck due to shortage of raw materials and limitations of manufacturing capacity. Third, COVAX faced one of the largest challenges when one of the largest vaccine producers, Serum Institute of India, failed to achieve the production target and eventually delayed the promised date of export due to unexpected increased COVID-19 cases during India's second wave.¹¹ For this reason, COVAX is going to face a vaccine shortage, even as India in the long run recovers from the devastating emergency and tries to fulfill their domestic needs with overseas commitments for manufacturing. Some scientists and health leaders were not fully satisfied with COVAX. They have criticized the COVAX utility for not being active enough to new surges in LMICs, and also they have distributed the vaccines based on country's population, but not according to the severity of outbreaks or resilience of affected healthcare systems to handle such surges.¹² Although HICs have promised to make both bilateral donations and further commitment of doses to COVAX, but till date these donations not approach the amount of what is required. For example, G7 countries have committed to LMICs for 870 million vaccine doses, whereas the WHO calculated that 11 billion will be required to vaccinate 70% of the world population.¹³ Moreover, China and Russia, who did not participate in COVAX, are providing doses of locally manufactured vaccines (such as Sputnik, Sinopharm, and Sinovac) by individual agreements, which they reckon to improve their global relationship.¹⁴

Conclusion:

The world health leader had anticipated the inequity and disparity regarding the COVID-19 vaccine distribution among different countries from their previous experiences. COVAX was formed to minimize the inequity. Due to different causes, mainly non-cooperation by the HICs the aim of the COVAX could not be achieved. Cooperation of global leaders and collaboration between WHO and other health organizations are expected to reduce the mismatch distribution of COVID-19 vaccines.

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