



Strategies for Universal Vaccination of COVID-19 in Developing and Underdeveloped Countries

Mahmoudreza Peyravi¹ and Milad Ahmadi Marzaleh^{1,*}

¹Department of Health in Disasters and Emergencies, School of Health Management and Information Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

*Corresponding author: Department of Health in Disasters and Emergencies, School of Health Management and Information Sciences, Shiraz University of Medical Sciences, Shiraz, Iran. Tel: +98-7132340774, Fax: +98-7132340039, Email: miladahmadimarzaleh@yahoo.com

Received 2021 December 14; **Revised** 2022 May 23; **Accepted** 2022 July 02.

Keywords: COVID-19, Vaccine, Management, Health, Pandemic

Dear Editor,

The COVID-19 virus is a member of the coronavirus family. The virus is highly contagious and has a very high risk of infection. It rapidly spread worldwide, and the subsequent global public health emergency was declared a pandemic by the World Health Organization (WHO) on January 30, 2020 (1). The virus has put a lot of pressure on countries' health systems (2, 3). New variants of the virus have been discovered worldwide, and efforts have been made to manage the virus. Countries' efforts to manage COVID-19, including general vaccination, national lockdowns (4), public education (5), and public health recommendations, have had practical implications. One of the best ways to manage and end the COVID-19 pandemic is universal vaccination. It is also one of the best ways to counteract the mutations of the COVID-19 virus.

As the world faces its most pressing logistical challenge (vaccine supply and distribution), countries are working to ensure that vaccines are delivered to patients as soon as possible. However, developing and underdeveloped countries face the most significant challenges in universal vaccination, including (1) lack of vaccine manufacturing technology; (2) lack of scientific ability for vaccine research and development; (3) sanctions; (4) lack of acceptance and public trust in domestically produced or even imported vaccines; (5) low quality or ineffectiveness of domestically produced vaccines; (6) lack of cold chain technology in the distribution and maintenance of vaccines; (7) inadequate marketing for the purchase of vaccines; (8) lack or absence of volunteers to participate in national vaccine production trials; (9) lack of management in the supply of vaccines; (10) childish and unhealthy competition in the production of vaccines in the laboratory and lack of focus on a national vaccine and its mass production; (11) reverse vaccine smug-

gling; (12) dissemination of incorrect information about vaccines; (13) vaccine phobias; and (14) data fabrication on the results of clinical trials on vaccine production.

The following strategies are recommended to promote the process of universal vaccination in these countries: (1) researching and cooperation with developed countries; (2) developing an intelligent vaccine supply and distribution chain; (3) combating the black market of vaccine sales; (4) using artificial intelligence and blockchain in the supply, transmission, and distribution of vaccines; (5) importing vaccines by non-governmental and neutral organizations such as the Red Cross and Red Crescent in countries under pressure and sanctions; (6) developing health diplomacy in countries under pressure and sanctions; (7) continuous tracking of vaccines with technologies such as radio-frequency identification (RFID) and smart bar code readers; (8) purchasing vaccines; (9) designing accurate vaccine distribution systems; (10) special coding and labeling of each vaccine for accurate tracking; (11) prioritizing vaccination and initiating vaccination with high-risk groups such as children, adolescents, pregnant women, disabled people, elderly individuals, and people with underlying and dangerous diseases; (12) encouraging the public and paying attention to the fact that the first available vaccine is the best; (13) donating vaccines by the WHO as well as influential and rich institutions and individuals to poor countries; (14) vaccine production in developing and underdeveloped countries under the license of leading international vaccine companies; (15) combating the dissemination of inaccurate information about vaccines in the media and cyberspace; (16) transparency and accurate information about all positive and negative dimensions of vaccines; and (17) efforts to build cold chain vaccine equipment technology to maintain the manufactured or im-

ported vaccines.

The vaccination problem in Africa has different reasons than in some Middle Eastern countries. In Africa, very few vaccines have been injected due to the lack of vaccine production, distribution, and injection infrastructure. Multilateral cooperation between underdeveloped and developed countries can fill this gap. International strategies for general vaccination include the identification of different strains of the virus to control mutations, the design of experimental studies, and the determination of the efficacy and effectiveness of vaccines (6, 7). Therefore, countries can help vaccinate communities through coordination and constructive interaction. Cooperation in the research and development of vaccines is another crucial aspect of developing vaccines.

Conclusion

Justice in public vaccination is the key to ending the pandemic. Ending the pandemic also depends on the cooperation of all countries. Therefore, developed countries can play a prominent role in ending the COVID-19 pandemic by providing humanitarian assistance to other countries in the field of vaccine supply or vaccine production technologies.

Footnotes

Authors' Contribution: All authors were responsible for the study's conception and design, prepared the first draft of the manuscript, conducted data analysis, supervised the study, and read and approved the final manuscript.

Conflict of Interests: The authors have no conflict of interest to declare.

Funding/Support: This study did not receive any funding from any university.

References

- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;**395**(10223):497-506. doi: [10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5). [PubMed: [31986264](https://pubmed.ncbi.nlm.nih.gov/31986264/)]. [PubMed Central: [PMC7159299](https://pubmed.ncbi.nlm.nih.gov/PMC7159299/)].
- Rauf A, Abu-Izneid T, Olatunde A, Ahmed Khalil A, Alhumaydhi FA, Tufail T, et al. COVID-19 Pandemic: Epidemiology, Etiology, Conventional and Non-Conventional Therapies. *Int J Environ Res Public Health*. 2020;**17**(21). doi: [10.3390/ijerph17218155](https://doi.org/10.3390/ijerph17218155). [PubMed: [33158234](https://pubmed.ncbi.nlm.nih.gov/33158234/)]. [PubMed Central: [PMC7662254](https://pubmed.ncbi.nlm.nih.gov/PMC7662254/)].
- Andersen KG, Rambaut A, Lipkin WI, Holmes EC, Garry RF. The proximal origin of SARS-CoV-2. *Nat Med*. 2020;**26**(4):450-2. doi: [10.1038/s41591-020-0820-9](https://doi.org/10.1038/s41591-020-0820-9). [PubMed: [32284615](https://pubmed.ncbi.nlm.nih.gov/32284615/)]. [PubMed Central: [PMC7095063](https://pubmed.ncbi.nlm.nih.gov/PMC7095063/)].
- Peyravi M, Dehbozorgi M, Ahmadi Marzaleh M. Two-Week Lockdown in Iran Due to COVID-19: Impacts, Challenges, and Recommendations. *Disaster Med Public Health Prep*. 2021;1-2. doi: [10.1017/dmp.2021.28](https://doi.org/10.1017/dmp.2021.28). [PubMed: [33583480](https://pubmed.ncbi.nlm.nih.gov/33583480/)]. [PubMed Central: [PMC8027556](https://pubmed.ncbi.nlm.nih.gov/PMC8027556/)].
- Peyravi M, Ahmadi Marzaleh M, Shamspour N, Soltani A. Public Education and Electronic Awareness of the New Coronavirus (COVID-19): Experiences From Iran. *Disaster Med Public Health Prep*. 2020;**14**(3):e5-6. doi: [10.1017/dmp.2020.94](https://doi.org/10.1017/dmp.2020.94). [PubMed: [32285765](https://pubmed.ncbi.nlm.nih.gov/32285765/)]. [PubMed Central: [PMC7176984](https://pubmed.ncbi.nlm.nih.gov/PMC7176984/)].
- Soleimanpour S, Yaghoubi A. COVID-19 vaccine: where are we now and where should we go? *Expert Rev Vaccines*. 2021;**20**(1):23-44. doi: [10.1080/14760584.2021.1875824](https://doi.org/10.1080/14760584.2021.1875824). [PubMed: [33435774](https://pubmed.ncbi.nlm.nih.gov/33435774/)]. [PubMed Central: [PMC7898300](https://pubmed.ncbi.nlm.nih.gov/PMC7898300/)].
- Wang J, Peng Y, Xu H, Cui Z, Williams RO. The COVID-19 Vaccine Race: Challenges and Opportunities in Vaccine Formulation. *AAPS PharmSciTech*. 2020;**21**(6):225. doi: [10.1208/s12249-020-01744-7](https://doi.org/10.1208/s12249-020-01744-7). [PubMed: [32761294](https://pubmed.ncbi.nlm.nih.gov/32761294/)]. [PubMed Central: [PMC7405756](https://pubmed.ncbi.nlm.nih.gov/PMC7405756/)].