



DISCUSSION PAPER

How the Fight over Covid-19 Vaccines will Shape Global Inequality

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Introduction

For a second winter, hospitals around the world are buckling under the pressure of increasing numbers of Covid-19 patients. This time, however, there seems to finally be a light at the end of the tunnel. One after another, half a dozen pharmaceutical companies announced that they have developed effective vaccines, which can prevent the transmission of the virus, raising hopes that life may finally return to normal. However, there is still a long way before a safe majority of the world's population is vaccinated and some level of herd immunity is achieved. Billions of vaccines have to be produced, stored, and distributed to the most distant parts of the world. This paper argues that unless there is a strong and well-coordinated international cooperation effort, the vaccination process will lead to more economic divergence between the world's poorest and richest nations due to their differing financial and operational capacities to access vaccines. This could lead to skyrocketing global income and wealth inequality, isolation of developing countries from international trade and investments, and increased geopolitical tensions.

Countries are competing to reach a limited number of manufactured Covid-19 vaccines first. Those which can vaccinate their populations will be able to open their economies at full capacity after one of the deepest economic crises in modern history. Access to Covid-19 vaccines is now a social, economic, and even geopolitical priority for all countries; pharmaceutical companies, which now have no problem with demand, are supplying countries which pay the price. However, it is already apparent that rich countries in the global north are crowding out developing countries, especially the poorest nations of Sub-Saharan Africa, from the market for Covid-19 vaccines. While governments in Europe and Northern America are racing to vaccinate their entire populations and plan even for the next round of vaccinations, some of the poorest countries have not been able to access even a single dose of Covid-19 vaccine.

According to some estimates, developing nations will have to wait months, even years, before Covid-19 vaccines are fully available to them. It is very much possible that the disease will prevail in most such countries for a long time to come. Then, similar to what happened with HIV since the 80s and malaria for even longer, even though there are protective vaccines and medicine available, Covid-19 is set to continue to wreak havoc in developing countries for decades to come, dampening economic growth, creating a vicious cycle between less economic growth and more sickness and preventable deaths, while developed nations will turn back to normalcy. Furthermore, soon, as developed countries vaccinate their nations, developing countries may become isolated from the rest of the world, particularly if wealthy countries cut them off from international travel, which would also mean isolation from international trade and investment. There are already discussions of 'vaccines passports', which will prevent those who are vaccinated from travelling and create a 'vaccine apartheid' between the world's poor and the rich.

The implications of such divergent vaccination trajectories for global inequality are potentially dramatic. However, they are not restricted to suffering in developing countries. As is often expressed by health experts, no one is safe until everyone is safe from Covid-19. Developed countries will always be under the risk of importing the virus from other countries. Moreover, it would ultimately affect rich countries through its toll on the global economy as well. Global output will continue to be depressed due to disruption in supply chains and international trade. The only potential way out of this catastrophe is effective financial and organisational cooperation between governments on a global scale. The World Health Organisation (WHO) and the COVAX initiative should lead the way for mass-scale vaccination in developing countries. Unless there is strong and well-coordinated cooperation between countries, everyone will continue to suffer.

Laissez-Faire?

The most important question currently facing the world is how we are going to plan the logistics of global-scale vaccination. Enough vaccines have to be produced, stored, and distributed to every part of the globe, so the pandemic can be dealt with once and for all. But some might say why bother 'planning' in the first place? That is, we can let the *invisible hand* of the market do its job, just like it does with everything else from simple foodstuffs to aircraft. After all, vaccines are produced by private companies, whose ultimate aim is to make profits, and they will go everywhere and anywhere to maximise their gains. In other words, we should not need government intervention either at the national or international level; as long as there is demand, potential private gains should be good enough of a motivation to get profit-seeking companies to supply even the most distant parts of the planet. Nobel laureate Richard Thaler even suggested selling a proportion of vaccines in auctions to those who are willing to pay the highest price (2020).

This pro-market approach has serious flaws. Private companies do not necessarily take social costs or benefits into consideration as they are primarily driven by private profit. They will set the price at a point that maximises profit and only sell to those who are capable of paying. This would potentially leave millions of poor people unvaccinated, which is not only morally problematic but also irrational when confronting a contagious disease. Vaccination creates social benefits, or what economists call 'a positive externality', transcending private benefits of a vaccinated person or the company that sold the vaccine. In simpler terms, when a person is vaccinated, the entire society benefits from it, and vice versa. What this implies is that what follows the logic of the markets and is considered as rational from the perspective of private companies is likely to cause serious social and economic damage.

Heled et al. (2020), for instance, analyse the case of Remdesivir, a commonly used antiviral in Covid-19 treatment, and show that the pricing policies of private companies are largely disconnected from the cost of medical R&D or manufacturing and does not maximise social benefit, but rather only reflect company interests. In other words, according to Heled et al. (2020), companies make a profit not by fulfilling social healthcare needs but often at their expense. Furthermore, they also make the case that the reason why the US has been affected by Covid-19 more than many other countries is its overdependence on market mechanisms for healthcare provision. Then, they conclude, government policy which depends primarily on private market mechanisms is largely suboptimal; instead, the government should take the leading role in medicine and vaccine markets to maximise social welfare.

Arguably, what is true about pharmaceutical markets at the national level is even more so at the international level. Without governmental interference, conditions created in private markets benefit the pharma industry at the expense of social welfare. If the profit-maximising market price for Covid-19 vaccines settles at a level which exceeds the reach of citizens in poor countries, then millions of people will have to continue living with the consequences of Covid-19. It is a fact that in developing countries, especially in Sub-Saharan Africa as well as in parts of Asia, Latin America, and the Middle East, millions of people do not earn enough income even for daily maintenance. For reference, more than 40% of world's population lives on less than \$5.5 a day (at 2011 purchasing power parity) while 8.5% lives with less \$3.2 a day (World Bank, 2021). In most poor countries, even governments lack the financial and organisational capacity to purchase an adequate number of vaccines and distribute them nationwide.

Table 1: Authorised Covid-19 Vaccines

COMPANY	COUNTRY	TYPE	PRICE
Moderna	USA	MRNA	\$25-\$37
Sinovac	CHINA	INACTIVATED VIRUS	\$29.75
Pfizer & Biontech	USA-GERMANY	MRNA	\$19.5
Sputnik V	RUSSIA	ADENOVIRUS - BASED	\$10
Johnson & Johnson	USA-BELGIUM	ADENOVIRUS - BASED	\$10
Oxford/ AstraZeneca	UK - SWEDEN	ADENOVIRUS - BASED	\$4-\$5

Source: Terry, 2021

Vaccine prices per dose range between \$5 to \$37 at the moment, excluding costs related to storage and distribution. The cheapest option is provided by the University of Oxford and AstraZeneca, who have stated that they will not make any profits from the vaccine as long as the Covid-19 pandemic continues. It also has the advantage of easy storage. However, their supply is considerably limited. Until they meet all the demand for their vaccine in the EU, it seems unlikely that they will extend their deliveries to other parts of the world. Most recently, they warned that their deliveries even to the EU will fall far below the formerly promised volume. Specifically, the EU was expecting more than 100 million doses in early 2021, whereas it seems that they will be able to deliver only half of that amount, which is a major blow to the EU's vaccination efforts (Peel et al., 2021).

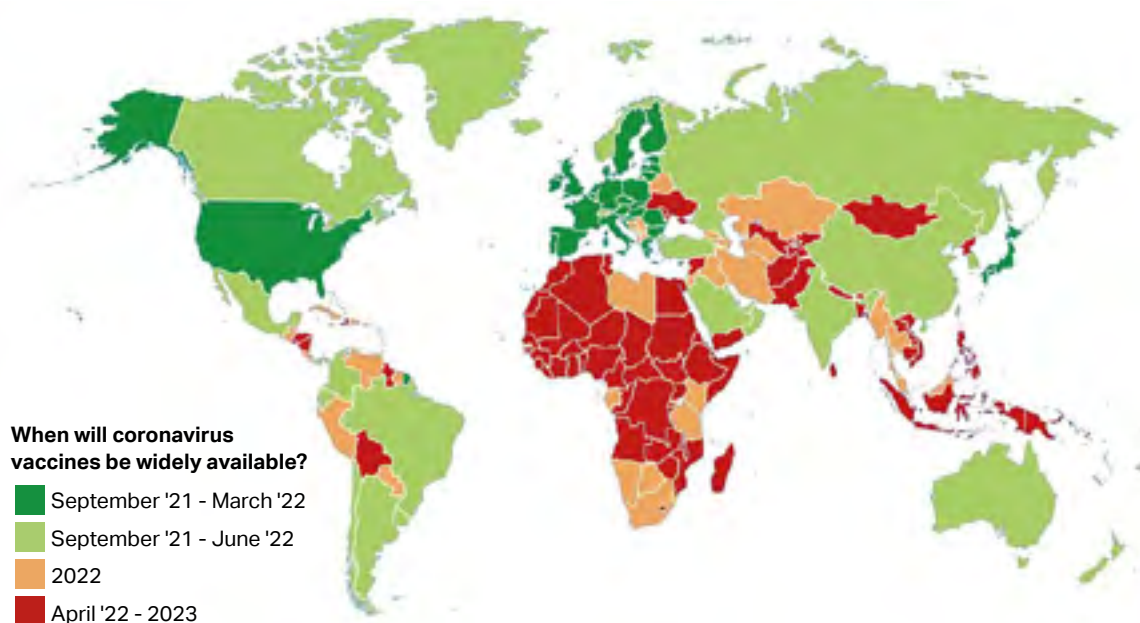
AstraZeneca is not the only company which failed to fulfil its promise. Pfizer is also struggling to supply the formerly promised 600 million doses to the EU and announced that the delivery will be significantly slower than anticipated. Italian Prime Minister Conte said countries that are successful at fast distribution are being punished with slow deliveries and that his government will take legal action against the compa-

nies. Similarly, the Austrian Health Minister Anschober said that the delay in deliveries is "unacceptable" (BBC, 2021). While European countries are racing to maximise deliveries and aim for a vaccination rate of 70% before spring, in most developing countries not a single dose has so far been delivered.

Director of Africa Centres for Disease Control and Prevention John Nkengasong, the continent's highest health authority, said that rich countries are buying vaccines "in excess of their needs while we in Africa are still struggling" and that this is a "moral issue" (Al-Jazeera, 2020). Oxfam reports that rich countries have pre-ordered enough doses to vaccinate their nations three times over while 90% of those living poor countries will not get vaccinated anytime within the next year (Oxfam, 2020). According to the Economist Intelligence Unit (EIU), widespread access to vaccines will be possible in most parts of Africa only after mid-2022, even 2023. Obviously, rich individuals living in poor countries will probably be able to access vaccines but the overwhelming majority of populations living in developing countries will be left unvaccinated for the foreseeable future. In short, absent multilateral intervention in a cooperative effort, most developing nations will continue to suffer from and lose lives to Covid-19.

Figure 1: Widespread Access to Vaccination

Rich countries will get access to coronavirus vaccines earlier than others



Source: EIU, 2020

Vaccine Apartheid

In a scenario where rich developed countries vaccinate their citizens while the world's poor are left behind, developed countries will likely continue to limit travel with other parts of the world in order to prevent unvaccinated people from crossing their borders. This may take the form of total border closures, which would cut off all individuals from poor countries from travelling to rich countries, or a partial ban only on those who have not been vaccinated. Either way, unless developing countries are able to access sufficient doses of vaccines, then the majority of people in some of the poorest countries will not be able to travel for business, work, education, or even tourism, and face the possibility of being entirely isolated from the rest of world.

In fact, there have already been discussions of so-called 'vaccination passports', which will allow those who have been vaccinated to travel while banning others from doing so. Israel, for instance, is preparing to enforce vaccine passports, while several other countries, including Greece, Spain, Italy, and Portugal, are also lobbying the EU to adopt similar measures. Airlines and the hospitality sector have already indicated their willingness to follow similar procedures even without government action in order to re-activate their own industries (Nuki et al., 2021). In other words, given the current trajectory in vaccination rates, we are one step away from something resembling a dystopian science fiction; a world physically separated between the rich and the poor, what some have referred to as 'vaccine apartheid' (Ghosh, 2020). If this happens even for a short period, it could have significant and long-lasting adverse economic impacts on developing economies.

Even under less dramatic circumstances, whereas developed countries will forward free of Covid-19 thanks to mass vaccination, developing countries are looking at the possibility of living with Covid-19 for decades to come. According to some economists, prevailing sicknesses are among the main causes of underdevelopment. Infectious diseases take lives, keep adults away from the job market and children from school. According to prominent economist Jeffrey Sachs (2003), for instance, Africa's "malaria ecology", which involves an especially dangerous type of malaria-spreading mosquito and that allows year-round transmission, effectively isolates the continent from international trade and hinders foreign investment. Acemoglu et al. (2001) show that the disease-related death ratio among British soldiers across British colonies in the 1820s correlates very well with the GDP per capita of the same localities in the 1990s. Sachs (2003) argues that this correlation proves that the prevalence of the disease is a major cause for the lack of long-term economic development in these countries.

It should be emphasised that in Sachs's understanding, even if people from poor countries can travel to other countries or acquire immunity to the disease over time, the prevalence of Covid-19 will continue to haunt their economic development in the decades to come because it will discourage foreigners from travelling to these regions. Interestingly, Sachs (2003) likens Africa's problem with Malaria to the economic impact of SARS outbreak, another coronavirus, in East-Asia in the early 2000s. SARS's impact on travel and business, Sachs claims, is similar to what Malaria causes in Africa; foreigners refrain from coming to these regions for investments or trade. Now, on the top of malaria, Africa faces the challenge of an actual coronavirus. Without mass vaccination against Covid-19, Africa potentially faces a situation that could be much more damaging than malaria, creating yet another barrier for foreign investment and international trade.

The current situation also resembles, in alarming ways, what has happened with AIDS since the 1980s. After AIDS became known and the initial shock passed in the early 1980s, rich countries have effectively dealt with the outbreak whereas poor countries, especially in Sub-Saharan Africa, continue to suffer from it. In 2018, 61% of all new AIDS patients were in Sub-Saharan Africa, followed by Latin America and some parts of East Asia. Moreover, the mortality rate among patients living in developing countries is twice as high as it is in Western Europe and Northern America (UNAIDS, 2020). In short, while rich countries have slowed the spread and reduced the mortality of AIDS, in poor parts of the world, it continues to be a major cause of sickness and death. Apart from the human tragedy, it has serious economic consequences. According to one estimate, the AIDS pandemic, via its effect on labour supply, productivity and foreign trade, has reduced national income growth by an average of 2-4% across Africa (Dixon et al., 2002).

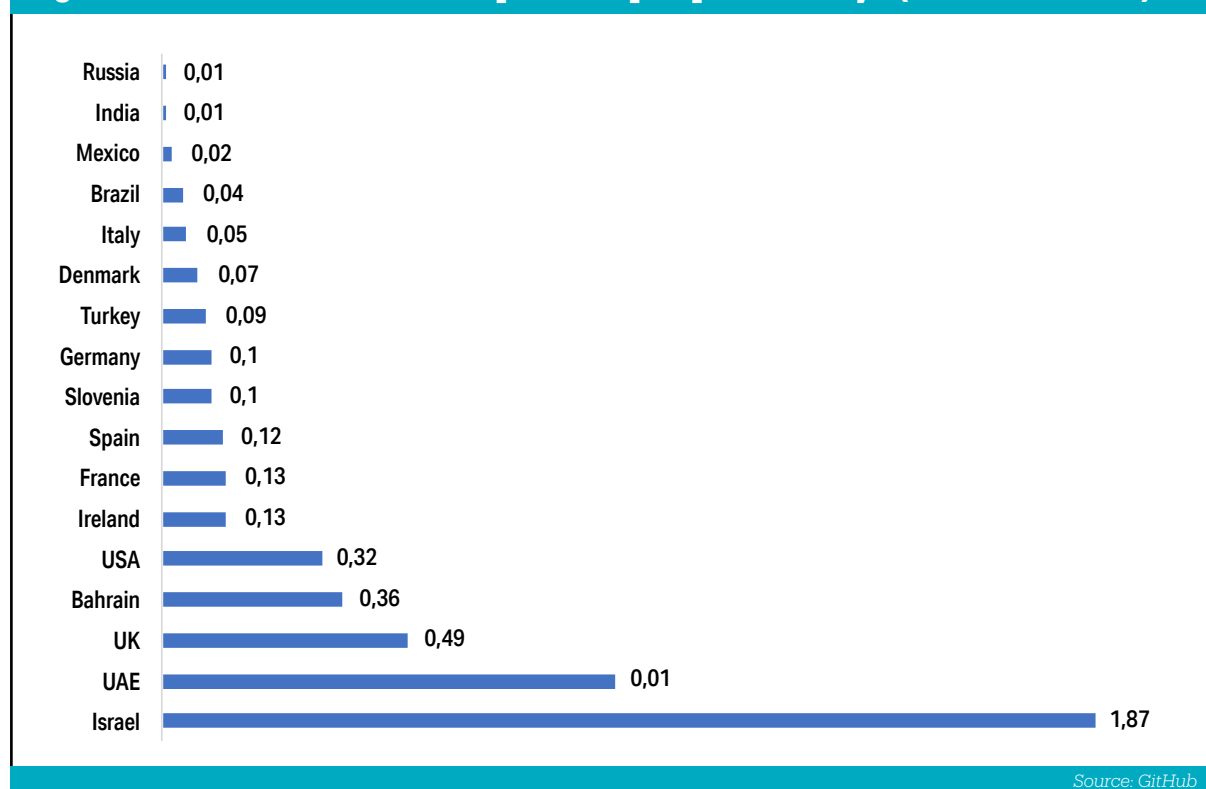
More recently, the 2009 swine flu (H1N1) pandemic showed how poor countries can be left behind by rich countries with regards to vaccine accessibility. As the virus spread, developed countries placed large quantities of advance orders for vaccines, which left developing countries with very little. Moreover, some rich countries even bought vaccine manufacturers in an attempt to monopolise them. Canada, Australia, and the US enforced governmental regulations to limit their companies from selling to other countries. Despite efforts by the WHO and the UN, including negotiating with manufacturers and developed countries to allow other countries to access vaccines, poor nations were still left with limited supplies (Fidler, 2010). In this instance, developed country governments dominated the ostensibly free market while others could not buy vaccines even if they were able and willing to pay.

Table 2: Vaccination – Top Locations as of 28.01.2021

Country	Doses per 100	Total Doses
Israel	47	4.252.868
UAE	28,3	2.764.450
UK	11,4	7.638.543
Bahrain	8,8	144.130
US	7,4	24.402.499
Puerto Rico	6,3	199.762
Serbia	4,6	319.504
Iceland	4,3	15.522
Denmark	3,7	216.128
Romania	2,9	570.704
Slovenia	2,9	60.979
Ireland	2,9	143.000
Spain	2,9	1.356.461
Portugal	2,7	278.413
Italy	2,6	1.575.258
Lithuania	2,5	70.018
Germany	2,4	1.990.889
Poland	2,4	905.457
Canada	2,4	886.914
Switzerland	2,3	197.368
Finland	2,3	126.910
Estonia	2,2	29.594
Austria	2,2	195.886
Czechia	2,1	222.450
Belgium	2	231.466
Greece	2	213.735
Slovakia	2	108.426
Sweden	1,9	192.700
Turkey	1,8	1.522.580
France	1,8	1.184.510

Source: GitHub

Figure 2: Number of Vaccines per 100 people in 7 days (16-23.01.2021)



The Way Forward: International Cooperation

It is false to assume that by monopolising early doses of Covid-19 vaccines, rich countries will cease to suffer from the effects of the virus. As long as the pandemic continues in other parts of the world, developed countries will live under the threat of importing new outbreaks. This is why it is repeatedly brought up by experts that before the pandemic is over everywhere, it is not over anywhere. Therefore, even based on self-interest, there is a strong case for international cooperation. This is true for economic recovery as much as it is for recovery from the pandemic. Unless poor countries in the developing world fully recover from the pandemic, the dual depression in global supply and demand will continue to affect developed economies. The every country-for-itself strategy that governments in developed countries currently follow not only fails the moral test but it is also irrational (Ghosh, 2020).

In a recent study, Kalemli-Ozcan et al. (2021) show that if developing countries are left behind in vaccination efforts, developed countries will also incur substantial costs. Specifically, the study concludes that in an extreme scenario where developed economies are fully vaccinated while developing countries are not, the total decline in global output, due to disruption in global supply chains and international trade, could be as high as \$4.3 trillion, of which \$1.6 trillion (37%) will be borne by developed countries. In a scenario where developed countries complete vaccination in early 2021 while developing countries vaccinate only half of their population by the end of 2021, the total output loss can still reach \$3.8 trillion, with half of the hit (\$1.9 trillion) being taken by developed economies. In comparison, according to researchers' calculation, the total cost of vaccinating citizens of poor countries is only \$38 bil-

lion. In short, there is every economic rationale for funding the vaccination efforts in developing countries where financial and logistic capacity is lacking.

Historically, one of the very rare occasions where the rich are concerned about the well-being of the poor have been epidemics. In this instance, perhaps the pandemic will engender rich countries in the Global North to care for and extend much-needed aid to the poorest of the world. Vaccine orders by rich and poor countries can be coordinated, so all countries can vaccinate their populations at a more or less similar pace. This would also eliminate the possibility of closed borders. The European Commission, for instance, coordinates vaccination efforts between EU countries, so the member states do not close borders to each other, similar to what happened during the first wave of the Covid-19 pandemic due to competition over PPEs and ventilators. Again, this is exactly what is waiting for us at the international level; developed countries are vaccinating at a high speed while developing countries are lagging, so we may see the world divided between these two groups of countries. Therefore, the solution can also be quite similar to what the EU commission is doing, that is coordination of vaccine deliveries, except it should be between all countries.

In fact, there is already an attempt to coordinate governments in their response to the pandemic. The Covid-19 Vaccine Global Access Facility (COVAX), created by the WHO, the Coalition for Epidemic Preparedness Innovations (CEPI), and Gavi, the Vaccine Alliance, aims to bring countries together in their effort to overcome Covid-19. In particular, COVAX seeks to prevent monopolisation of vaccines by rich countries and coordinate their distribution according to population size and respective urgency of countries' prevention efforts. However, despite that more than 180 countries joined COVAX - including 94 rich developed countries and most recently the US - representing two-thirds of the world's population, it seems to have failed in bringing about any meaningful change so far (Ghosh, 2020). An equitable distribution of vaccines has already been sacrificed for vaccine nationalism.

Beyond the failure to extend aid to developing countries, there is also a lack of cooperation, even competition, between major countries. It is not clear, for instance, as to why the EU or the US have not authorised the use of Sputnik V or Chinese developed Sinovac as of yet. Similarly, Western-made vaccines have not so far been supplied to other parts of the world. It can be argued that there is another layer of geopolitical ten-

sion between these competing powers, with the EU and US, on one side, and China and Russia on the other, in terms of provision of vaccines to other countries. Some countries that can be considered comparatively more neutral in this geopolitical competition, including Brazil, India, Indonesia, and Turkey, have purchased vaccines from Russia and China while trying to access Western-made vaccines as well (unsuccessfully so far). Interestingly, Hungary is the only country in the EU that is preparing to buy the Russian-made Sputnik V even though it has not been approved by the EU, whereas Serbia is the only European country that is using the Chinese-made Sinovac vaccine (Economist, 2021).

One might ask, if free markets are not efficient and socially beneficial for the distribution of Covid-19 vaccines, then why leave other life-savings drugs and vaccines to the mercy of free markets? People in poor countries die from many other preventable diseases because they cannot access expensive treatments or vaccines. In fact, pharmaceutical companies have been criticised for their pricing policies as has the WHO for its ineffectiveness in working more efficiently to prevent such human tragedy. Relatedly, while big pharma has created half a dozen vaccines for Covid-19 in record time, they have failed to develop a cure or vaccine for another epidemic, Ebola, that impacted only poor West African countries. It seems that there is a lesson in Covid-19 about the nature of capitalism and the need for global cooperation in general.



(Emrah Yorulmaz / Anadolu Agency)

Conclusion

It has been more than a year since the world heard about a novel coronavirus in China. Since then, millions of people have lost their lives and livelihoods across the globe. Now, with the availability of vaccines, which have the potential to effectively prevent the spread of the Covid-19 virus, we are finally looking at the possibility of returning to our pre-pandemic normal. This means that after one of the deepest economic crises in history, caused by the Covid-19 pandemic, production can start to operate at full capacity and international trade can resume. However, before a full economic recovery is possible, billions of vaccines have to be produced and distributed to all corners of the world. The world is facing a major challenge of meeting enormous global demand for Covid-19 vaccines with limited supplies.

In particular, poor countries dramatically lack the financial and organisational capacity to access and distribute vaccines on a mass scale. Rich countries are already lined up for a limited supply of vaccines, that are produced by a handful of companies, most of which are based in developed countries, while most poor countries do not have the political power or financial means to compete for this life-saving intervention. As long as prices remain beyond the reach of poor developing countries, rich countries will monopolise early doses while the overwhelming majority of people in poor countries will remain unvaccinated. Unequal vaccine distribution will mean that Covid-19 will continue to spread and take lives in poor countries while rich countries move towards ending the pandemic. In other words, following the logic of the market will amount to no less than a humanitarian catastrophe.

Furthermore, it is likely that under such conditions, rich countries would seek to close their borders to people from developing countries in order to avoid further outbreaks. Several countries, including Israel and others in the EU, are already planning for 'vaccine passports', which will allow only those who have been vaccinated to enter. Apart from human suffering, millions of people living in the poorest parts of the world face the possibility of being prevented from travelling to other countries for business, education, or work. Considering that those who will receive the vaccine overwhelmingly include citizens from developed countries as well as the richest in developing countries, measures such as vaccine passports will effectively create a world that

is physically divided between the rich and poor, what some have referred to as 'vaccine apartheid'.

If Covid-19 prevails in most parts of the poor world, it will have serious humanitarian and economic consequences. However, its consequences will not be limited to poor countries. Due to its effect on global supply chains and international trade, rich countries also stand to suffer economically. Prevalence of Covid-19 will depress global output and disrupt international trade, which can even lead a long-term global economic stagnation. Given that developed countries have already been suffering from secular stagnation for some time, this has significant implications for these economies. Therefore, vaccination in poor countries could prevent not only immense human suffering in such countries but also benefit economically wealthy countries. All that is needed is a cooperative mechanism at the global scale, which can effectively circumvent the problems in the vaccine market and coordinate vaccine efforts. Governments need to cooperate more effectively, and rich countries should extend more aid to poor countries for vaccination efforts. Mechanisms such as COVAX provide an effective channel to realise this aim.

Unless there is strong and effective international cooperation, crises situation such as this has great potential to lead to immense human suffering in poor countries, dramatically rising inequality between developed and developing countries, and a collapse in the global economy, with significant political and geopolitical consequences. This is important not only from a moral standpoint but also for economic reasons. According to experts, pandemics are likely to become more intense and frequent due to changing ecological and social patterns (Chan et al., 2010). Moreover, the world is facing an increasingly urgent climate crisis. We need to start seriously thinking through some difficult questions regarding how the world's rich and poor nations should cooperate. Strong institutions of effective cooperation and multilateral organisations to implement these mechanisms are urgently required.

References

- Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American economic review*, 91(5), 1369-1401.
- Al-Jazeera (2020, December 10). 'Moral issue': African official blasts COVID vaccine inequality. <https://www.aljazeera.com/news/2020/12/10/moral-issue-african-health-official-blasts-vaccine-inequality>.
- BBC (2021, January 24). Covid: Italian PM brands vaccine delay 'unacceptable'. BBC News. <https://www.bbc.co.uk/news/world-europe-55780431>.
- Chan, E. H., Brewer, T. F., Madoff, L. C., Pollack, M. P., Sonrick, A. L., Keller, M., ... & Brownstein, J. S. (2010). Global capacity for emerging infectious disease detection. *Proceedings of the National Academy of Sciences*, 107(50), 21701-21706.
- Dixon, S., McDonald, S., & Roberts, J. (2002). The impact of HIV and AIDS on Africa's economic development. *Bmj*, 324(7331), 232-234.
- Economist (2021, January 9). Vaccinating the World; The Great Task. The Economist Briefing. <https://www.economist.com/briefing/2021/01/09/the-great-task>.
- EIU (2020, December 18). Rich countries will get access to coronavirus vaccines earlier than others. The Economist Intelligence Unit. <https://www.eiu.com/n/rich-countries-will-get-access-to-coronavirus-vaccines-earlier-than-others/>.
- Fidler, D. P. (2010). Negotiating equitable access to influenza vaccines: global health diplomacy and the controversies surrounding avian influenza H5N1 and pandemic influenza H1N1. *PLoS Med*, 7(5): e1000247. doi: 10.1371/journal.pmed.1000247.
- Ghosh, J. (2020, November 16). Vaccine Apartheid. Project Syndicate. <https://www.project-syndicate.org/commentary/pfizer-vaccine-doses-claimed-by-rich-countries-weakens-co-vax-by-jayati-ghosh-2020-11?barrier=accesspaylog>.
- GitHub (2021). Data on COVID-19 Vaccination Rates. <https://github.com/owid/covid-19-data/blob/master/public/data/vaccinations/locations.csv>. Retrieved from OurWorldInData.org published online at <https://ourworldindata.org/covid-vaccinations>.
- Goodman, P. S. (2021, January 23). If Poor Countries Go Unvaccinated, a Study Says, Rich Ones Will Pay. New York Times. <https://www.nytimes.com/2021/01/23/business/coronavirus-vaccines-global-economy.html?referringSource=articleShare>.
- Heled, Y., Rutschman, A. S., & Vertinsky, L. (2020). The problem with relying on profit-driven models to produce pandemic drugs. *Journal of Law and the Biosciences*, 7(1), Isaa060. <https://doi.org/10.1093/jlb/Isaa060>.
- Kalemli-Ozcan, S., Demiralp, S., Yesiltas, S., Yildirim, M. & Cakmakli, C. (2021). The Economic Case for Global Vaccinations: An Epidemiological Model with International Production Networks (No: 15710). CEPR Discussion Papers.
- Nuki, P., Gulland, A., Rothwell, J., Squires, N., Badcock, J., Samuel, H., & Smith N. (2021, January 18). Fears of 'vaccine apartheid' as countries mull immunisation passports. The Telegraph. <https://www.telegraph.co.uk/global-health/science-and-disease/fears-vaccine-apartheid-countries-mull-immunisation-passports/>.
- Oppenheim, B. & Yamey, G. (2017, June 19). Pandemics and the Poor. Future Development. <https://www.brookings.edu/blog/future-development/2017/06/19/pandemics-and-the-poor/>.
- Oxfam (2020, December 8). Rich countries have pre-purchased enough doses to vaccinate their entire populations nearly 3 times over. Oxfam Emergency Response Report. <https://www.oxfam.ca/news/canada-front-of-the-line-for-covid-19-doses-while-9-out-of-10-people-in-poor-countries-are-set-to-miss-out-on-vaccine-next-year/>.
- Peel, M., Fleming S., Khan M., & Mancini D. P. (2021, January 22). EU hit by delay to Oxford/AstraZeneca vaccine delivery. Financial Times. <https://www.ft.com/content/3dbfe495-5947-4dd0-9f43-5edc5e6d6dc7>.
- Sachs, J. D. (2003). Institutions matter, but not for everything. *Finance and Development*, 40(2), 38-41.
- Thaler, R. H. (2020, December 9). Getting Everyone Vaccinated, With 'Nudges' and Charity Auctions. The New York Times. <https://www.nytimes.com/2020/12/09/business/coronavirus-vaccination-auctions-celebrities.html>.
- Terry, B. (2021, January 13). Comparing COVID-19 Vaccines: Timelines, Types and Prices. BioSpace. <https://www.biospace.com/article/comparing-covid-19-vaccines-pfizer-biontech-moderna-astrazeneca-oxford-j-and-j-russia-s-sputnik-v/>.
- UNAIDS (2020). UNAIDS Data Report 2020. The Joint United Nations Programme on HIV/AIDS. https://www.unaids.org/sites/default/files/media_asset/2020_aids-data-book_en.pdf.
- World Bank (2021). Poverty Gap at \$1.9 and \$3.2 a day (2011 PPP) (%) [dataset]. <https://data.worldbank.org/indicator/SL.POV.LMIC.GP>.

