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The social organization of science during the COVID-19 pandemic

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Abstract.
BACKGROUND: The COVID-19 pandemic has shocked society worldwide. Multiple efforts went immediately into developing treatments for managing and vaccines for preventing the disease. National and international initiatives emerged to deal with the deep economic and social inequalities in our world today.
OBJECTIVE: To show that the global inequalities that have become salient during the COVID-19 pandemic and specially with the global vaccination campaign, are the result of a highly privatized system of research and development (R&D), which is first and foremost profit-driven, and where epistemic and social concerns are not prioritized.
METHODS: Philosophical analysis.
RESULTS: After exploring the current organization of scientific research, as well as its impact in the development of research at a global scale, the paper shows the way in which this highly privatized organization of research has permeated scientific research on COVID-19, identifying who is currently benefiting from pandemic science, and who on the contrary is suffering the consequences of this organization. Using the COVAX mechanism as an example, the paper argues that international efforts to counteract the power of commercially-driven science has not rendered the expected results.
CONCLUSIONS: The current organization of science ought to be shaken and restructured if we aim to be better prepared to address the global challenges of the future with the relevant scientific and technological development.

Keywords: Social organization of science, pandemic science, COVAX, privatization of science, coronavirus

1. Introduction

The COVID-19 pandemic has shocked society worldwide. Multiple efforts went immediately into developing treatments for managing and vaccines for preventing the disease. A number of problems have arisen regarding the allocation and distribution of vaccines, even before they were available [1]. National and international efforts emerged to deal with the deep economic and social inequalities in our world today. The COVAX mechanism appeared as global strategy to join forces and ensure that the most vulnerable countries, i.e., those with the least bargaining power, would not be left behind in the vaccination process.

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COVAX would lead a joint negotiation strategy with pharmaceutical companies and provide financial support for low-income countries unable to purchase the vaccine. Much has been said regarding the unequal distribution of vaccines. The high demand has introduced vaccine nationalism [2], setting export barriers for vaccine distribution in countries where vaccines are manufactured, at least until local supply has been guaranteed, hoarding of vaccine supplies in high-income countries who have been able to overpay up to 4 times the required doses to vaccinate all their population [3], and so on. Weak bargaining power and limited supplies have led to extremely slow vaccination programs in the global south, which basically has been obliged to wait in line until the richer countries conclude their vaccination process. The idea of a *vaccine apartheid* has emerged to describe the brutally unequal, as well as epidemiologically deficient, vaccine distribution process that we have in place [4].

In this piece, I argue that the global inequalities that have become salient during the COVID-19 pandemic and specially with the global vaccination campaign, are the result of a highly privatized system of research and development (R&D), which is first and foremost profit-driven, and where epistemic and social concerns are not prioritized. This, in turn, will cost us millions of lives to the Coronavirus, which perhaps could have been saved with a different organization of R&D. In order to show this, I first explore the current organization of scientific research, as well as its impact in the development of research at a global scale. I then show the way in which this highly privatized organization of research has permeated scientific research on COVID-19, identifying who is currently benefiting from pandemic science, and who on the contrary is suffering the consequences of this organization. Using the COVAX mechanism as an example, I argue that international efforts to counteract the power of commercially-driven science has not rendered the expected results. Finally, I conclude by identifying the main mechanisms that have been used by pharmaceutical companies worldwide to oppose a more leveled field for vaccine distribution.

2. How was science funded before the pandemic?

The social organization of science suffered a major restructure as the huge national budget for scientific and technological research started to decline in the dusk of the Cold War. A desire to increase the competitiveness of the US on the global scale led to a series of reforms, with the goal of maintaining the US as a leader of R&D worldwide, while adapting to the changing economic and political landscape. Among the main changes, we can find the strengthening of intellectual property rights, the weakening of antitrust laws, the emergence of international free-trade agreements, the creation of new research centers, such as contract research organizations and think tanks, and the advent of new research strategies such as the out-sourcing and off-shoring of research [5].

As a result, scientific and technological research has steadily moved into the private sector in recent decades. Since the end of the Cold War, the total percentage of public funding of R&D has decreased, at least in the US and EU, which together still represent the mayor drivers of R&D today. In contrast, the private sector has steadily increased its investment in this area, so much so that it currently performs 73% and funds 70% of R&D in the US [6]. In addition, the privatization of scientific and technological research has focused on applied research (vs. basic science), and it has also favored certain areas of research among which pharmaceuticals have a central place [6].

Although science has also been commercially driven in the past—think, for instance, of the big corporate labs in firms such as Dupont or Kodak in the beginning of the 20th century—a crucial difference with the commercialization of research today has to do with globalization. New information

and communication technologies (ICTs) as well as fast and efficient transportation have not only changed economic development worldwide, but also scientific and technological research [7]. In particular, an international division of R&D has emerged, in which the main sources of research funding remain in the Global North—and reach the Global South through grants, philanthropy, or international collaborations—whereas certain stages of the research process are now off-shored to the Global South—e.g., data gathering and analysis. The system remains highly hierarchical, since the leadership role remains in the hands of researchers and institutions in the Global North, who are still in charge of the more defining stages, such as agenda setting, data interpretation, and publication [8].

3. What has changed during the pandemic?

Without a doubt, the COVID-19 pandemic put huge pressure on national governments not only to implement public health measures to contain the virus, but to take the lead toward a solution. Of course, this meant an emergency call to scientific researchers and pharmaceutical companies, who rapidly became in charge of developing a vaccine to immunize the global population. Both the US government and the EU were quick to provide public funding to support the vaccine effort. The US government, through Operation Warp Speed, allocated more than $12 billion to pharmaceutical companies [9], and the EU has contributed circa €3 billion for the production of vaccines [10].

As expected, the big pharmaceutical companies of the West became key players, leading to the development of a number of, up until now, successful vaccine candidates, such as the ones developed by Pfizer, Moderna, Astra-Zeneca, Johnson & Johnson, and Novavax. At the same time, China displayed its great research capabilities, also at the head of the race with the development of at least three different vaccines by Chinese pharmaceutical companies Sinovac, Sinopharm and CanSino. According to the latest update of the World Health Organization on March 23rd 2021, there are currently 83 vaccines undergoing clinical trials, and 184 in pre-clinical development [11]. The top 10, which are on Phase 3 or even Phase 4 of clinical development, are all driven by pharmaceutical companies, or in collaboration with pharmaceutical companies. In the meantime, non-COVID biomedical research worldwide has suffered massive cuts, especially funding that usually arrives via charitable agencies [12].

So even if there has been an important investment from tax-payer money for the development of vaccines against COVID-19, the truth is that the organization of scientific research in this realm is pretty much comparable to its pre-COVID stages, insofar as private companies are leading the way in technological innovation, and taking advantage of their privileged status for commercial gain. The globalized privatization of science has become even more salient as multinational pharmaceutical companies receive tax-payer money from different states, conduct international clinical trials, and then negotiate independently and confidentially with each national government to make a profit from their vaccines in a time of crisis.

Despite public financial support, it has become clear that pandemic science is still a commercially-driven endeavor. In addition, public-private collaborations have been encouraged, e.g., Moderna/NIAID and Oxford/AstraZeneca, in order to boost the search for a vaccine. In the end, however, profits will remain private. It is no surprise then that pharmaceutical companies have significantly increased their lobbying expenditures during the pandemic: Novartis by 259%, AstraZeneca by 154%, Biogen by 344%, PhRMA by 30%, and Pfizer 56% [13], for congressional decisions on the allocation of funding and support for vaccine and treatment development is of outmost interest to these companies. After all, it is a no-brainer:

national governments have invested in research development generously and promptly, and if they fulfill their promises, pharmaceutical companies will profit, while reducing financial risks.

4. COVAX to the rescue?

Even from the start, it became clear that social and economic inequalities would make the purchase and distribution of vaccines a challenge, particularly for low and middle-income countries. COVAX (Covid-19 Vaccines Global Access Facility) emerged as an alternative to address this challenge and allow the most vulnerable a fighting chance. Led by the WHO, Gavi (a private-public alliance for vaccine promotion), and CEPI (a private foundation for pandemic research), the COVAX mechanism was created for countries worldwide to join forces in their negotiations with pharmaceutical companies and procure vaccine access even for the least wealthy. High-income countries would help low and middle-income countries to acquire vaccine supplies by contributing a percentage of their investment in vaccine purchases through COVAX to those who need it [14].

Vaccine hoarding has now become a reality. High-income countries, with only 14% of the world's population have acquired 51% of the available vaccines, and some countries, such as the UK and Canada, have overstocked their vaccine supply, securing two times and even four times the supply needed to vaccinate all their population respectively [3]. Furthermore, *vaccine nationalism* has also emerged with richer countries privileging the vaccination of their own citizens over others worldwide, and taking advantage of their positions of power as vaccine manufacturers and high bidders to block vaccines exports until local supplies are used [2]. Vaccine nationalism is likely to postpone the end of the pandemic, with high-income countries vaccinating their population, slowing down the vaccination pace of the most vulnerable populations everywhere else, thus increasing the death toll of COVID-19 [15].

Vaccine hoarding and vaccine nationalism have impeded the proper implementation of the COVAX mechanism delaying vaccine supplies for low and middle-income countries, and probably contributing to worsening the already deep economic, social, and health crisis that the pandemic has brought to these countries. In addition, some are calling the current situation a *vaccine apartheid*, in which powerful pharmaceutical companies are favoring their own economic interests at the cost of human lives worldwide, while high-income countries play their game instead of changing the rules that gave them this power in the first place. In the words of Winnie Byanyima, UNAIDS Executive Director:

> Nine months ago world leaders were queuing up to declare any COVID-19 vaccine a global public good. Today we are witness to a vaccine apartheid that is only serving the interests of powerful and profitable pharmaceutical corporations while costing each one of us the quickest and least harmful exist route from this crisis (…) The vaccine science, know-how and technology paid for in large part by over $100 billion of taxpayers' money, can no longer be treated as the private property of pharmaceutical corporations. Instead, these must be shared openly, via the World Health Organisation's Covid Technology Access Pool so that more manufacturers can be brought on board and a global plan put in action to scale up vaccine production [4].

Despite its laudable intentions, COVAX has not been able to fulfill its promise, insofar as it has been unable to counteract the power given to pharmaceutical companies in our current regime of globalized privatization of scientific and technological research. Multinational pharmaceutical companies seem to have become so powerful that not even the governments in the rich countries which helped create them, dare to question their privileges. On the contrary, they seem very willing to play by their rules, at least as long as they have negotiating power to procure vaccine supplies for their citizens. They have not

acknowledged that this won't be enough, and could even leave us worse-off, in the fight to neutralize the effects of a global pandemic.

5. Conclusion

Pandemic science has followed the social (commercial) organization of science that was in place before the pandemic. This means that the economic interests of the pharmaceutical companies producing COVID-19 vaccines have been prioritized over global social needs. National governments in rich countries have not acted coherently in favor of the most vulnerable people worldwide, and they have even put in place self-centered strategies to procure vaccine supplies for their own citizens, even hoarding supplies that they won't need. It is obvious now that the global privatization of science has been successfully exploited during the pandemic, where even the powerful governments of the Global North have let pharmaceutical companies take advantage of global inequalities. In terms of economic profits, it is then fair to say that the current organization of R&D thrives on inequality and, in the case of the pandemic, it is clearly contributing to broaden the gap between rich and poor countries. In this sense, in order to handle the social inequalities that have been exacerbated by the development and distribution of COVID-19 vaccines worldwide, we need to think more broadly about the inequalities in global R&D more generally. The current organization of science ought to be shaken and restructured if we aim to be better prepared to address the global challenges of the future with relevant scientific and technological developments.

Conflict of interest

The author declares no conflict of interest in the development of this manuscript.

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