Should Commercial Entities Develop the COVID-19 Vaccine?

Report

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IS MONATISING A VIRUS RIGHT FOR SOCIETIES THAT CAN'T PAY FOR THE SOLUTION?

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1. BACKGROUND INTRODUCTION

There were 615,200 people entering Ireland in February 2020, a rising figure that probably would have continued to increase if it weren't for the world governments' COVID-19 response. When the virus spread all across China, the chances of it being contained in a globalised earth was slim: from the United Nations' estimates, there is approximately 7.9 billion people in the world in December 2021. Only a few thousand are "*uncontacted*."

This poses a question: do we stop the virus spreading by trying to get multiple billions of people all to lock themselves away from all the other multiple billions of people or do we manufacture a vaccine that prevents the virus spreading as much as possible? The former option would get very messy: people would become mentally unhealthy, the economy would collapse, there would have to be a huge stock piling beforehand, and it is nearly impossible to implement. The option that the Government of Ireland has opted for with its *Living with COVID* plan is that we continue as usual to the best of our ability, abiding by new social distancing rules and when the vaccinations finished development, we decided if we wanted to take them or not. They're not 100% effective and not 100% of people will be inoculated even if we have enough supply but it will bring the transmission rate down which will let more immunodeficient people live – the ultimate goal for the government.

This approach makes sense, but a pandemic will never be ideal. The main problem with vaccinations is cost and inequity in affording the cost (i.e. people in poorer countries not receiving as much as those in richer countries).

Ireland has given €5,000,000 (five million euro) towards vaccination aid to other countries, four million of that going towards the UN's COVAX facility trying to provide equitable access to vaccines worldwide and the rest going to the World Health Organization of the UN. Additional money has been donated through the European Union's membership fee paid by 27 member states contributing to €850 million that could pay for 1.3 billion vaccines going to low-to-middle-income countries that couldn't pay for it otherwise because of conflict or lack of development. The EU has also allocated some of the €50 million going towards Global Health to the World Health Organisation and Gavi (the Vaccine Alliance) which would also go towards COVID-19 vaccination.

But it's not just the government helping the effort – AstraZeneca and Oxford and Johnson & Johnson have pledged to provide their doses on a not-for-profit basis until the end of the pandemic *(See Section 3)*. Many have not done this because from the perspective of a commercial entity, it is the opposite of what its goal is: to make profit. This report will go over the effects of this perspective and will try to determine if it is the best solution to this ongoing pandemic.

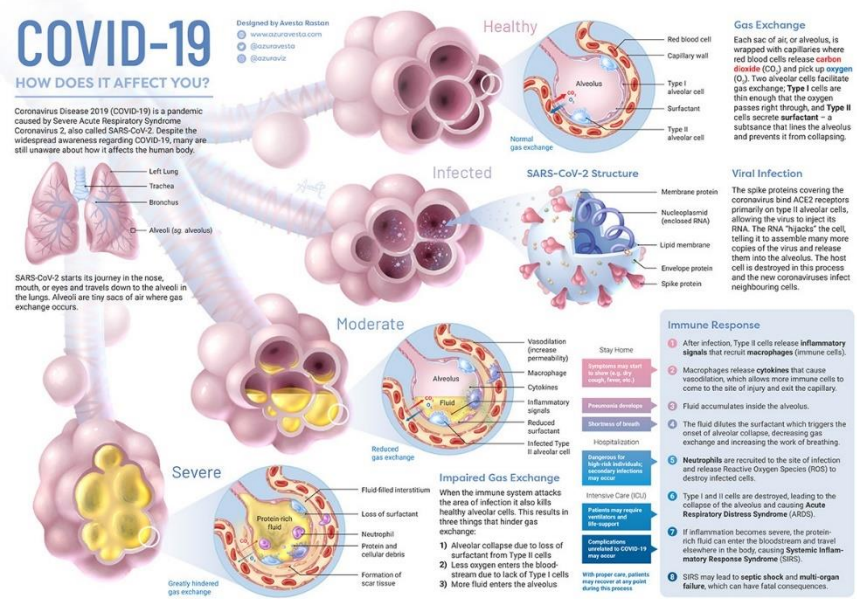
2. ADVANTAGES OF COMMERCIAL RESEARCH

About SARS-CoV-2/COVID-19

To understand the processes that the vaccine developers use, it would be helpful to understand the virus that causes COVID-19: **S**evere **A**cute **R**espiratory **S**yndrome **Co**ronavirus **2** (**SARS-CoV-2**). It wasn't the first of its kind, SARS-CoV-1 was another coronavirus that caused a virus called SARS that broke out in 2002 which wasn't as strong as COVID-19 and was under control by 2004 but had killed 774 people. It wasn't the first time a

SARS virus had broken out and it certainly wasn't the first coronavirus but this one was a highly infectious variant that has left millions of people dead.

It is spread by virons that get into the respiratory system (the system your body uses to convert oxygen into energy aerobically) by being transmitted from person to person from them breathing, sneezing or somehow getting the virons inside them out into the air which it can travel about 2 metres. The virus can't spread like this if all virons are redirected away from the person with a mask or by staying far enough away from them that it cannot be transmitted to them. The virus contains an RNA code it spreads to the cells in your alveoli located at the end of your bronchioles in your lungs that mark the end of the respiratory system. In the alveoli, gas exchange takes place to get the oxygen in the air through the alveoli's thin wall into your blood where it needs it. The virus destroys itself by executing its RNA code but the code is for the cells to make more viruses in its place and sooner or later those few virons that got in becomes a much bigger problem.



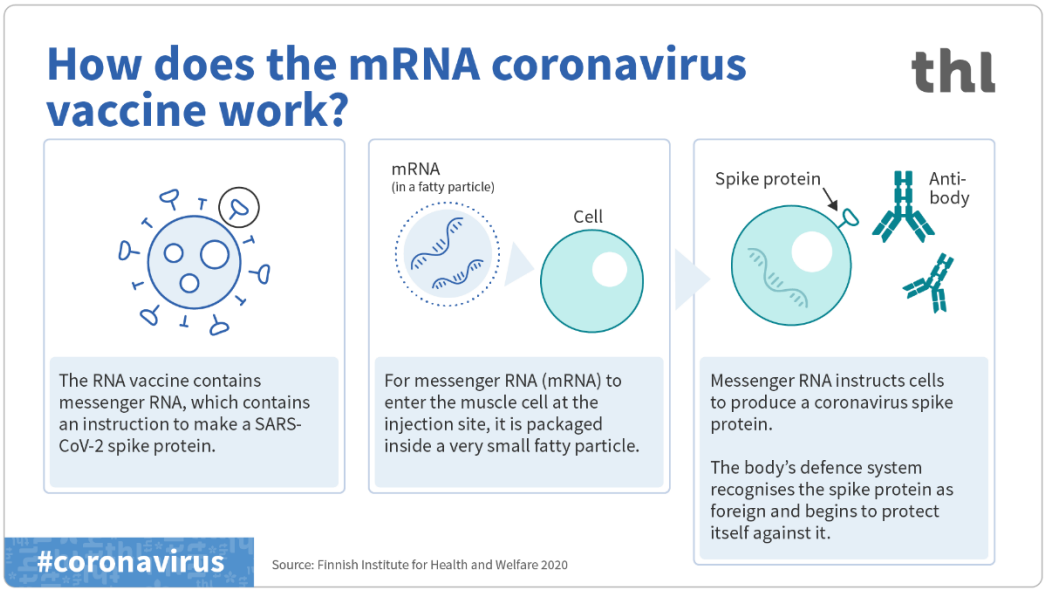
Source: Visual Capitalist

Coronavirus pandemics have even been depicted in fiction decades beforehand and has been foreshadowed for years; it wasn't a surprise, and the researchers weren't going in empty-handed either because the government was already funding research on vaccination research, luckily.

Vaccinating against SARS-CoV-2

The way to combat the virus is to stop it spreading in the first place or to give the body the ability to fight it. Traditionally, the way to do this is through giving the body small amounts of the virus and triggering your immune system to respond. Because of the small amounts, your immune system should be able to handle it but still have the experience to fight the real thing should it need to, like doing past papers or a fire drill to prepare for the real papers or a real fire.

But there is another way that Phizer and Moderna, two commercial companies, have been researching and that is mRNA vaccines. mRNA works like a virus but with good intentions: it is **mod**ified **RNA** (where **mod**e**RNA** got their name from!) that tells your body how to make proteins. The problem with it that people had in the past was that it was, after all, just like a virus and your body doesn't know it is there to help you. The whole premise of vaccines having your body fight them seems contrary (at least to me) to the premise of RNA vaccines, so researchers had to hide the RNA in a *lipid nanoparticle*, a thin layer of fat that stays hidden when it enters the body but dissolves when it is needed. When it is dissolved it gets your own body to make the spike proteins (the "*corona*", Latin for "crown" that gives the virus its name) and your body then knows to look out for those specific proteins. The name given to this modified RNA that sends the message to your body is **m**essenger **RNA** (**mRNA**)



The Commercial Market

Estimates of vaccine efficacy from Phase 3 clinical trials, primary series

Efficacy estimates cited generally indicate protection from symptomatic COVID-19, although there are some differences between trial measurements. Not all estimates are directly comparable, and do not cover protection against new variants. Estimates for Pfizer, Moderna, Gamaleya, Novavax, J&J, Sinovac and AstraZeneca come from a single trial, although for AstraZeneca there are data available from other, smaller studies, too.

= Commercial =Non-profit for vaccines only

BioPharma Dive / Highlights added

While Pfizer and Moderna didn't come up with these concepts, Pfizer and Moderna, who bought the patent to mRNA for $75 million from the

company that used to have the rights for it, found a way to commercialise it and to become more than just research. mRNA molecules are faster to make than traditional proteins too and estimates of vaccine efficacy from clinical trials say Pfizer & BioNTech's vaccine and Moderna's vaccine are the most efficient vaccines at 95.0% and 94.1% efficacy followed then by the Gamaleya Research Institute supported by the government of Russia being the most efficient vaccine which is only 5% less efficient then BioNTech and Pfizer's. *(See below)*

Another thing we can look at is the target supply of each because ultimately the vaccine is pointless unless people actually receive it. It's hard to compare governments with companies in this field because the governenments leading the way are being secretive about their plans, but here is the data that I found:

Vaccine	**Target supply (doses)**	Funding
BioNTech, Pfizer	3 billion (2021) 4 billion (2022)	US $5.9 billion DE $445 million
Oxford, AstraZeneca	2 billion (with partners)	US $1.2 billion CEPI $383 million Gavi $367 million GB $80 million EU Undisclosed
Novavax	2 billion (2021 onwards)	US $1.66 billion (paused August 2021) CEPI $388 million
Sinovac	2 billion (annually)	Undisclosed
Sinopharm, Beijing Institute	Billions	CN Undisclosed
Johnson & Johnson	1 billion	US $2 billion

Sanofi[1], GlaxoSmithKline	Originally 1 billion (by mid-2021) $2.13 billion	US $2.13 billion
Moderna	700-800 million (2021) 3 billion (2022)	US - $5.96 billion CEPI - Undisclosed
CureVac	300 million (2021) 600 million (2022)	DE $640 million EU Up to $85 million CEPI $8 million
Clover Biopharmaceuticals[2]	Hundreds of millions (annually)	CEPI $70 million
Gameleya Research Institute	Hundreds of millions	RU Undisclosed
CanSino Biologics	Undisclosed	CN Undisclosed
(Continued on next page) Inovio	*(Continued on next page)* 100 million (2021)	*(Continued on next page)* US - $83 billion CEPI $17 million
Medicago, GlaxoSmithKline	76 million (2021) 1 billion (by 2023)	CA Unspecified FR (Quebec) $5 million
Merck & Co.	Undisclosed	US via IAVI $38 million

[1] Sanofi doesn't intend to pursue vaccine development anymore
[2] They have not started selling them as of 23 September

3. THE PROBLEM

The Patent Problem

On the 15th September 2021, only 1% of people are fully vaccinated in lower-income countries and that figure is 10% in lower-middle-income countries, compared with more than half of the entire population being fully vaccinated in high-income countries. This shows a very drastic difference, and that figure is with the aid from Irish Aid, the EU, the UN, the World Health Organisation, charities, and other organisations. It isn't just a correlation that lower income countries are in conflict and can't give out the vaccine, because many researchers are saying that the best way to provide equity when it comes to COVID-19 vaccine access is long-term aid: allowing the global south to make their own vaccines. Peter Singer, an adviser to the director-general of the WHO (UN) says that *"Charity is good, but we can't rely on charity alone"*. Health-advocacy organisations are pressing owners of the vaccines' patents to allow this development by releasing their rights to their invention to technology and drug manufacturers in these low-to-middle-income countries.

Case Study: South Africa

The most effective vaccines, as mentioned in Section 2, are developed by commercial entities like Pfizer, BioNTech and Moderna (I will discuss later in this section what they chose to do with this power) who won't release their patents. Some of these companies have been developing vaccines in poor countries already; for example, Johnson & Johnson, who is not profiting from the vaccine but still retains the patent for themselves, already develop vaccines in South Africa, a lower-middle-income country but they are sending them all to Europe. *"It's like a country is making food for the world*

and sees its food being shipped off to high-resource settings while its citizens starve," Glenda Gray, a South African scientist who helped lead Johnson & Johnson's clinical trial there, said to the NY Times. This reminds me of the Irish Potato Famine as well, where the UK government was taking the food that was being grown in Ireland and leaving the potatoes which became unavailable because of blight. South Africa may have had a choice to do this deal with companies, but they would not refuse the tax from an incredibly wealthy company making billions. A "*confidential contract*" allegedly viewable by the NY Times between South Africa and JnJ ensured that they would be selling to the wealthy countries. that Popo Maja, a spokesman for the South African health ministry, said the government was not happy with the requirements in the contract but lacked the leverage to refuse them. "*The government was not given any choice,"* he said in a statement. "*Sign contract or no vaccine*." The alternative was to willingly send away the solution to the deadly pandemic, something that a government would be wrong to do. Ireland welcomed the soup kitchens, but it was not the right solution to the problem.

Three months later, Bloomberg reported that JnJ and Phizer were actually asked by South Africa to suspend delivery of the vaccine to them just before the third wave of the virus led by the Omicron variant because of the plunging demand. This shows that even if low-to-middle-income countries have access to the vaccine it is not clear whether the population would even take the jabs. The continent of Africa's most developed economy has only 35% of their populations fully vaccinated even after six months of the vaccine being made available. The day before Bloomberg announced this, the people receiving the vaccine only got to half the daily peak.

South Africa was able to vaccinate more people than the amount that turned up, so does this mean that lack of availability because of privatization isn't the real problem?

The Monetary Problem

Whether people will take it or not, commercialised vaccines cost money. Here are some vaccination patent-holders and how they do finance with developing countries:

Pfizer and BioNTech

In the first half of 2021, Pfizer made $11.3bn in USD (almost ten billion euro) from the *Comirnaty* jab it developed with the German company BioNTech. They raised the price of their tozinameran[3] vaccine when they discovered that the mRNA formula was very effective – and valuable. In July Pfizer lifted their sales forecast for the whole year to $33.5bn (€29.6bn, almost €20 billion more than what it expected to make in the first half, meaning a forecast of almost twice as much in the second half). BioNTech expects to make revenues of €16bn from the vaccines in 2021, as its net profit in the first half jumped to almost €4bn from only €142m a year earlier (an extremely high increase of 2,816%, 28 times what they were making before). Pfizer and BioNTech take 50% of all gross profit.

Pfizer and BioNTech are trying to produce 3 billion Comirnaty jabs in 2021 and 4 billion in 2022. They are now charging the EU €19.50 per jab compared to the €15.50 deal they had before and *The Times* reports that the UK is now paying £22 GBP a shot for 35m doses for the booster campaign, another increase. These increases were explained by Pfizer's CEO who said that it was a tiered pricing system:

> *"This means wealthier nations would pay about the cost of a takeaway meal for each dose … middle-income countries would*

[3] This is the International Nonproprietary Name for Comirnaty. This is the same worldwide regardless of what brand name it is marketed under in that country. Pfizer doesn't have any other trademarks for it, but some companies do. (e.g., Oxford & AstraZeneca)

pay roughly half that price … and to low-income countries we were offering them doses at cost."

- Albert Bourla, CEO of Pfizer Inc.

AstraZeneca and the University of Oxford

AstraZeneca's *Covishield*/*Vaxzervia* vaccine in partnership with the University of Oxford, neither of whom are making profit, made AstraZeneca $1.2 billion in USD. Pascal Soriot, the CEO of AstraZeneca, said in July 2021 that *"we cannot be a non-profit forever, but we will never intend to make large profits."*

4. CONCLUSION

In my opinion, commercial companies developing vaccines for viruses like SARS-CoV-2 are helpful because there are so many companies that can invest in a range of different vaccine methods (like rNA) and then the government only have to pay for the vaccines that they know work. That cuts out the money wasted on research, but the question is if it is worth paying the extra profit? The problem is, I can't actually answer that question because of the immense secrecy in the sector because both companies and governments (under pressure by companies or otherwise) are keeping things secret. Small companies that could have been easily bought out become huge monopolies that pressure governments into signing crazy deals that hide information from

the world. I don't think these companies should have the power they have, and I find it wrong that they are taking advantage of an emergency.

Governments are pouring billions into companies without knowing what they are actually paying for. I don't know why Johnson & Johnson weren't giving enough vaccines to South Africa initially and they weren't even profiting on it. I am sure that wouldn't happen with a proper government in control and because of what I learnt about South Africa, I think that it doesn't matter whether a company is commercial or not. I don't know if what AstraZeneca, JnJ and GSK are doing is a public relations stunt or if the shareholders feel that it is the right thing to do for humanity, but I don't know, which is worrying.

I think that non-profits are very beneficial as long as they supply equitable access to the vaccine to everybody. There are multiple problems I talked about like people not getting the vaccine, problems with companies themselves, but there is a shortage of vaccines in some countries but to restrict the vaccination sector may drive away the huge percentage of non-governmental organisations that are creating so many vaccines. I think this leaves it up to the funding from governments and non-government and intergovernmental organisations. Ideally, the vaccine would be produced solely by the government for the people, but I think commercial entities play an integral role in vaccination and to start funding research into a new vaccine wouldn't be a good idea because they don't have the patents that the companies already have.

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