

COVID-19 VACCINES:
ROLL-OUT AND UPDATED STUDIES

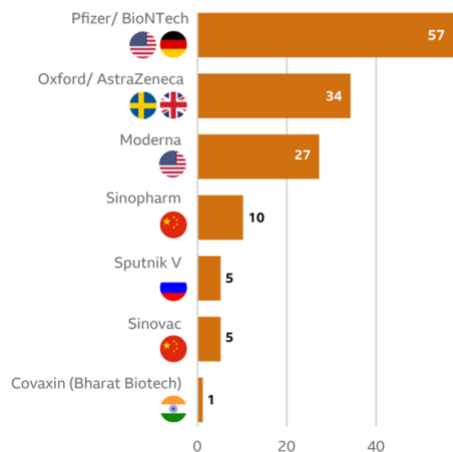


In our previous update, we discussed how the COVID-19 vaccine originated and the history of its development through the Ebola epidemic of 2013-2016. In this update, we wanted to touch on the process of US-wide and global vaccine roll-out as well as the updated studies regarding both the **Pfizer** and **Moderna** vaccines.

We also wanted to update that since our last report there have been no new vaccines authorized or approved for use in the United States, but the AstraZeneca (UK) vaccine has been approved for use outside of the United States. Unlike the two vaccines that are currently approved for use in the US, the AstraZeneca vaccine uses a modified version of a virus that produces fragments of the virus that trigger an immune response. Clinical trials have shown that it is 82% effective after two doses, but it is shown to be much less effective at protecting against some of the currently circulated variants. We are currently waiting for 2 other vaccines, made by Novavax and Johnson & Johnson, one of which (Johnson & Johnson) has applied to the FDA for Emergency Use Authorization. The FDA is planning on meeting regarding the vaccine candidate on February 26.

Authorized/Approved Vaccines				
Name	Vaccine Type	Primary Developers	Country of Authorization / Origin Approval	
mRNA-1273	mRNA-based vaccine	Moderna	US	US
BNT162b2	mRNA-based vaccine	Pfizer, BioNTech; Fosun Pharma	Multi-national	UK, Bahrain, Canada, Mexico, US, Singapore, Oman, Saudi Arabia, Kuwait
AZD1222	Adenovirus vaccine	AstraZeneca	UK	UK, Bahrain, Brazil, EU, India, South Africa
CoronoVac	Inactivated vaccine (formalin with alum adjuvant)	Sinovac	China	China, Brazil, Chile, Turkey
No name announced	Inactivated vaccine	Wuhan Institute of Biological Products; China National Pharmaceutical Group (Sinopharm)	China	China
Sputnik V	Non-replicating viral vector	Gamaleya Research Institute, Acellena Contract Drug Research and Development	Russia	Russia
BBIBP-CorV	Inactivated vaccine	Beijing Institute of Biological Products; China National Pharmaceutical Group (Sinopharm)	China	China, United Arab Emirates, Bahrain
Convidicea (Ad5-nCoV)	Recombinant vaccine (adenovirus type 5 vector)	CanSino Biologics	China	Mexico, China (military use), Pakistan
Covaxin	Inactivated vaccine	Bharat Biotech, ICMR	India	India
EpiVacCorona	Peptide Vaccine	Federal Budgetary Research Institute State Research Center of Virology and Biotechnology	Russia	Russia

Which vaccine has greatest global reach?
Number of locations currently administering each vaccine

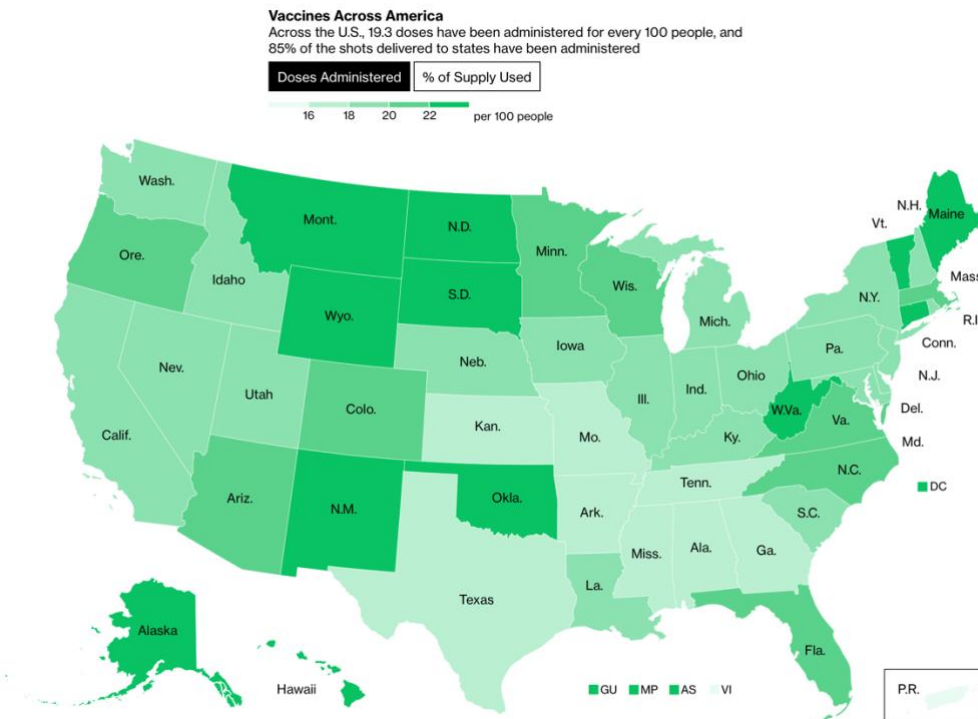


Several new research papers have suggested that one dose of the current two-shot regimens may be enough for certain population segments, specifically Covid-19 survivors. Researchers in Israel have reported that a single shot of the **Pfizer** vaccine is 85% effective at preventing symptomatic disease 15-28 days after being administered. An FDA spokesperson said there currently isn't enough research to change vaccine administration, but the US government is open to adjusting the dosing schedules, evidenced by the Centers for Disease Control and Prevention (CDC) allowing second doses to be delayed by several weeks. Obviously, dosing regimens should not be changed until it has been proven that a second dose does not provide much-added benefit to those previously



infected and a further worry revolves around vaccine hesitancy (people who may not be medically savvy may find changes confusing).

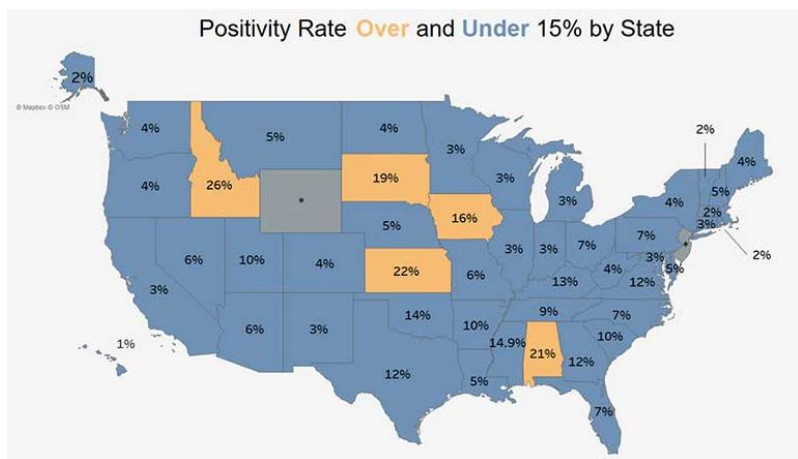
The largest vaccination campaign of all time is currently underway. More than 209 million doses have been administered across 92 countries. Unlike what we have been hearing colloquially, the



vaccine rollout in the United States is one of the best in the world. The US has distributed doses three times as quickly as the EU and almost five times that of Canada. More Americans have now received at least one dose than have tested positive for the virus since the pandemic started. With the current

vaccination rate of approximately 1.4 million doses per day, it will take an estimated 10 months to cover 75% of the US population. The United States has been leading the world on securing vaccination supplies but has been somewhat less successful at translating that into actual vaccinations.

It is interesting to note, although certain states such as North and South Dakota have been among the best at distributing the coronavirus vaccine among their citizens, they are also hotspots, with South Dakota have a case positivity rate of almost 20%.

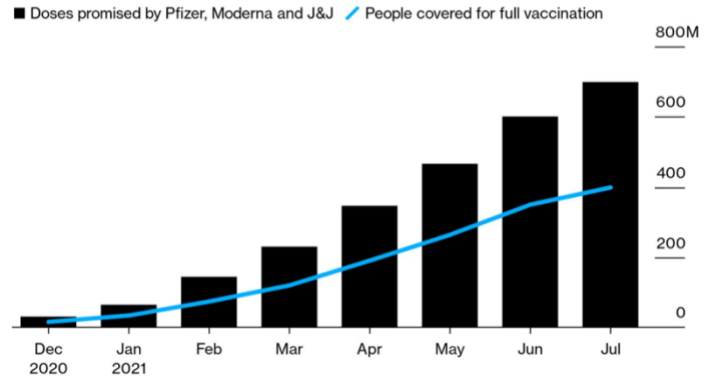


The first stage of the US rollout fell short of federal projections as vaccinations proceeded unevenly among the states. After initially focusing on hospitals and institutional healthcare settings, this next phase focuses more on retail pharmacies and health clinics to help expand the pool of those eligible for vaccinations. States have also turned large facilities such as sports stadiums into mass vaccination facilities. Others have been more efficient than others at administering their doses,

but unfortunately, winter storms have caused significant vaccine shipment delays recently and forced vaccination sites across the South and Midwest to close. If President Biden’s plan to vaccinate all willing Americans by July is successful, the United States would be significantly further ahead of nearly all other large countries, including China.

Vaccine Progress Points to a Spring Surprise

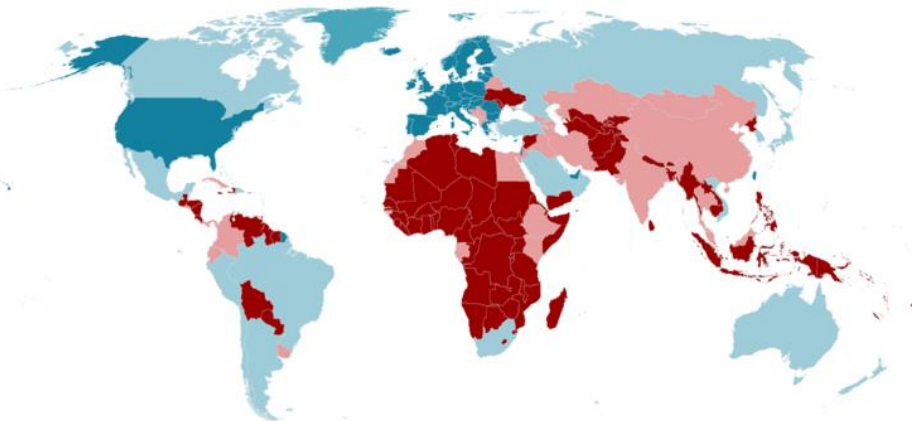
Manufacturers promise enough shots to cover the U.S. by Independence Day



Unfortunately, immunity around the world may take significantly longer than first thought. With the latest global vaccination rates of approximately 6.25 million doses per day, it would take an estimated 5 years to cover 75% of the global population with a two-dose vaccine. Israel currently leads the rate of inoculation with 82.3 doses administered per 100 people while most countries haven’t given their first shots yet. This had led some experts to believe it could take many years before the COVID-19 pandemic is brought under control at a global level due to vaccine stockpiling in wealthier nations. The European Centre for Disease Prevention and Control chief Andrea Ammon has urged European countries not to drop their guard against a virus that “seems very well adapted to humans” and could require pharmaceutical companies to tweak vaccines over time, like the seasonal flu. According to Ammon, “we should be prepared that it will remain with us.”

When will countries be fully covered?

■ Late 2021 ■ Mid 2022 ■ Late 2022 ■ From early 2023



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