

# The world of vaccines, before and after COVID

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The COVID-19 pandemic has forever changed the world's relationship to vaccines, spurring unprecedented production and innovation even while poorer nations were left behind.

At the start of World Immunization Week, AFP looks at the current

state of play.

## Millions of lives saved

Vaccines for more than 20 life-threatening diseases prevent between two to three million deaths a year, according to the World Health Organization.

Until COVID-19, vaccines tended to be targeted at specific groups, such as children, the elderly or vulnerable people.

And before the pandemic, the world produced around five billion total vaccine doses a year.

Then everything changed: 11 billion doses of COVID vaccines were produced in 2021 alone.

While vaccines against COVID were created in under a year, there are still no jabs for other [infectious diseases](#) like HIV that have been around for decades and killed millions.

The huge differences in vaccination rates between rich and [poor countries](#) has also shone a light on other vaccine inequalities.

Despite an effective measles vaccine being available for more than half a century, 140,000 deaths from the disease were recorded in 2018—mostly among children in developing countries, according to France's INSERM institute.

## Different technologies

Since British physician Edward Jenner came up with the [first vaccine](#) in

1796 for smallpox, several different kinds have been developed.

Inactivated vaccines, which are used for polio and influenza, kill or inactivate the germ, but retain its ability to produce antibodies to fight future infections.

Attenuated vaccines—used for measles, mumps and rubella as well as chickenpox—contain a weakened version of the virus, again to boost antibodies.

More recently, viral vector vaccines, used for Ebola or AstraZeneca and Johnson & Johnson's COVID vaccines, take a modified version of a different, harmless virus to smuggle genetic instructions to the body's cells, telling them to make antibodies.

The newest technology is mRNA, used in Pfizer and Moderna's COVID vaccines, which delivers instructions to build the spike protein of the coronavirus, to evoke antibodies.

## **mRNA 'shuffling the deck'**

Traditionally, only a few large pharmaceutical firms have had the capacity to develop new vaccines because of the huge costs involved.

"It was the preserve of a happy few. Messenger RNA is shuffling the deck," said Loic Plantevin, a healthcare expert at the Bain and Company consultancy.

Before the pandemic, four companies accounted for 90 percent of the global vaccine market: American giants Pfizer and Merck, Britain's GSK and France's Sanofi.

However, none except Pfizer—thanks to a partnership with German

firm BioNTech—managed to quickly get a COVID vaccine to market.

But the rise of COVID has created new players in the field, such as mRNA vaccine leaders BioNTech and Moderna.

It has also spurred production in nations that missed out on the lion's share of vaccine doses earlier in the pandemic.

The WHO plans to set up mRNA vaccine production centres in six African countries as early as 2024.

Such projects have made possible by mRNA vaccines, which can be updated and developed more swiftly, while "traditional technologies remain complicated to deploy and relocate," Plantevin said.

Drew Weissman of the University of Pennsylvania, whose decades of research paved the way for mRNA technology, said his team has also been working to set up COVID vaccine production sites in Thailand and in several African countries.

"My overall goal is that if you have local production and local control, when COVID is over these vaccine sites will be able to make the vaccines that they need," Weissman told AFP.

"So Thailand will make dengue, Africa will make malaria—those are vaccines that pharmaceuticals don't have much interest in."

## **Malaria, HIV now targeted**

The rapid rollout of the flexible mRNA technology has also boosted hopes of new vaccines for other infectious diseases. Moderna is already targeting dengue fever, Ebola and malaria.

There are also numerous projects working on a universal coronavirus vaccine, that would protect not just against COVID and its variants, but against other future coronaviruses that could spread from animals.

And there are still hopes for the long-sought goal of an HIV [vaccine](#).

Plantevin said "the pandemic has accelerated the pace and reminded (us) of the need to continue innovating in vaccines".

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