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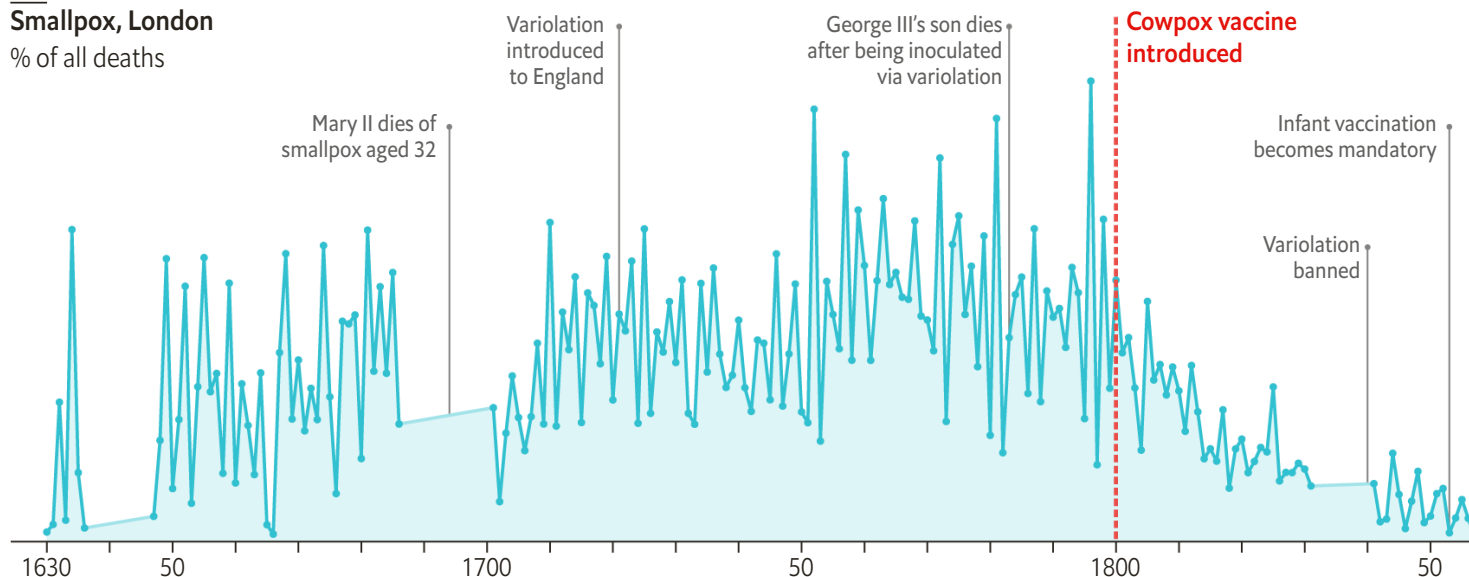
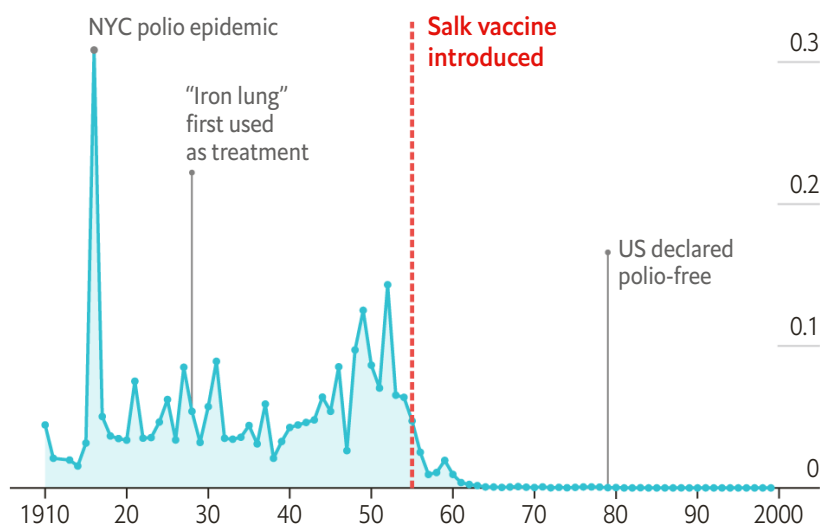
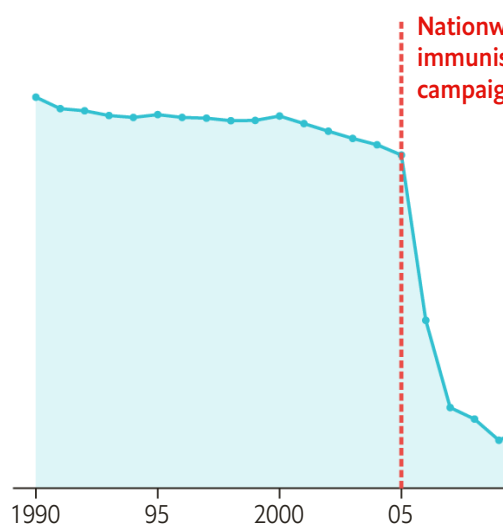
Gift of the jab

# The smallpox vaccine took decades to bear fruit

Vaccination campaigns are hard

**Smallpox, London**

% of all deaths

**Polio, United States, % of all deaths****Measles, Nigeria, % of all deaths**

**A**S NEW VARIANTS of SARS-COV-2 take off, it seems increasingly likely that vaccination is the only way the pandemic will be brought under control. In theory, the high efficacy shown in clinical trials should be sufficient to stop the virus cold. Yet only a few vaccines have ever brought epidemics to an abrupt halt. Even in modern times, many campaigns have fallen short of the impact covid-19 jabs will need to have for pre-pandemic lifestyles to resume.

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The first efforts to make humans in the West immune to common diseases were ineffective. By the 15th century, Chinese doctors were grinding up dried smallpox scabs and blowing them into the nostrils of healthy children. In the early 1700s Lady Mary Wortley Montagu, an English aristocrat, saw women in Ottoman Istanbul conducting variolation—a process designed to induce a mild infection and then immunity, in which pus taken from smallpox blisters is applied to scratches on the skin.

Montagu variolated both of her children, who survived. She later argued successfully for the procedure to become widespread. Yet during the next 80 years, the share of deaths in London caused by smallpox actually rose to nearly 9%, from just over 6% in 1640-1720. Variolation could cause deadly infections; among the victims were two sons of King George III.

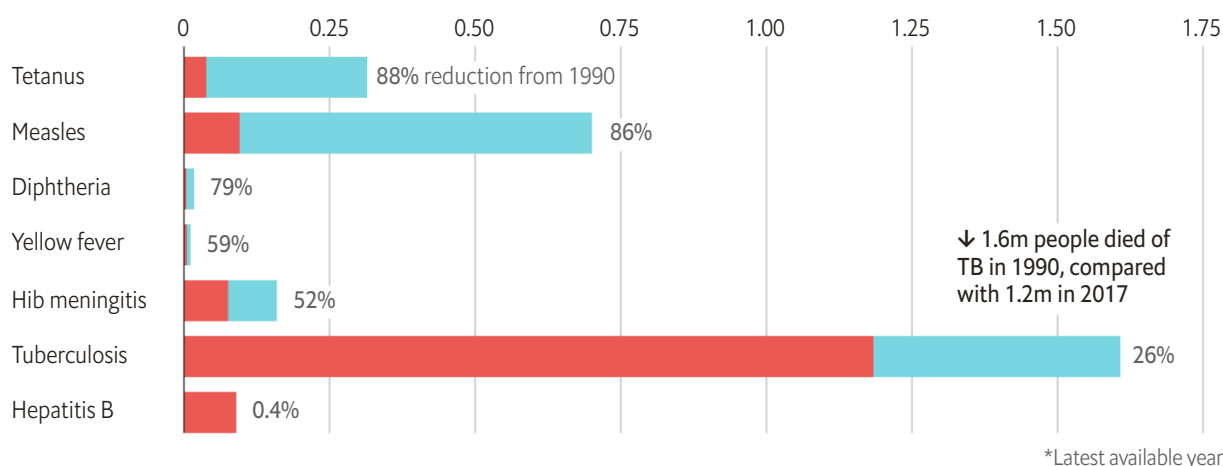
Real progress only began when Edward Jenner, a physician who was apprenticed to a country doctor as a boy, began to wonder why dairymaids who had contracted cowpox rarely caught smallpox. In 1796 he used cowpox lesions from an infected maid to produce the first true vaccine—one that creates immunity without infection.

Although Jenner's method worked, it still took decades for England to vanquish the disease. At the start, public scepticism and inconsistent quality control and distribution hampered vaccination efforts. By 1830, however, smallpox was responsible for only 2-3% of deaths in London. The disease was mostly defeated by 1890.

In the mid-20th century, advances in immunology and public-sector logistics enabled vaccines to bring about faster results. In just a few years, Jonas Salk's vaccine all but eliminated deaths in America caused by polio. There are now around 25 diseases for which vaccines are used in humans. In many cases, their impact has been recent: since 1990 annual deaths from measles and tetanus have fallen by nearly 90%.

**Annual global deaths, m**

From selected vaccine-preventable diseases

■ 2017\* 
 ■ Difference between deaths in 1990 and 2017


Some common diseases, however, have proven stubbornly resistant. Tuberculosis still claims 1.4m lives a year, mostly in poor countries; researchers have yet to improve upon the BCG vaccine, which is only moderately effective against TB. In other cases, gains have proven fragile. Nigeria slashed its measles rate by vaccinating nearly 60m children in 2005-06, but saw deaths from the disease creep up five years later, because inoculation did not become routine.

With governments around the world making vaccination against SARS-CoV-2 their top priority, it is likely that the decline in deaths caused by it in 2020-21 will be even more precipitous than that of polio in 1955-56. Yet it will take years to learn if covid-19 vaccines confer lifelong immunity, or whether constant vigilance will be required to keep the world protected. ■

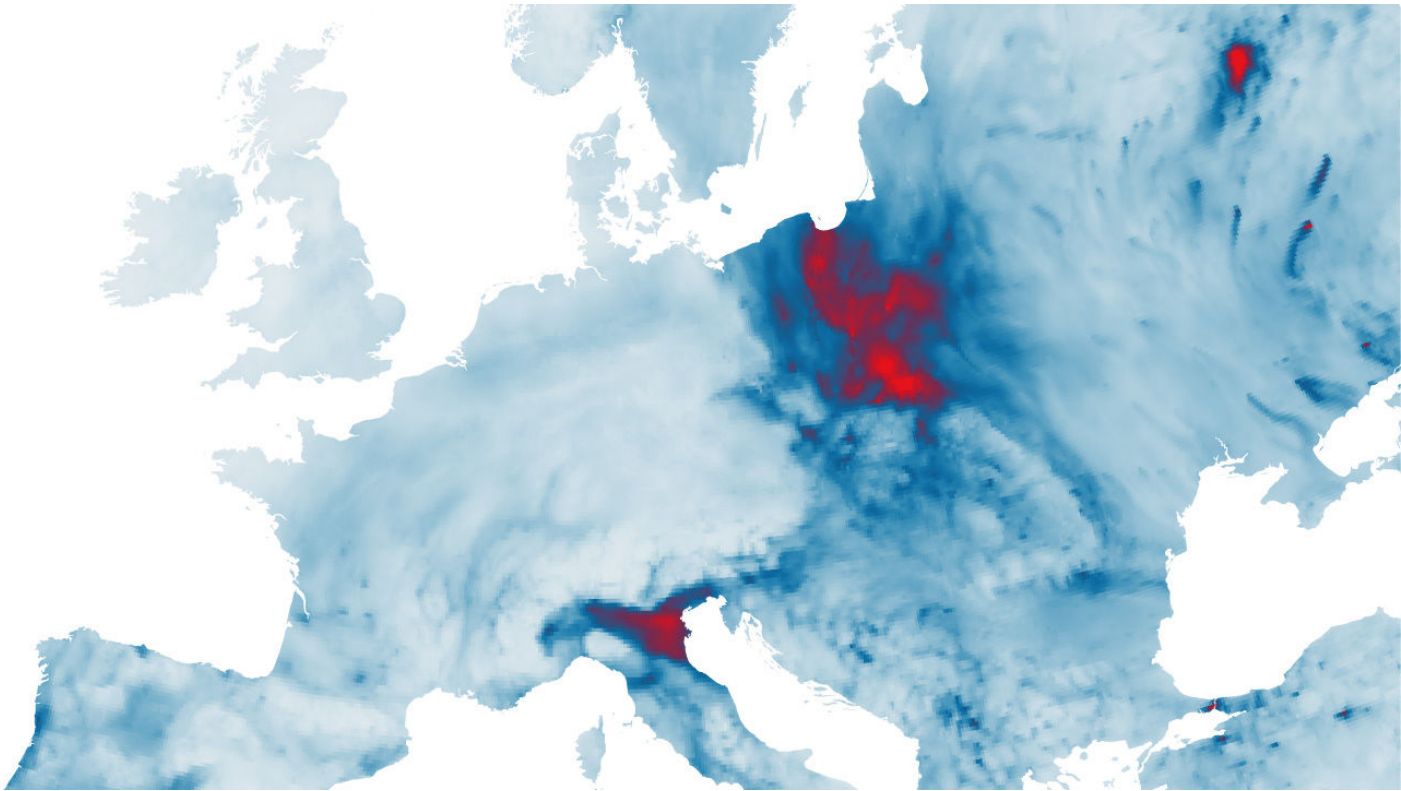
Sources: Our World in Data; Global Health Data Exchange; IHME; Google; government statistics

*This article appeared in the Graphic detail section of the print edition under the headline "Gift of the jab"*


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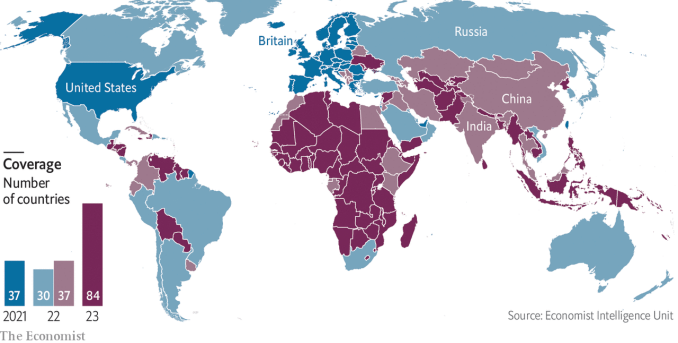
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Daily chart

## Vaccine nationalism means that poor countries will be left behind

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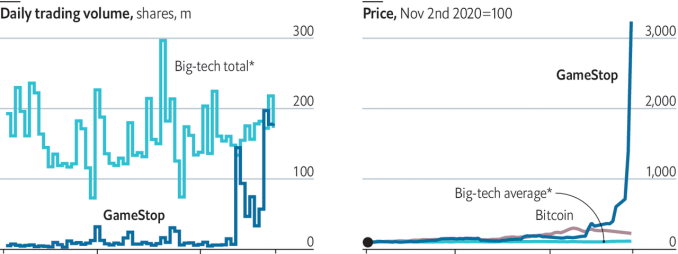
Covid-19, when will widespread vaccination coverage be achieved? Late 2021 Mid 2022 Late 2022 from early 2023  
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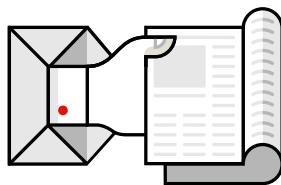


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