The precedents for disease eradication through international cooperation

Part one

Frank Gaglioti
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Humanity, employing its growing achievements in the medical sciences, has been attempting to defeat viral diseases for millennia. Scourges like smallpox have been some of the deadliest viral infections known to man.

The advances made in the 18th to 19th century in the sciences were critical in the understanding of disease and the pathogens that caused them. However, it was also recognised that for human society to wrest victory from these pathogens with pandemic potential, there had to be cooperation on an international basis.

Today, humanity confronts the COVID-19 pandemic that has resulted in more than 30 million infections and a death toll approaching 1 million worldwide. In the name of profit, all the scientific gains of the past two centuries are being scrapped, allowing the virus to run rampant, through a global policy of "herd immunity," even though according to every public health authority, humanity has the means to eradicate the virus, if scientific determinants were made the basis for political action.

"As the world confronts the COVID-19 pandemic, humanity's victory over smallpox is a reminder of what is possible when nations come together to fight a common health threat," said the World Health Organisation (WHO) director-general, Dr Tedros Adhanom Ghebreyesus, in May. Smallpox is the only global disease to be eliminated from nature, except for stores remaining in two high-security laboratories in Russia and the US.

For centuries, smallpox was one of the most feared diseases and remained notorious across the world. When it spread, often as a by-product of colonial wars and slave trades, it produced devastating results in Africa, Asia, and the Americas.

Smallpox is caused by the Variola virus occurring in two forms—variola minor and major. Studies of mummies from ancient Egypt demonstrating the characteristic pox scars on their skins led scientists to recognise that the disease has long been part of human civilisations. The exact origins of the disease remain unknown.

Smallpox symptoms were extremely severe, including high fevers and a whole-body rash that broke out into pus-filled blisters. The minor form was the less virulent, killing 1 percent of its victims, while the major form killed one out of every three people infected. Even if victims survived, they could be blinded and left permanently scarred.

The disease was spread through direct contact with the virus-containing pustules that spread the infection when they burst.

An English physician by the name of Edward Jenner performed the earliest scientific studies on the disease, circa 1796. Jenner noticed that milkmaids who had cowpox did not get smallpox symptoms after variolation, the deliberate inoculation of an uninfected person with the smallpox virus that was widely practiced before the era of vaccination.

This early treatment regimen attempted to purposefully produce a mild form of the illness that would later provide the individual protection from exposure to the virus that produced severe forms of the disease.

The method involved inserting or rubbing a powdered form of smallpox scabs or fluid from the pustules into superficial scratches made in the skin, thereby infecting the person producing a less severe disease than the naturally acquired smallpox. Symptoms would last two to four weeks after which they would subside indicating successful recovery and immunity. This effectively was a primitive attempt at vaccination.

Jenner surmised from his observations that cowpox not only protected against smallpox but could also be used to inoculate a person to immunise them against smallpox.

He conceived a simple test to prove his hypothesis. In the now infamous experiment, Jenner took material from cowpox sores from a milkmaid Sarah Nelmes and used it to inoculate James Phipps, his gardener's son. Later Jenner exposed the unfortunate boy to the smallpox virus, but he fortunately did not contract the disease. Jenner went on to repeat his experiments to verify his results.

Although at that time there was no understanding of viruses, microbes or immune cells, Jenner had made a great intuitive leap that he subjected to scientific experimentation. He called his procedure vaccination, from the Latin word for cow—*vacca*.

Jenner published his discovery privately in 1798—*An Inquiry into the Causes and Effects of the Variolae Vaccinae, a disease discovered in some of the western counties of England, particularly Gloucestershire and Known by the Name of Cow Pox*. "The annihilation of the smallpox, the most dreadful scourge of the human species, must be the final result of this practice," Jenner wrote.

By 1800, vaccination against smallpox had spread across England and into Europe. Jenner sent vaccination material to a professor of physics at Harvard University in the United States, Benjamin Waterhouse, who introduced vaccination in New England.

Waterhouse sent some vaccine to Thomas Jefferson, who wrote to Jenner in 1806:

"Yours is the comfortable reflection that mankind can never forget that you have lived. Future nations will know by history only that the loathsome smallpox has existed and by you has been extirpated." Jefferson's was a utopian vision—the material conditions in society had not yet emerged for its realisation.

Jenner's work, at the cusp of the 19th century, was certainly a trailblazer, but what had to be established was a method of mass distribution of vaccine on an equitable basis. But the rapidly evolving capitalist social relations meant scientists worked only sporadically in that direction, and especially the working class and oppressed masses, and poorer countries missed out.

Smallpox remained a deadly disease into the 20th century when it was responsible for the deaths of at least 300 million people. Only in the post-war periods did a slight thawing in communications between US and Soviet scientists allow an advance in mankind's control over the viruses.

In 1958, the Soviet virologist and deputy health minister Viktor Zhdanov proposed the eradication of smallpox to the World Health Assembly, an offshoot of WHO. Zhdanov was a significant scientist in his own right and carried out important work on the scientific classification of viruses.

American public health physician D. A. Henderson was charged in developing the international eradication programme for the WHO. At the time, smallpox was still active in Latin America, Africa, and South East Asia. Henderson set up the Centres for Disease Control (CDC) in the US.

In 1966, an ambitious 10-year plan was developed involving systematic vaccination along with a programme of surveillance and containment that consisted of special teams that reacted to any outbreaks. The programme had an annual budget of US$2.4 million per year.

In 1975, Rahima Banu, a three-year-old girl from Bangladesh, became the last person to contract the variola major virus in nature. A public health drive ensured blanket vaccination of everybody in the entire area to a range of 2.4 kilometres.

In 1977, the last reported case of variola minor smallpox occurred in Ali Maow Maalin, a Somali hospital cook who contracted the disease in October, making a full recovery. None of his contacts developed the disease, and an aggressive containment effort prevented an outbreak.

The last reported person known to die of smallpox was Janet Parker, a medical photographer at the Birmingham University Medical School, who contracted it in the laboratory. On May 8, 1980, the World Health Assembly declared smallpox destroyed in nature.

To be continued