

International Partnerships

Smallpox eradication – a cold war victory

Donald Henderson

The author, who was in charge of the smallpox eradication campaign, recalls how remarkable individuals decided to work together for a common purpose, and in doing so achieved infinitely more than the official hostilities of superpowers.

A critical but little-appreciated factor in the achievement of smallpox eradication was a remarkable collaboration between WHO, the USA and the USSR beginning in 1966 and extending through the certification of eradication in 1980. Although many years during this period were especially tense ones in East–West relationships, professionals from the two countries worked amicably together within a WHO framework to galvanize the smallpox eradication campaign and to bring it to a successful conclusion little more than 10 years after its inception. There are many chapters to the story, but perhaps the following highlights are the ones most worth recounting.

WHO's commitment to smallpox eradication was made at the instigation of the Soviet Union, an act for which the Russian government has rightfully claimed the

credit. In 1958, Academician Viktor Zhdanov, then Deputy Minister of Health of the Soviet Union, proposed to the World Health Assembly that smallpox eradication should be undertaken as a priority programme of the Organization. As he pointed out, the Soviet Union as well as other smallpox-free countries was regularly besieged by smallpox importations from abroad, which compelled all countries to continue costly national vaccination programmes to protect themselves. Why not join forces to attack the problem on a global scale? He noted that the Soviet Union had interrupted transmission in 1936 with a liquid vaccine which was not heat-stable and at a time when the health infrastructure, transport and communications in some parts of the country were still comparatively primitive. This showed clearly that smallpox transmission could be stopped even under difficult conditions. Given that large quantities of highly stable freeze-dried vaccine could now be produced, was it not reasonable to pursue a global programme? Once smallpox was eradicated, vaccination could cease everywhere.

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Yes in principle

The proposal was accepted by the Health Assembly with little discussion. However, WHO at that time was already deeply

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committed to a global programme for malaria eradication, a vastly more complex and costly enterprise than would be required for smallpox eradication. The United States, through bilateral assistance, was by far the largest contributor to this effort. The Director-General was determined that nothing should be done to compromise the malaria campaign and sought to make sure that all possible WHO funds should continue to be used in support of it. The smallpox programme was not a priority for him because he personally was convinced that smallpox eradication was not feasible unless everyone, everywhere could be vaccinated. A Brazilian, he was well aware that there were tribal groups in the Amazon Basin who lived deep in the jungle and were seldom seen by health authorities, and that there were similarly inaccessible groups in other countries.

From 1959 through 1965 the amounts budgeted by WHO for smallpox eradication were merely token, varying between US\$100 000 and US\$200 000 a year. One officer managed the programme at the Geneva headquarters, and there were four field staff. Voluntary contributions were

solicited and each year contributions in kind (primarily of vaccine from the USSR) amounting to about \$100 000 were received. Little progress was made.

Each year at the Health Assembly, Zhdanov expressed his dismay and frustration at the slow rate of progress and demanded that the Organization make a greater effort, pointing out that smallpox eradication (as compared to malaria eradication) was perhaps the only programme that could be completed within the foreseeable future. A number of other countries joined in the protests but little changed. As time went on, it became increasingly clear that the malaria programme, despite the infusion of ever larger sums of money, was gradually failing. Another highly visible programme and another certain failure (as the Director-General perceived it) was the last thing the Organization needed.

Yes in practice

In 1965, the level of dissatisfaction heightened sharply as the United States delegation joined Russian counterparts at the Assembly in arguing that more had to be done by WHO toward smallpox eradication. They asked the Director-General to draw up a specific plan. At the following Assembly, the Director-General presented such a plan, and in the WHO budget for 1967 he added \$2 400 000 for smallpox eradication. If the Assembly accepted the plan, it meant that the overall budget would increase by 16%. If the Assembly rejected it, the implication, of course, was that the countries were not serious about the programme. Given the strong objections to substantial increases in the WHO budget on the part of most industrialized countries and some developing ones as well, the Director-General was

reasonably confident that the budget, as presented, would not be accepted. The debate was prolonged and contentious but finally, the budget was accepted: 58 votes were needed, and 60 were registered. It was the closest vote on a budget in the Organization's history.

The Director-General was concerned by this turn of events and, in substantial measure, held the United States accountable for tipping the balance. He called on the Surgeon General of the United States to demand that an American be assigned to direct the programme, specifically myself, then Chief of the Surveillance Section at the United States Public Health Service's Communicable Disease Center.

I was no expert in smallpox, having only once seen cases in an outbreak in Argentina. But I had been one of several who had worked with WHO to determine what the possible shape and costs of a global campaign might be, a study which served to justify, in part, the special budget request. As I was to learn, the Director-General's interest in me was not primarily my expertise. He explained that he wanted an American as the director so that when the programme failed, as he was sure it would, the Americans, not WHO, would be seen as responsible. I was ordered by the United States Public Health Service to go to Geneva, there to join Dr Isao Arita in directing the programme.

My appointment initially proved to be somewhat problematic. Dr Dmitry Venediktov, a Deputy Minister who replaced Zhdanov as head of the Russian delegation, argued strongly that the leadership of the programme should be given to a Russian because the programme, after all, had been undertaken at the instigation

of the Soviet Union. However reasonable this might have been, the Director-General held firm.

Immediately at issue was the status of a USSR donation to WHO of 25 000 000 doses of vaccine which had begun some five years before and been renewed annually. From the beginning of the programme it was apparent that vaccine would be sorely needed by upwards of 30 countries. Except for the USSR, no country had production facilities on a scale which would permit contributing more than one to two million doses per year, even if they were so inclined. As it turned out, the Soviet donation eventually amounted to more than 80% of all vaccine annually contributed through WHO. In a meeting with Dr Venediktov at the May 1967 Assembly, I expressed the hope that whatever concerns he might have regarding programme leadership, the USSR would continue its annual vaccine donation. He took me aside to say, "I want you to know that we have checked you

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out and are now confident that you are honest and a good scientist, that your only objective is to eradicate smallpox. You will have our full support." That proved to be the case, and Venediktov came to be a close personal friend. He explained that he could not promise vaccine for more than one year at a time, but pointed out that it was in the nature of the centrally planned

economy of the USSR to continue producing each year what had been produced the year before. Thus, the donation would be secure.

Working within the WHO structure to carry out a programme which extended across four of WHO's six regions was not an easy task. The fact that the Director-

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General continued to believe that the programme would ultimately prove a fiasco did not make the task easier. However, having the strong and interested backing of both superpowers greatly facilitated the effort. For example, before each meeting of the Health Assembly and of the Executive Board, I would meet with each of the delegations, at their request, to brief them fully and candidly on progress and problems. They would then use the occasion of the Board and the Assembly to ask leading questions. This permitted me to highlight special problems. Behind the scenes, they expressed their interest, views and concerns to the Director-General, the Regional Directors and national health leaders. Another example of assistance related to problems we had when, at times, certain countries decided officially to withhold information on the incidence of smallpox. The respective embassies of the USA and USSR proved most helpful in confidentially providing the needed information. Meanwhile, their diplomatic staffs sought to persuade the respective governments to cooperate in reporting.

The issue of appropriate international staffing of the programme appeared, at first, to pose difficult problems. There were far fewer Russians on the WHO staff than the calculated "appropriate representation" called for and of those on the staff, a number failed to meet performance expectations. The Soviet government wanted larger numbers to be recruited by WHO. To this end, the Soviet delegation to the Assembly regularly brought a large number of applications, and an agreement was reached whereby some defined number would be hired. Some of the applicants were clearly well-qualified; some were apparently proposed for other reasons. This arrangement sometimes resulted in individuals being appointed to jobs for which they were ill-qualified and unmotivated. This pleased no one.

Venediktov and I agreed that if smallpox eradication was to succeed, we would need extremely motivated, intelligent health staff who were willing to endure the rigours of field work. How to identify such people? The plan elaborated was for Venediktov's staff to assemble in Moscow a panel of 20 to 30 qualified individuals and that I, with one of his senior staff, would interview each in English (the working international language for most of the countries) and decide mutually whom to accept. Interestingly, we didn't disagree on a single candidate and eventually recruited about half of them. Some proved to be among the best of our field epidemiologists.

During the second year of the programme, we encountered an unexpected problem with Russian vaccine which I was advised by our Assistant Director-General was simply too diplomatically sensitive to tackle. The USSR, in addition to donating vaccine to WHO and shipping it through

Geneva, was also donating vaccine directly to some countries, one such country being Afghanistan. Routinely, the results of testing of the vaccine were provided to Afghan health authorities and these protocols, we discovered, showed the vaccine to be below standard. The official WHO view was that because the donations were bilateral, WHO had no right or authority to intrude on the relationship in any way. Nevertheless, I flew to Moscow, laid out the problem in full to the authorities, and asked them to look into it. My Ministry contacts expressed their thanks and later reported that their investigation had resulted in the closing of several small vaccine production units which were performing poorly, and in the establishment of a central testing laboratory to ensure that all vaccine, wherever produced, would meet international standards. There were no further problems. Indeed, the quality of the Russian vaccine, in terms of both potency and stability, consistently and notably exceeded required standards.

Epilogue

Today, there are two laboratories which retain live smallpox virus, one in the Russian Federation and one in the United States, a fact which has caused many a raised eyebrow in relation to whether this might not represent yet one more remnant of the cold war. Actually, it does not. As eradication progressed in the various countries and the numbers of cases fell sharply towards zero, we decided that it would be important to confirm the remaining suspect cases in the laboratory to determine for certain whether or not they were smallpox. We initially had made efforts to establish some national and regional laboratories but this proved far more difficult than expected. A more

reliable system, as we saw it, was for specimens from the different countries to be shipped by air to Geneva, and then sent once each week to a laboratory for electron microscopic examination (providing an immediate presumptive diagnosis) and eventual virus isolation. With results sent by telex, a final report was available within 10–14 days. There were only two laboratories which had the technical competence to do the testing and whose staff were willing, albeit reluctantly, to undertake the mundane function of routine laboratory work. They were the Institute of Virus Preparation in Moscow and the Communicable Disease Center in Atlanta. To divide the burden, specimens received were sent one week to Moscow and the next week to Atlanta. In keeping with accepted virological practice, the egg membranes on which the viruses grew were stored in freezers. And so two libraries of specimens accumulated.

The diagnosis of specimens by these two laboratories was itself an important contribution, but more significant were their

The problem of substandard Russian vaccine was considered to be simply too diplomatically sensitive to tackle.

research contributions in characterizing the pox viruses; in undertaking and supporting field investigations of vaccinia, monkeypox, camelpox and cowpox; and in support of a variety of epidemiological studies. Dr Svetlana Marrenikova from the Institute of Virus Preparations and Dr James Nakano from the Centers for Disease Control and their staffs exchanged specimens and findings, worked in each other's laboratories, and provided technical support and training for vaccine pro-

duction facilities and laboratories in other countries.

International assistance to the smallpox programme over the period 1967–1980 amounted to US\$ 98 million in cash and in kind, of which a third was provided by WHO and other United Nations agencies and two-thirds by individual countries. The three major contributors were the USA, the USSR and Sweden.

In brief, there is no question that the smallpox eradication programme could ever have succeeded without the collaborative relationships between the USA and the USSR which survived, and indeed thrived, through some of the most difficult days of East–West antipathy. It was the WHO venue that made these relationships possible.

There was one issue, however, which regrettably could not be resolved. As the programme moved toward its conclusion, it became apparent that smallpox staff and national health authorities alike were much too eager to move on to other problems, long before eradication could be fully verified. In October 1975 Professor Holger Lundbeck, Director of the Swedish National Bacteriological Laboratory, and frequent consultant to the programme, wrote to caution us that Soljenitzyn's "Rule of the Final Inch" (from *First Circle*) might well have been written with the smallpox eradication programme in mind. As Lundbeck translated from the original Russian:

The rule of the Final Inch! The realm of the Final Inch! In the Language of Maximum Clarity it is immediately clear what that is. The work has been almost completed, the goal almost attained, everything seems completely right and the difficulties overcome. But the quality of

the thing is not quite right. Finishing touches are needed, maybe still more research. In that moment of fatigue and self-satisfaction it is especially tempting to leave the work without having attained the apex of quality. Work in the area of the Final Inch is very, very complex and also especially valuable, because it is executed by the most perfected means. In fact, the rule of the Final Inch consists in this: not to shirk this crucial work. Not to postpone it, for the thoughts of the person performing the task will then stray from the realm of the Final Inch. And not to mind the time spent on it, knowing that one's purpose lies not in completing things faster but in the attainment of perfection.

This quotation was promptly disseminated throughout the world to our international staff and to national programme directors. From then until the end of the programme, the phrase "the final inch" served often as a reminder and a rallying cry. All who worked in the programme from 1975 to 1980 clearly recall "the final inch".

In the original draft of the monumental book on the campaign, *Smallpox and its eradication* (1), reference was made to this final inch and a description provided. However, Dr Ivan Ladnyi, who was then an Assistant Director-General, was adamant that no reference could be made to Soljenitzyn or his book nor could the quotation be used in any way, even in a paraphrased form. Ladnyi himself had worked for five years with smallpox programmes in East Africa, was a co-author of the smallpox eradication book, and a personal friend of the other authors. However, he was under orders from higher authorities in Moscow, and every attempt to change this decision failed. It represented the single instance of censorship in the smallpox book, and effectively the only real failure in a highly satisfactory collaboration between the superpowers. ■

Reference

1. **Fenner F, Henderson DA, Arita I, Jezek Z, Ladnyi ID.** *Smallpox and its eradication*. Geneva, World Health Organization, 1988.

Editor's Note

Readers may also be interested in the following articles published in **World Health Forum** to mark the tenth anniversary of the eradication of smallpox.

Lundbeck H. Ten years without smallpox. *World health forum*, 1987, **8**: 281–282.

Henderson DA. Smallpox eradication: a WHO success story (Interview). *World health forum*, 1987, **8**: 283–292.

Jezek Z. Tasks in the wake of smallpox eradication. *World health forum*, 1987, **8**: 293–296.

Fenner F. Can smallpox return? *World health forum*, 1987, **8**: 297–304.

A signal achievement in preventive medicine

For more than three thousand years, smallpox was a major scourge of mankind, spreading across the world as new centres of population became established and grew in size. Because of its high fatality rate, it was universally feared; in the towns and cities of Asia and Europe where records were kept, it caused on average 10% of all deaths each year. As early as the tenth century, Chinese and Indian sages had discovered a method that provided some protection against this terrible scourge, albeit one which often resulted in serious illness and some loss of life. This was the inoculation of smallpox virus from scabs—variolation—a practice that was taken up in a number of countries but seldom widely applied. Then in 1796 came one of the seminal discoveries of medicine—the demonstration by experiment that a harmless virus obtained from cows could protect man against smallpox. Edward Jenner, an English country doctor, had discovered vaccination—a practice which was rapidly disseminated throughout the world. It resulted in a marked decrease in the toll of smallpox in the industrialized countries, but the disease continued almost unabated in Africa, Asia and Latin America. ...

Written by five men who were intimately associated with various aspects of the eradication and certification programmes, and subject to detailed review by many of their colleagues in the eradication campaign, Smallpox and its eradication provides a comprehensive description of a formerly cosmopolitan and lethal disease that man has now eradicated, forever, and of the programme in some eighty countries in Africa, Asia and South America that led to this achievement. ... The book concludes with an overview of the lessons learnt during the programme—lessons that have already been applied by the World Health Organization to a variety of other programmes designed to lighten the burden of human illness.

■ **H. Mahler.** In: **F. Fenner et al.** *Smallpox and its eradication*. Geneva, World Health Organization, 1988 (Foreword).