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# Commentary: Smallpox eradication in West and Central Africa revisited

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*In May 1980, the Thirty-third World Health Assembly adopted a resolution accepting the report of the Global Commission for the Certification of Smallpox Eradication and affirming its belief that this once-universal disease had been eradicated worldwide, 21 years after the global eradication programme had begun in 1959.*

*A key element in the eradication effort was the surveillance–containment strategy, which was first tested in Nigeria in 1966, and which led to its adoption throughout the world. West and Central Africa became the first region of the world to be smallpox free and one by one other regions followed.*

*One of the major lessons to be learned from the smallpox eradication programme is that interdependence is required if global results are to be achieved. Unfortunately, however, humanity has failed to learn this lesson in the long term, and although global health has improved dramatically the gaps between the rich and poor remain vast.*

To read the account of smallpox eradication in West and Central Africa 30 years after the actual work, revives memories, but also provides a chance for perspective. What are the facts, what were the feelings, what has been the fallout, and where have we failed?

## **The facts**

In retrospect it seems clear — we didn't know how to eradicate smallpox when we started. Even that provides a lesson: we are always faced with making sufficient decisions based on insufficient information. If we had waited until all the answers were available, the work on smallpox eradication would never have started — selecting the target helped develop the appropriate tools and strategy.

Despite a huge volume of literature on smallpox, teams working in West and Central Africa in the 1960s continually discovered new knowledge and rediscovered old knowledge. What were the facts? Smallpox was not highly contagious but it was tenacious. Vaccination on the day of exposure to the virus or even a day or two afterwards, could still provide protection. Also, the vaccine provided protection for a longer period than had been suspected. Indeed, the disease was rare in people who had a vaccination scar, regardless of how long

ago they had been vaccinated. A given village could go many years between outbreaks, and at any one time a very small percentage of villages were actually harbouring the disease. The most efficient control efforts were achieved during months when transmission was lowest, and a chain of infection interrupted at the seasonal low prevented many cases the following year. Gradually, the facts that emerged called into question the mass vaccination strategy.

The outbreak in Ogoja, Nigeria, in December 1966 provided an unexpected opportunity to test the surveillance–containment strategy. However, the published account does not do justice to some aspects. First, this approach was not used because of keen insight or prior analysis. Rather, it was used because adequate supplies of vaccine were unavailable and it was meant to solve an immediate problem rather than to create a new strategy. Second, despite the dramatic end to the outbreak within a period of weeks, implementation of a new strategy beyond this one outbreak was not immediate; it took months to change the approach in Eastern Nigeria and one-and-a-half years to implement the new strategy through West and Central Africa.

Nevertheless, the results were dramatic and set a pattern seen in other areas; namely, smallpox usually disappeared within a year in any specific geographical area when the surveillance–containment strategy was instituted. West and Central Africa became smallpox free 3 years and 5 months after the programme began, well ahead of the target of 5 years. This led to the adoption of the surveillance–containment strategy throughout the world and continuous improvement of the actual tactics used.

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For example, using this approach, India went from very high rates of smallpox in May 1974 to interruption of transmission in the entire country 12 months later.

### **The feelings**

Those working on smallpox eradication in the late 1960s recall the heady times that prevailed in those days. While critics of the programme felt that the eradication of any disease was not possible, those who worked in the programme had few doubts. Each day presented challenges that were overcome, reinforcing the idea that all obstacles could be neutralized. In the words of former United States Surgeon General Julius Richmond, "The workers in the programme were simply too young to know it couldn't be done."

There was a clear sense of learning on the job and a willingness to alter tactics daily. Frequent meetings were held to compare experiences. This led to rapid changes throughout West and Central Africa. An important lesson was that parallel activities and research, with many groups seeking better approaches, could speed up the process of improvement.

It was also a time of high expectations on the part of African workers. The early years of independence from colonial powers were times of great hope, when anything was possible and people were convinced things were getting better. It was the ideal time to raise the expectations for a better health outcome.

### **The fall out**

The experiences in West and Central Africa had a catalytic effect on smallpox eradication in the rest of the world. The problems of communication, transportation, and inadequate health infrastructure were felt to be more severe in Africa than elsewhere. Despite these problems, West and Central Africa became the first region of the world to be smallpox free. Countries in other regions were forced to ask why they should lag behind. The experience was soon shared in other areas of the world through the transfer of both African and expatriate workers to other countries. One by one, other regions followed until smallpox remained only in East Africa. With each area cleared, more resources could be concentrated in the remaining smallpox areas. In retrospect, after the success in West and Central Africa, the rest of the story was inevitable.

The fall out continues today. The surveillance lessons of smallpox eradication were soon adapted to other vaccine-preventable diseases, dracuncu-

liasis, and a host of other diseases. The experience gained by health workers of every level in epidemiology, logistics, health education, planning, evaluation and community development became useful in other health programmes. Techniques such as cluster sampling have become part of the infrastructure of primary health care. The Expanded Programme on Immunization is a direct result of smallpox eradication and it in turn serves as the foundation for primary health care.

### **The failings**

One of the major lessons to be learned from the smallpox eradication campaign is that interdependence is required if global results are to be achieved. Everyone gained. The countries with smallpox were better off, but even the USA, smallpox free for many years before the global campaign, recouped its investment quickly and now saves more each year because of the elimination of this one disease than its annual assessed contribution to WHO.

What is the long-term response to this lesson? We continue to act in a parochial short-term manner. We act as if there was no lesson to be learned at all, inadequately funding poliomyelitis and dracunculiasis eradication, and the USA even failing to pay its dues to WHO. Global health has improved dramatically, but the gaps between the rich and the poor remain vast. We fail to exploit the science now available; for example, the availability of hepatitis B vaccine and *Haemophilus influenzae* vaccine. Smallpox eradication provided a shining moment when the gaps were closed. Everyone in the world, and everyone who will ever live, benefited from a given body of science and experience. Einstein once said nationalism is an infantile disease, it is the measles of mankind. We will have failed if we don't use the experience of smallpox eradication to actually become global citizens.

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## **Résumé**

### **Retour sur l'éradication de la variole en Afrique occidentale et centrale**

En 1980, la Trente-Troisième Assemblée mondiale de la Santé a adopté une résolution acceptant le rapport de la Commission mondiale pour la Certification de l'Eradication de la Variole et confirmant que cette maladie autrefois universelle avait été éradiquée dans le monde entier, 21 ans après le lancement du programme mondial d'éradication, en 1959.

Un des principaux éléments de l'effort d'éradication fut la stratégie de surveillance-endiguement qui fut d'abord mise à l'essai en 1966 au Nigeria, avant d'être appliquée dans le monde entier. L'Afrique occidentale et l'Afrique centrale furent les premières régions à avoir éliminé la variole. Les autres régions suivirent, l'une après l'autre.

Le programme d'éradication de la variole montre que l'interdépendance des actions est parfois indispensable pour obtenir des résultats à l'échelle mondiale. Malheureusement, il semble que l'humanité n'ait pas su tirer profit à long terme de cet enseignement. En effet, si la situation sanitaire s'est améliorée dans l'ensemble, le fossé qui sépare les pauvres des riches est encore immense.