

day period. In heavily infected areas this was done each month and, in less infected areas, every second or third month. During the first search in October 1973, thousands of unreported cases were detected. But once discovered, the outbreaks could be contained.

Through careful planning, training and assessment, the searches became increasingly thorough. Between searches, surveillance teams visited schools and markets seeking to learn about cases of smallpox. Containment measures were strengthened. As the numbers began to decrease, a reward for the detection of a case was offered to the first person reporting it and to the health worker investigating it. Similar approaches were soon employed in Bangladesh, Pakistan and Nepal. On 16 October 1975, only two years after the start of this new strategy, the last case of smallpox occurred in Asia—on Bhola Island in Bangladesh. This marked the end of variola major, the severe form of the disease. As 1975 drew to a close, only Ethiopia remained with smallpox. There, variola minor was prevalent, a form of smallpox which killed only one per cent of its victims in contrast to variola major which killed 20 per cent or more.

Ethiopia's programme, besides being the last to begin, faced incredibly difficult problems. Although the country is larger than France and Spain together, the available staff numbered little more than 100 persons. There was almost no health infrastructure. Roads were few and it was estimated that half the population lived more than a day's walk from any accessible road. Civil war and famine compounded the problems. However, with the interruption of smallpox transmission in Asia, more resources could be made available to Ethiopia. Village residents were recruited and trained to serve as surveillance workers and vaccinators; more transport was provided; helicopters were laid on to facilitate supervision. Less than one year later, on 9 August 1976, the last case occurred there.

Unfortunately, coincident with the last outbreak in Ethiopia, smallpox was introduced into neighbouring Somalia. Before fully effective surveillance systems could be established, nomads disseminated the disease throughout the southern part of the country. In May 1977, a national emergency was declared, additional staff were recruited and special assistance was provided by WHO. An intensive surveillance-contain-

ment and vaccination programme continued throughout the summer months. More than 3,000 cases occurred, the last of them on 26 October 1977.

Nevertheless, surveillance teams and search workers continued for two years and more in their efforts to discover cases. In many countries, a reward was

A windfall for development

Already the international community is starting to collect part of the health legacy—and it is likely to be huge—that smallpox eradication will bequeath. Calculations indicate that in the post-smallpox era a sum of nearly US \$1,000 million annually will be released, or some \$10,000 million over a decade.

The cost to the world of a disease like smallpox included production or purchase of vaccine, maintenance of vaccination programmes, the treatment of vaccination complications, spending to maintain national surveillance and frontier controls, and the cost involved in handling the emergencies caused by sudden outbreaks. Thus in the United Kingdom, an outbreak sparked by an imported case in 1961 involved a bill for an estimated \$3.6 million. United States experts calculate that smallpox protection was costing the American taxpayer about \$150 million a year—or about half the total cost of the global eradication programme which was just over \$300 million.

The release of money that has hitherto been tied up for smallpox could have massive impact—provided it is diverted to development programmes. In one recent year, 1975, total funds available for the health sector (including water supplies) as bilateral aid from the Organization for Economic Cooperation and Development (OECD) and from the European Economic Community (EEC), or as multilateral aid via the UN specialized agencies, amounted to \$1,500 million. The new resources could therefore make a massive addition to the funds available.

In the view of WHO, these funds would have their greatest strategic impact in the area of primary health care. They could be applied to a combination of health development activities, including clean water and sanitation, immunization programmes, action to promote correct and adequate nutrition, particularly for infants and young children, maternal and child care, and programmes for the supply of oral rehydration kits to combat diarrhoeal diseases and to ensure the availability of essential drugs to all who need them.

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offered and tens of thousands of cases of chickenpox, measles and other rash diseases were reported by villagers in hopes of collecting a reward. Thousands of specimens were taken and sent to WHO Diagnostic Centres in Moscow and Atlanta, USA. None proved to be smallpox. For the disease to persist in a population, it must be passed from one person to another in a continuing chain of infection. Since there is no animal reservoir and no asymptomatic carrier (person having the disease but showing no symptoms), each person who is a link in this chain must experience the characteristic illness. During the programme, it was found that smallpox never persisted for more than eight months in a country without being detected by the surveillance network. Continuing search during a two-year period, that is, three times this eight-month period, provided additional assurance that the spread of smallpox had stopped.

To confirm that transmission had been interrupted, specially constituted WHO International Commissions visited each country. In 1978, the Director-General of WHO appointed a Global Commission to review the experience in all countries. The Commission completed its work on 9 December 1979, at which time it agreed that there was sufficient documentation to certify worldwide eradication.

The eradication of smallpox means that vaccination everywhere can be stopped and that travellers will no longer need vaccination certificates. The savings throughout the world are estimated to be \$1,000 million annually. The cost of this achievement was only \$112 million in international assistance, or \$9 million spent annually during the 13-year period 1967-1979. This includes all funds spent by WHO plus bilateral and multilateral contributions from 42 countries. It is estimated that globally the endemic countries spent perhaps twice this amount but, in fact, few spent much more than they had hitherto been spending on never-ending smallpox control programmes.

Now the chapter entitled "smallpox" is closed—let us hope for ever. The achievement of eradication is a victory for hundreds of thousands of health workers in many different countries. WHO staff alone were drawn from 73 different countries. It is a triumph of international cooperation and of preventive medicine. With coordination, cooperation, dedication and imagination it is clear that much can be achieved at minimal cost. ■