



ACTIVE SEARCH OPERATIONS FOR SMALLPOX - AN ETHIOPIAN EXPERIENCE

by

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1. Introduction

A smallpox eradication programme was begun in Ethiopia in January 1971. Since its inception, the operational strategy has stressed the detection and containment of outbreaks by a staff now numbering approximately 100 Ethiopian sanitarians and volunteer health workers from the United States of America, Japan and Austria working as one and two man mobile teams. Because of the size of the country (1 221 900 square kilometres), the scattered, comparatively inaccessible population of approximately 25 million persons, and the paucity of health services, systematic programmes of vaccination have necessarily been limited to major cities and towns and to populations afflicted by outbreaks. During 1971, 26 329 cases were detected and containment measures taken in each outbreak and during 1972, 16 976 cases were reported. The effectiveness of the measures taken is apparent in Fig. 1. After 14 months of a high smallpox incidence, punctuated only by a brief seasonal summer decline, in 1971, the number of cases reported monthly began a steady if irregular decline beginning in March 1972. This continued throughout the September-December period during which a seasonal increase normally occurs. By March 1972, smallpox transmission appeared to have been interrupted in 10 of the 14 Provinces of the country.

Considerable experience has been gained in the development of effective surveillance activities in remote areas, many of the outbreaks having been discovered and contained in regions where the surveillance teams had to walk for more than two weeks in difficult, mountainous terrain.

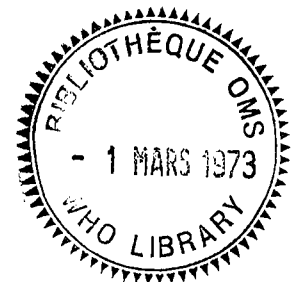
When smallpox was widely prevalent and many Awrajas (Districts) were heavily afflicted, the discovery of outbreaks was no problem. However, as more and more areas of the country approached a nil incidence, it became increasingly important to discover outbreaks while they were still small in size and before they became large enough to attract the attention of the scattered notification units (health centres and government officials).

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Due to the limited communications in the country and the small number of personnel in the programme, a methodology for the active search for cases was required which would permit a team to appraise the smallpox situation in a large area in a short period. By determining, with some margin of confidence, that smallpox was absent in a given area, priorities for future activities could be suitably adjusted.

Experience had shown that schools and markets were especially productive places to obtain information regarding smallpox in a given area but the sensitivity of this approach had not been measured. Accordingly, in July 1972, a field study was undertaken to determine the sensitivity of this method in an Awraja (District) where the notification posts had reported no cases for a period of six months. It was decided that the study should be such to permit the appraisal to be completed within 14 days.

#### Field study area

Selale Awraja (District) in Shoa Province was chosen for the study. Fourteen cases of smallpox had been recorded between January and March 1971 and in one of the seven sub-districts and an additional 14 cases in December 1971. Between then and July 1972, no cases had been reported.

The Awraja has an approximate area of 48 000 square kilometres and a population of about 275 000 persons. There is one all-weather road which crosses the Awraja from south-east to north-east; all other areas can be reached at any time of the year by mule or on foot. In the capital, Fitché, there is a governor's office and, in each of the seven sub-districts, a sub-district governor's office, each of which is required to report outbreaks of communicable diseases. There are, in addition, over 100 lesser officials and village leaders (Meketal Woreda Governors, Chikashumus, Atbiadagnias and Balabuts).

One Health Centre (at Fitché) and four Health Stations serve the Awraja. The Health Stations are each staffed by one dresser and both the Stations and the Health Centre are essentially fully preoccupied in providing curative medicine.

A total of 3000 students attend the secondary school at Fitché and the primary schools which are located in each sub-district. Students are drawn from all parts of the District and those in residence return to their homes once every one to two months. Major markets are held weekly in Fitché and in each sub-district capital and minor markets are distributed throughout the District. People come from as far as two to three days walk to meet and exchange both goods and news.

#### Methods

During the first week of June, a surveillance team consisting of one surveillance officer and one vaccinator proceeded to the Awraja with the objective of conducting an active search operation during a 14-day period.

At the Governors and sub-governors offices, inquiry was made about possible smallpox cases and meetings were held with local leaders who had been specially summoned. During the two-week period, contact was made in this manner with the governor, seven sub-governors and 119 lower level officials and village leaders.

At the Health facilities (Fig. 2), the smallpox situation was discussed with the staff and all out-patients were queried about possible smallpox cases in their villages.

In the schools (Fig. 2), the surveillance officer proceeded class by class showing a picture of a smallpox patient (WHO Recognition Card) and inquiring if the students knew of cases in their villages. Time and patience were found to be of special importance in order to overcome initial shyness. The children were first taught what smallpox is, what it looks like and why they should help in locating outbreaks. Once this was done, there was usually an eager response.

In the market places (Fig. 2), nine of which were visited in all, the surveillance officer contacted the local leaders who were present and proceeded section by section through the market showing pictures of smallpox patients and inquiring about the presence of the disease in villages. Although experience had shown that some came from as far as three days walk, most attending the market came from an area within a radius of three hours walk. For operational purposes it was assumed that, after prolonged and intensive questioning at a market, reasonably complete information could be obtained regarding smallpox occurrence within a 12 kilometre radius.

### Results

None of the government officials, village leaders or health personnel knew of any cases of smallpox.

In the primary school at Gebra Guracha and at the market, the team was informed of two suspect cases which had occurred in June in that village (Fig. 2). These were confirmed clinically and it was learned that their source of infection was the village of Ijirri located three hours walk from Gebra Guracha.

The outbreak in Ijirri, which was subsequently conformed as smallpox, consisted of eight cases occurring in three households. The first case had occurred eight weeks previously. Despite the limited extent of the outbreak, the team was informed about the outbreak at five different locations: In the secondary school at Fitcha (nine hours walk away); in the primary school and at the market in Gebra Guracha (three hours walk away); at the market in Degem (six hours walk away); and at the market in Gohalsion (six hours walk away). Not only was the existence of the outbreak known to a number of people but information could even be obtained as to the names of the heads of households where cases had occurred.

On investigation, Ijirri was found to be a village of approximately 600 persons with widely scattered clusters of houses. Approximately one-and-one-half hours walk was required to go from one end of the village to the other.

The first patient, a 20-year-old woman, had developed a rash on 20 April shortly after arriving in the village from neighbouring Gojjam Province, a known endemic area. Pustular material was obtained by a villager from this patient's lesions and two children aged three and six were variolated in a second household. About 20 May, a 40-year-old woman developed smallpox in yet a third household. Four more persons were then variolated in the initial two households, bringing the number of cases to nine in all, seven of which occurred as a result of variolation. The 40-year-old woman was most probably the source of infection for the patient in Gebra Guracha, a three-year-old girl, who became ill on 31 May. The subsequent case in Gebra Guracha occurred on 17 June in a one-year-old sister.

In addition to these cases of smallpox, 20 other suspect cases were reported to the team but, on investigation, all were found to be chickenpox or other skin infections.

The surveillance team simultaneously vaccinated and searched for cases in a wide area around Ijirri and Gebra Guracha and on routes frequented by the villages. In all, 3632 vaccinations were performed but no additional cases were found.

Since the time of the visit, no cases have been reported from or detected in Selale Awraja.

Discussion

Based on the results of the investigation, it would appear that active search especially in school and market places, if reasonably conscientiously conducted, is a sensitive method to detect even comparatively small outbreaks of smallpox though located at some distance away.

The local people usually but not always correctly identified the disease but it was evident that all suspect cases had to be checked by the teams however time-consuming this might be. It is noted, for example, that the first mention of the Ijirri outbreak was from a man who informed the surveillance team that there was chickenpox in the village.

On the basis of a single active search operation such as this, it is, of course, impossible to conclude with certainty that all cases of smallpox in the District have been detected. However, if the District were located in a much larger smallpox-free area where importations were unlikely, repeat search operations at intervals of perhaps four to six months would provide increasing certainty that smallpox transmission was not occurring. For smallpox to persist in an area, one clinically ill person must infect a second and he a third in a continuing chain of transmission. With detection of even a single case, epidemiological investigation permits discovery of the remainder of the outbreak. Thus, with the lapse of time and accumulation of cases in an area, there is an increasing probability that an active search operation such as described would detect one or more cases in the chain and so permit the infected focus to be defined.

Thus, while it might seem impossible in remote and difficult areas to detect cases of smallpox, this study illustrates the facility and rapidity with which this may be done employing a very simple and direct approach.

SUMMARY

In little more than two years, the smallpox eradication programme in Ethiopia has succeeded in reducing smallpox incidence from a rate of over 100 per 100 000 (1971) to the point in March 1972, where 10 of 14 provinces were free of smallpox and the complete interruption of transmission could be foreseen within a year's time. Because of the size of the country, dispersed population, difficult communications and limited staff, programme strategy has necessarily focused on case detection and containment of outbreaks rather than on systematic mass vaccination.

A continuing active search for cases has been an important activity. Inquiries at schools and market places about cases of smallpox have been remarkably effective in detecting outbreaks. In a special study of the method, a two man team in 14 days conducted an active search in a 48 000 square kilometre area in which resided 275 000 persons. Two related outbreaks, one of nine cases and one of two cases were detected and containment measures taken. Although the infection had been imported only eight weeks previously, information about the outbreak was obtained at six different schools and markets located three to nine hours walk distant from the principal focus.

Approaches such as this should prove useful to both endemic and non-endemic areas throughout the world.

FIG. 1  
ETHIOPIA - SMALLPOX INCIDENCE

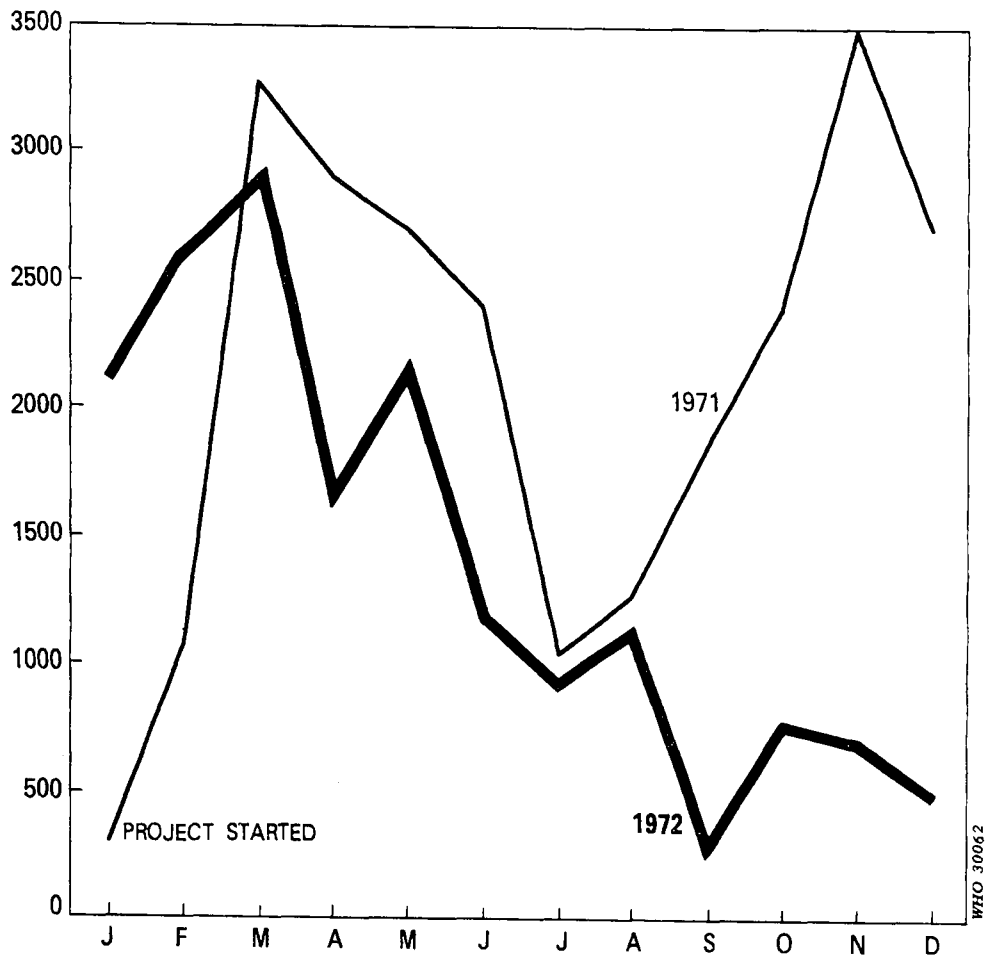


FIG. 2  
SELALE AWRAJA, ETHIOPIA - OUTBREAK

