



INTER-REGIONAL SEMINAR ON SURVEILLANCE  
AND ASSESSMENT IN SMALLPOX ERADICATION

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THE TWENTY YEARS AND THE TWENTY MONTHS

by

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Introduction

Smallpox eradication, a dream of 20 years, was realized in 20 months. In this paper, we have endeavoured to analyse the factors responsible for our apparent success in interrupting smallpox transmission in the province of Central Java.

Central Java has a population of 22.8 million with an average density of 719 persons per square kilometre. It borders the provinces of East and West Java as well as the Indian Ocean and the Java Sea. The province consists of 35 administrative areas: 29 regencies and 6 municipalities.

Central Java was free of smallpox between 1939 and 1948 but the disease was re-introduced during our war of independence. Smallpox subsequently spread throughout the province and during the period 1963 to 1967, an average of 25 of the 35 areas reported cases annually. Since 1968, when Indonesia joined a world-wide eradication programme under the auspices of WHO, cases declined sharply. As of October 1970, no cases had been reported from Central Java since April 1970 (Figure 1).

Methods

To illustrate the developments that made eradication possible, the period before the programme started (1963 to mid-1968) is compared with the period after.

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## Results

Man power: Before the start of the smallpox eradication programme six coordinators, nurses with little epidemiological background, were responsible for smallpox control activities in the province. One supervisor in each administrative area was responsible for the vaccinators. The supervisors worked under the guidance of the coordinators. Each vaccinator was responsible for a population of about 150 000. He was supposed to make a complete round for primary vaccination every 3 months, while revaccinating all persons in his area once in three years.

Beginning with 1968 the following changes were introduced (Table 1). Every vaccinator was made responsible for only about 40 000 persons. While the system of supervisors was not changed, the coordinators were replaced by four "Advance Teams", each of which was usually led by one full-time physician. The same personnel used formerly for mass vaccination were used for part-time containment teams.

Means: Finance and supplies were the main limiting factors before 1968. To increase mobility, WHO provided various means of transport. Locally produced freeze-dried vaccine totally replaced liquid and room-dried vaccine which had been employed previously. (Our nationally-produced vaccine has been routinely evaluated by the WHO Reference Laboratory and has consistently met WHO standards.) To ensure that vaccine would be available at no charge to all the population, the central government purchased and distributed all vaccine. The central government also took financial responsibility for containment teams that had previously been paid by the local governments.

Strategy: Between 1963 and 1967, control activities consisted primarily of mass-vaccination campaigns. Although about 25 million vaccinations were performed in the period, reported cases were higher at the end of this time than at the beginning. In 1968, the number of infected administrative areas was 26 (fig. 2) but the number had nearly doubled in comparison to the 1963-67 average.

In 1968, the handling of vaccine became subject to stricter rules with regard to permissible time of storage without refrigeration and bifurcated needles were introduced.

By the beginning of 1969 a few administrative areas in the north-west of the province were found to constitute the principal problem (fig. 3). A mass campaign was organized which was aimed at children never previously vaccinated (back-log). Although more than 61 000 vaccinations were performed, transmission continued. A scar survey, conducted in June 1969 on the occasion of a WHO assessment, indicated that herd immunity in Central Java was indeed high (Table 2.). However, it was surprising to find that East Java, in spite of a lower level of immunity, had already eradicated smallpox.

After this last mass campaign, we put increasing emphasis on well supervised containment activities. All Advance Teams were concentrated in the problem area in August 1969. Although in the course of the following operations only 54 000 additional vaccinations were given by the containment teams, cases decreased from 147 in August to 31 in December 1969. Since May 1970, no cases have been detected.

### Discussion

In a sense, it appeared that repeated mass-vaccination campaigns only served to maintain our epidemiological situation. When supervision and technical guidance are poor it is tempting to emphasize the total number of vaccinations (quantity) administered rather than the success one is having in eliminating smallpox.

After the start of the smallpox eradication programme, we learned slowly that the quality of containment through better technical guidance and supervision is far more important. This implies careful tracing of the source of infection, intensive pinpoint vaccination around each case, and conscientious follow up. In the past, financial considerations limited our surveillance to passive case finding but, after the programme started, we gave highest priority to active case finding. This implies, of course, a willingness to spend a great deal of time in the field to check suspect areas and to conduct detailed, careful investigations.

Using such a rational method, our programme progressed steadily and in a well planned manner. Thus, we were able to master our problem of 20 years in 20 months.

### Summary

With mass-vaccination campaigns and stepped up routine vaccination it was possible to reduce considerably reported cases in Central Java in the first year of the WHO assisted smallpox eradication programme. However, a comparably low level of cases had occurred in previous years.

Only when priority was given to high quality work in surveillance and containment was eradication achieved.

TABLE 1

Comparison of approaches used before and after  
the Smallpox Eradication Programme began in 1968

	Before start of SE Programme	After start of SE Programme
<p>1. <u>Man power</u></p> <p>1. Smallpox control and supervision</p> <p>2. Vaccinators</p>	<p>6 Nurse coordinators</p> <p>Every 3-5 subdistricts</p>	<p>4 Advance Teams led by M.D.</p> <p>Every subdistrict</p>
<p>2. <u>Means</u></p> <p>1. Transportation</p> <p>2. Vaccination apparatus</p> <p>3. Vaccine</p> <p>4. Vaccine handling Permissible limit for usage</p>	<p>None</p> <p>Vaccinostyl from Central Government</p> <p>Liquid or room-dried paid for by regency</p> <p>3 months after receipt by vaccinator</p>	<p>Bicycles for vaccinators; motorcycles for sub-supervisors; cars for Advance Teams (supplied by WHO)</p> <p>Bifurcated needle from WHO</p> <p>Freeze-dried paid for by Central Government</p> <p>1 month after receipt by vaccinator</p>
<p>3. <u>Strategy</u></p> <p>1. Containment</p> <p>2. Surveillance</p>	<p>Mass vaccination</p> <p>Reporting, investigation and follow up; sporadic</p>	<p>Specific pin point vaccination</p> <p>Reporting, investigation and follow up increasingly emphasized.</p>

TABLE 2

Estimated number of children in Java without pockmarks  
or vaccination scar, June 1969

Area	Under 1 year			1 - 4 years			5 - 14 years		
	Est. pop. (000) 1969	Unpro- tected		Est. pop. (000) 1969	Unpro- tected		Est. pop. (000) 1969	Unpro- tected	
		No. (000)	%		No. (000)	%		No. (000)	%
1. West Java	693	499	72	3 024	1 119	37	5 123	871	17
2. Central Java	735	301	41	3 206	224	7	5 433	54	1
3. East Java	871	470	54	3 802	760	20	6 442	322	5
4. Djakarta	129	71	55	563	18	3	954	57	6
5. Jogjakarta	89	26	29	390	12	3	661	1	-

(WHO Assessment Team Report, June 1969)

FIGURE 1

CENTRAL JAVA: SMALLPOX INCIDENCE BY MONTH, 1964 - 1970

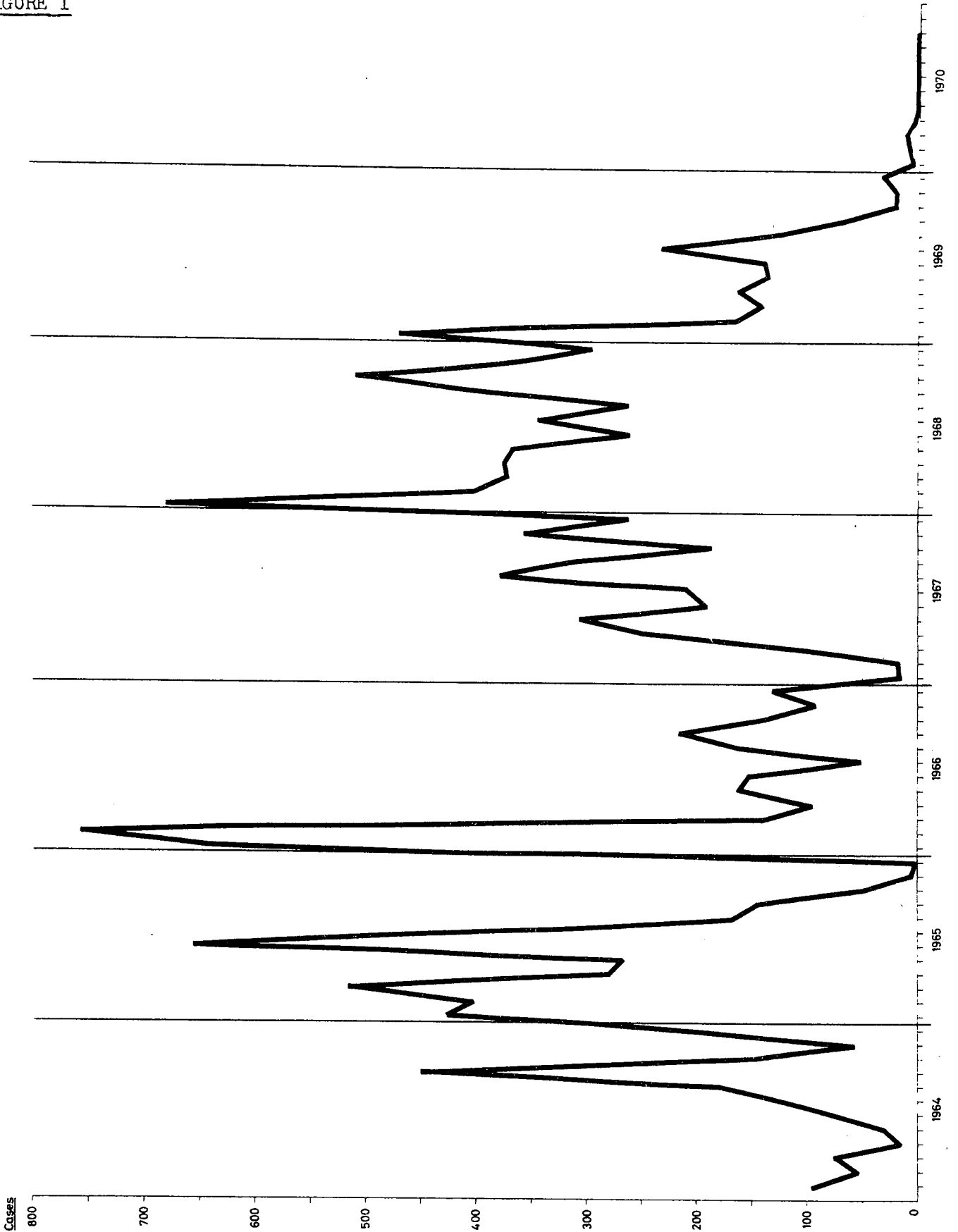


FIGURE 2

CENTRAL JAVA: SMALLPOX INCIDENCE, 1968 (4608 cases)

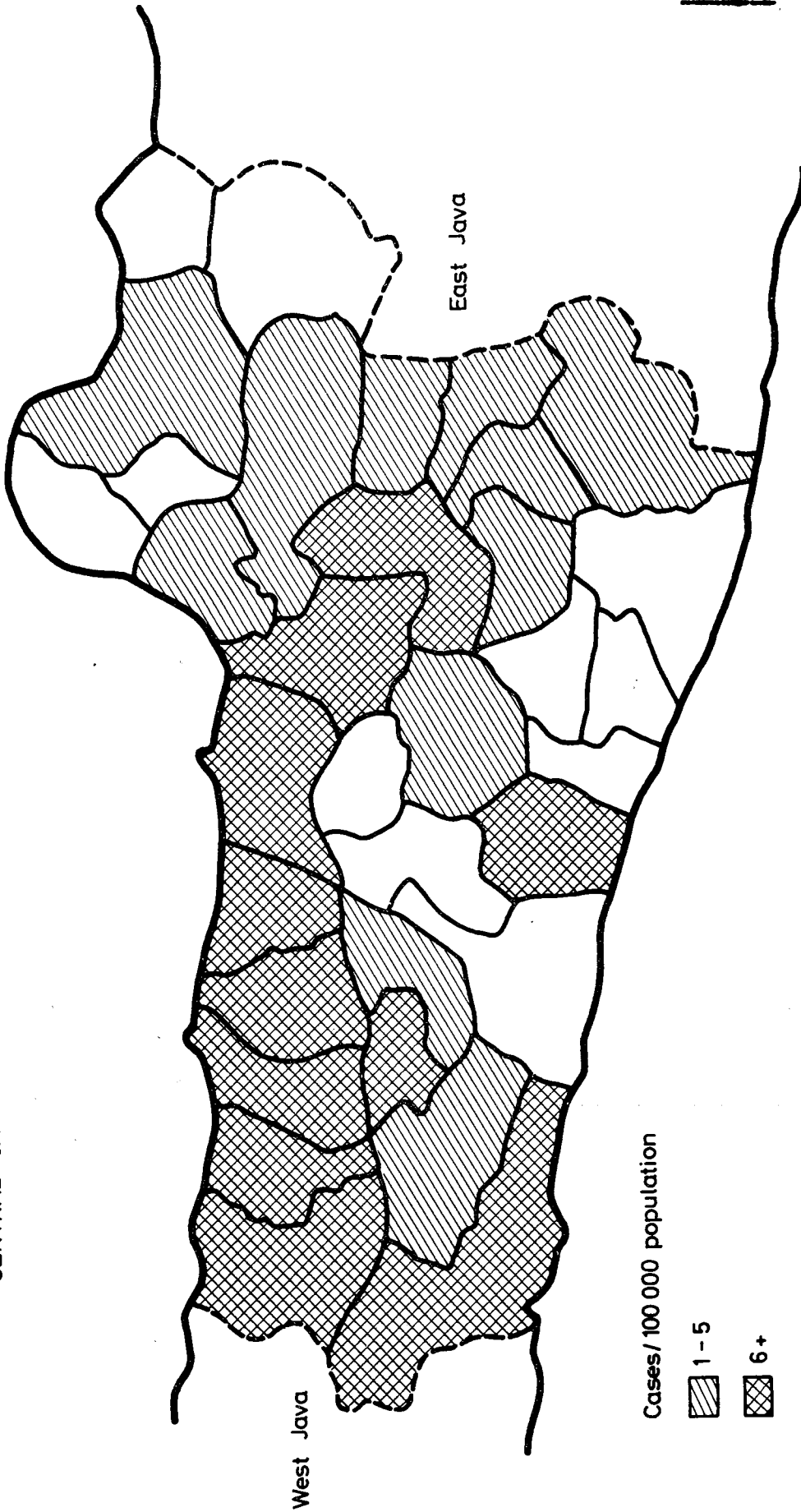


FIGURE 3

CENTRAL JAVA: SMALLPOX INCIDENCE, 1969 (1689 cases)

