



INTER-REGIONAL SEMINAR ON SURVEILLANCE
AND ASSESSMENT IN SMALLPOX ERADICATION

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IS ROUTINE VACCINATION A NECESSITY
IN A SMALLPOX ERADICATION PROGRAMME?

by

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1.0 Introduction

West Java province has been one of the most important endemic areas for smallpox in Indonesia. The province has a population of more than 21 million at an average density of 466 persons per km². Administratively it is divided into 20 regencies and 4 municipalities.

Smallpox has been endemic in all parts of the province since 1948. An estimate of completeness of smallpox notification made by a scar survey in February 1968¹ revealed that less than 7% of the cases occurring in 1967 had been notified to the provincial health services.

The smallpox eradication programme began in July 1968, surveillance-containment activities were gradually improved and reinforced. The result of these activities was a dramatic increase in reported smallpox incidence. In 1969, 11 966 smallpox cases were reported from West Java. This represents 68% of all reported cases in Indonesia or nearly a quarter (22%) of the world incidence. In the entire province, 961 out of 3 772 villages (25%) were infected. Escalation of activities soon brought results, and by the end of 1969, one regency had reported its last indigenous cases. In 1970, up to week 40, 19 regencies and 4 municipalities notified 4 387 cases. During this 40 week period, smallpox in 15 regencies and 4 municipalities has one by one been brought under control (Table 1).

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In the course of the programme, several approaches in the strategy and tactics of eradication methods have been applied and evaluated in our search for the most efficient methods to interrupt smallpox transmission in this province.

This paper summarizes the principal findings in 3 regencies, each of which has been approached in a different manner.

2.0 Methods

2.1 Routine vaccination

Routine vaccination has been carried out in West Java since the inception of the smallpox eradication programme by newly assigned personnel at the rate of one vaccinator per subdistrict with an average population of 50 000. The "dual system"² has been employed; however, the execution of this scheme has been extremely unsatisfactory.

2.2 Surveillance outbreak containment

In the beginning, surveillance outbreak containment activities were poor. Only a minority of cases were reported to the regency health services due to incomplete reporting at village level. Containment measures were not effected properly and there was no systematic effort to trace cases in villages outside those in which the reported cases were residing.

2.3 Backlog fighting

In July 1969 efforts were made to eliminate the backlog of susceptible individuals which was increasing with alarming speed due to newborns, influx of migrants and poor routine vaccination. To achieve this goal and continuing our east-west strategy of areal priority, 4 teams were recruited for each of 7 regencies bordering Central Java. The task of each team, consisting of 5 vaccinators and a team leader, was to perform primary vaccination exclusively. This campaign was called the "backlog fighting operation", which was done house to house and village to village.

Many outbreaks were discovered during this operation. However, due to the fixed vaccination schedule and some administrative obstacles, the Tjirebon Regency teams could not properly perform simultaneous containment activities. When the campaign was over, transmission of smallpox was still continuing on a large scale.

2.4 Backlog fighting synchronized with surveillance-containment action

In October 1969, the approach was modified and backlog fighting was synchronized with surveillance-containment activities. This programme was initiated in 3 other regencies with the highest smallpox endemicity (Bandung, Sukabumi, Tjilandjur) under direct supervision and guidance from SEP headquarters

One mobile team was stationed in every regency to reinforce the surveillance-containment activities.

2.5. Detection by active search for cases and outbreak containment measures

A third approach was implemented in December 1969. Investigation at this time revealed that Bogor Regency was the main focus of smallpox. Considering the high cost of the backlog fighting operation and the limited financial resources available, a decision was made to set up a solid surveillance-containment system without backlog fighting in Bogor Regency.

An additional number of personnel was recruited to reinforce the existing fire-fighting team. They were trained in the field and afterward sent to priority areas for active case detection. This resulted in the detection of many previously unknown outbreaks and a great number of cases (Table 1).

Additional mobile fire-fighting teams were then sent out into the field to assist the local teams.

3.0 Main Findings

3.1 Tjirebon Regency - Backlog fighting not synchronized with surveillance-containment activities

The backlog fighting operation started in Tjirebon Regency in week 29 and ended in week 46 (1969) with an interruption of 3 weeks in between. During the 15 week operation the teams visited 188 287 households in 294 villages and performed 57 163 primary vaccinations. 208 cases were detected in 24 villages. The total man-days needed for this operation was 2 025.

Independent assessment indeed revealed that this operation had succeeded in reducing the backlog of unprotected children. The percentage of unprotected children below 1 year was reduced from 83% to 26%, for the 1-4 year age group from 36% to 11%, and for the 5-14 year age group from 3% to 2% (Table 2).

In spite of the higher immunity level in these, the most susceptible age groups, transmission continued on a large scale. This became evident only 2 days after finishing the backlog fighting operation when 12 mobile teams from other provinces in Java were concentrated in Tjirebon Regency for a 2 day containment exercise. Seven out of 69 suspected villages visited by the teams were found to be still infected. The 165 notified cases from 31 villages after further investigation of the teams, increased to 283 cases, of which 12 were acutely ill.

Two WHO short term consultants set up an effective surveillance-containment system during their assignemnt in this regency^{2), 3)}. A systematic search for smallpox cases was carried out in 82 of 294 villages. The surveillance-containment activities started in week 41 (1969) and during 34 weeks, 516 additional cases were found. Finally, in week 21 (1970) Tjirebon Regency

became free from smallpox. The total man-days needed to control smallpox were 3 430.

3.2 Bandung Regency - Backlog fighting synchronized with surveillance-containment action

The escalation of both activities began in week 44 (1969). The backlog fighting operation ended in week 18 (1970), 26 weeks after its initiation. Surveillance-containment operations were conducted simultaneously to interrupt smallpox transmission. Bandung Regency reported its last cases in week 27.

401 490 households in 242 villages were visited by the backlog fighting teams and 163 194 primary vaccinations were performed; 565 cases in 74 villages were detected during these activities. The total man-days needed to control smallpox were 4 020.

3.3 Bogor Regency - Detection by active search for cases and outbreak containment measures

Escalation activities for this regency started in week 51 (1969). Based on a reported outbreak in one of the subdistricts, one mobile team from headquarters had been sent out for fact finding. On further investigation 18 of 24 subdistricts were found to be infected.

During a period of 42 weeks, 166 out of 328 villages were visited by investigators of the containment teams in an active search for cases. 101 villages were found to be infected and 2 101 smallpox cases were detected. 15 175 primary vaccinations were performed during the period. The total man-days expended were 1 802.

In week 43, 3 villages were still known to be infected. However, smallpox incidence had dropped almost to nil and within a matter of months it is expected that there will be no cases.

3.4 Proportion of unprotected children

To obtain information concerning the vaccination status of the most susceptible age groups, scar surveys were carried out in these 3 regencies in October 1970. The results of these surveys are presented in Annexe 1. Despite the fact that there are almost three times as many unprotected children in Bogor as contrasted to Bandung and Tjirebon, smallpox incidence has diminished as rapidly in Bogor as in the other two regencies.

4.0 Discussion

It was known that in 1967 less than 7% of the cases occurring in West Java appeared in the statistics¹. The all-Java mobile team exercise in 1969 in Tjirebon Regency further emphasized the incompleteness of case notification. Escalation of activities by an active search for cases in Bogor Regency resulted in the detection of a great number of additional cases, thus revealing the incompleteness of routine case notification.

However, it has been shown that in endemic areas, where notification is very incomplete, an active search for smallpox cases coupled with proper containment measures, have proved to be sufficiently effective to eradicate smallpox.

It was evident that efforts to obtain a high immunity level in endemic areas without effective detection and proper containment activities failed to interrupt smallpox transmission. On the other hand, intensive case detection and proper containment measures interrupted smallpox transmission even in populations with low immunity levels.

As far as routine vaccination is concerned, the results of scar surveys in Bogor Regency and the assessment of the backlog fighting in Tjirebon Regency have revealed that routine vaccination is not the most important factor in achieving smallpox eradication.

It is the author's opinion that the continuation of routine vaccination activities to achieve eradication is a luxury which can hardly be afforded, particularly where financial resources are limited as in his own country.

The reinforcement of effective surveillance including active case detection and proper containment action is the solution to counter the present smallpox epidemic situation.

5.0 Summary

Taking West Java as an example, the author demonstrates that proper surveillance-containment action brought smallpox under control in a short period while on the contrary, routine vaccination and mass vaccination campaigns had little effect in interrupting smallpox transmission.

The author proposes that it may be wise to suspend routine vaccination and mass campaigns for financial reasons.

6.0 Acknowledgement

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TABLE 2

TJIREBON REGENCY - SUMMARY OF BACKLOG FIGHTING ASSESSMENT
AUGUST - SEPTEMBER 1969

Age group	No. examined (A)	No. with take (B)	No take (C)	Unvacinated (D)	% Take Rate (E)	% Unprotected before operation (F)	% Unprotected after operation (G)
1 year	446	265	6	110	98	85	26
1-4 years	1 350	337	20	129	94	36	11
5-14 years	1 800	27	2	30	93	3	2
TOTAL	3 596	629	28	269	96	26	8

Formula for calculation:

$$E = \frac{B}{B + C} \times 100\%$$

$$F = \frac{B + C + D}{A} \times 100\%$$

$$G = \frac{C + D}{A} \times 100\%$$

SUMMARY OF SCAR SURVEYS IN CHILDREN UNDER 15 YEARS OF AGE IN
THREE REGENCIES OF WEST JAVA PROVINCE, OCTOBER 1970

1. TJIREBON REGENCY, 29-30 October 1970

<u>Age group</u>	<u>No. examined</u>	<u>% Unprotected</u>
< 1 year	1 457	28
1-4 years	3 084	11
5-14 years	3 801	6
Total	8 342	12

2. BANDUNG REGENCY, 29-30 October 1970

<u>Age group</u>	<u>No. examined</u>	<u>% Unprotected</u>
< 1 year	1 185	44
1-4 years	3 508	12
5-14 years	3 787	7
Total	8 480	14

3a. BOGOR REGENCY - less endemic areas, 6-10 October 1970

<u>Age group</u>	<u>No. examined</u>	<u>% Unprotected</u>
< 1 year	924	86
1-4 years	3 092	46
5-14 years	3 669	23
Total	7 685	39

3b. BOGOR REGENCY - highly endemic areas, 6-9 October 1970

<u>Age group</u>	<u>No. examined</u>	<u>% Unprotected</u>
< 1 year	1 210	66
1-4 years	3 825	32
5-14 years	4 531	18
Total	9 566	30

SUMMARY OF SCAR SURVEY IN CHILDREN BELOW 15 YEARS OF AGE IN LESS ENDEMIC AREAS OF BOGOR REGENCY
Period : 6-10 October 1970

Subdistrict	Below 1 year				1-4 years				5-14 years				Total			
	P	X	O	All	P	X	O	All	P	X	O	All	P	X	O	All
1. Tjigudeg (Tjigudeg village)	0	34	100 (75%)	134	10	196	278 (57%)	484	41	404	115 (21%)	560	51	634	493 (42%)	1178
2. Tjimanggis (Sukatani village)	0	36	169 (82%)	205	10	342	364 (51%)	716	19	473	141 (22%)	633	29	851	574 (37%)	1554
3. Tjimanggis (Tugu village)	0	55	356 (87%)	411	2	918	367 (29%)	1287	31	1290	407 (24%)	1728	33	2263	1130 (33%)	3426
4. Parungpandjang (Parungpandjang village)	0	8	166 (95%)	174	4	178	423 (70%)	605	52	498	198 (26%)	748	56	684	787 (52%)	1527
Range																
TOTAL	0	133	791 (88%)	924	26	1634	1432 (48%)	3092	143	2665	861 (23%)	3669	169	4432	3084 (39%)	7685

P = Pockmarks (with or without vaccination scars)

X = Vaccination scar

O = No scars of vaccination or pockmarks.

SUMMARY OF SCAR SURVEY IN CHILDREN BELOW 15 YEARS OF AGE IN HIGHLY ENDEMIC AREAS OF BOGOR REGENCY
Period : 6-9 October 1970

Subdistrict	Below 1 year			1-4 years			5-14 years			Total					
	P	X	O	P	X	O	P	X	O	P	X	O			
													All	All	All
1. Tjileungsi (Lulut village)	2	74	93 (75%)	31	461	157 (24%)	649	52	551	109 (15%)	712	85	1086	359 (23%)	1530
2. Tjomas (Pasireurih village)	2	78	115 (59%)	10	562	147 (20%)	719	45	637	136 (17%)	818	57	1277	398 (23%)	1732
3. Tjiteureup (Tadur village)	1	89	113 (56%)	21	431	173 (28%)	625	30	619	49 (7%)	698	52	1139	335 (22%)	1526
4. Kedunghalang (Nagrag village)	0	39	169 (81%)	19	267	288 (50%)	574	83	384	202 (30%)	669	102	690	659 (45%)	1451
5. Tjibinong (Tengah village)	0	51	163 (76%)	9	374	219 (36%)	602	39	667	146 (17%)	852	48	1092	528 (32%)	1668
6. Tjilawi (Lemahduhur village)	0	70	151 (68%)	36	367	253 (38%)	656	99	519	164 (21%)	782	135	956	568 (34%)	1659
Range			(55% - 81%)			(20% - 50%)					(7% - 30%)				(22% - 45%)
Total	5	401	804 (66%)	126	2462	1237 (32%)	3825	348	3377	806 (18%)	4531	479	6240	2847 (30%)	9566

P = Pockmarks (with or without vaccination scars)

X = Vaccination scar

O = No scars of vaccination or pockmarks.

SUMMARY OF SCAR SURVEY IN CHILDREN BELOW 15 YEARS OF AGE, BANDUNG REGENCY
Period : 29-30 October 1970

Subdistrict	Below 1 year			1-4 years			5-14 years			Total						
	P	All		P	All		P	All		P	All					
		X	O		X	O		X	O		X	O				
1. Tjimeahi	-	142	126 (47%)	268	9	637	80 (11%)	726	8	802	31 (4%)	841	17	1581	237 (13%)	1835
2. Tjipatat	-	73	165 (69%)	238	20	550	163 (22%)	733	35	614	100 (13%)	749	55	1237	428 (25%)	1720
3. Tjiwiday	-	119	77 (39%)	196	7	631	60 (9%)	698	5	733	40 (5%)	778	12	1483	177 (11%)	1672
4. Tjikalong Wetan	-	169	68 (29%)	237	5	671	28 (4%)	704	5	660	25 (4%)	690	10	1500	121 (7%)	1631
5. Bandungaran	-	161	85 (35%)	246	10	551	86 (13%)	647	21	657	51 (7%)	729	31	1369	222 (14%)	1622
Range			(29% - 69%)			(4% - 22%)				(4% - 13%)				(7% - 25%)		
Total	-	664	521 (44%)	1185	51	3040	417 (12%)	5508	74	3466	247 (7%)	3787	125	7170	1185 (14%)	8480

P = Pockmarks (with or without vaccination scars)

X = Vaccination scar

O = No scars of vaccination or pockmarks.

SUMMARY OF SCAR SURVEY IN CHILDREN BELOW 15 YEARS OF AGE, TJIREBON REGENCY
Period : 29-30 October 1970

Subdistrict	Below 1 year			1-4 years			5-14 years			Total		
	P	X	O	P	X	O	P	X	O	P	X	O
			All			All			All			All
1. Tjirebon Barat	-	103	50 (33%)	3	254	34 (12%)	9	446	23 (5%)	12	803	107 (12%)
2. Tjirebon Selatan	-	315	73 (19%)	4	624	45 (7%)	9	966	28 (3%)	13	1905	146 (7%)
3. Tjiwaringin	-	87	67 (44%)	15	375	105 (21%)	29	490	95 (15%)	44	952	267 (21%)
4. Kapetakan	-	276	108 (28%)	9	528	85 (14%)	29	608	51 (7%)	38	1412	244 (14%)
5. Babakan	-	273	105 (28%)	20	904	79 (8%)	19	968	31 (3%)	39	2145	215 (9%)
Range			(19% - 33%)			(7% - 21%)						(7% - 21%)
Total	-	1054	403 (28%)	51	2685	348 (11%)	95	3478	228 (6%)	146	7217	979 (12%)
												8342

P = Pockmarks (with or without vaccination scars)

X = Vaccination scar

O = No scars of vaccination or pockmarks.