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INTERNATIONAL ASSESSMENT OF SMALLPOX ERADICATION IN INDONESIA

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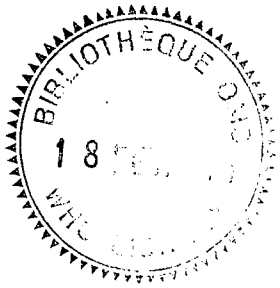

Is Routine Vaccination a Necessity in a Smallpox Eradication Programme?[a]

by

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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 km^2. Administratively it is divided into 20 regencies and four 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 1968[1] 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 3772 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 four municipalities notified 4387 cases. During this 40 week period, smallpox in 15 regencies and four municipalities has one by one been brought under control (Table 1).

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 three regencies, each of which has been approached in a different manner.

Methods

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 sub-district with an average population of 50 000. The "dual system"[2] has been employed. However, the execution of this scheme has been extremely unsatisfactory.

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Surveillance-outbreak containment

In the beginning, surveillance-outbreak containment activities were poor. Only a minority of cases was 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.

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 area priority, four teams were recruited for each of seven regencies bordering Central Java. The task of each team, consisting of five 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.

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 three other regencies with the highest smallpox endemicity (Bandung, Sukabumi, Tjiandjur) under direct supervision and guidance from SEP headquarters. One mobile team was stationed in every regency to reinforce the surveillance-containment activities.

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 afterwards 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.

Main findings

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 three weeks in between. During the 15 week operation the teams visited 188 287 households in 294 villages and performed 57 163 primary vaccinations. Two hundred and eight cases were detected in 24 villages. The total man-days needed for this operation were 2025.

Independent assessment indeed revealed that this operation had succeeded in reducing the backlog of unprotected children. The percentage of unprotected children below one 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 two days after finishing the backlog fighting operation when 12 mobile teams from other provinces in Java were concentrated in Tjirebon Regency for a two 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 assignment 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 3430.

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 4020.

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. One hundred and one villages were found to be infected and 2101 smallpox cases were detected. 15 175 primary vaccinations were performed during the period. The total man-days expended were 1802.

In week 43, three 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.

Proportion of unprotected children

To obtain information concerning the vaccination status of the most susceptible age-groups, scar surveys were carried out in these three regencies in October 1970. The results of these surveys are presented in Annex 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.

Discussion

It was known that in 1967 less than 7% of the cases occurring in West Java appeared in the statistics.[1] 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.

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

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.

Acknowledgement

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TABLE 1

WEST JAVA - DISTRIBUTION OF SMALLPOX CASES BY REGENCY/MUNICIPALITY BY FOUR-WEEK PERIOD, 1969 AND 1970

REGENCY/ MUNICIPALITY	Pop. (ooo)	No. of cases 1969	No. of cases 1970 (to week 40)	1969 Weeks 1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40	41-44	45-48	49-52	1970 Weeks 1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40
1. Tjiamis	1 218	334	-	47	31	52	32	38	25	38	38	1	29	3	-	-	-	-	-	-	-	-	-	-	-	-
2. Subang	947	112	21	14	2	2	-	24	15	7	21	12	12	1	1	-	21	-	-	-	-	-	-	-	-	-
3. Indramaju	1 037	875	12	176	156	67	130	96	17	14	28	42	65	27	26	31	8	3	1	-	-	-	-	-	-	-
4. SUKABUMI Mun.	95	25	4	1	4	1	8	4	-	-	2	1	1	1	2	-	3	-	1	-	-	-	-	-	-	-
5. Tasikmalaja	1 221	324	19	22	19	65	23	18	10	19	19	18	21	26	38	26	16	2	1	-	-	-	-	-	-	-
6. Kuningan	633	534	19	79	44	25	46	36	13	11	4	36	112	121	1	4	16	1	2	-	-	-	-	-	-	-
7. Serang	862	39	1	-	1	-	1	1	-	7	-	-	2	8	5	14	-	-	1	-	-	-	-	-	-	-
8. TJIREBON Mun.	185	54	5	9	-	7	17	5	4	-	-	-	1	-	5	6	1	-	-	4	-	-	-	-	-	-
9. Madjalengka	770	379	28	117	22	43	11	9	3	7	9	38	20	67	17	16	13	8	6	1	-	-	-	-	-	-
10. Sumedang	634	208	16	8	29	23	10	15	22	18	10	9	12	19	23	10	14	-	1	1	-	-	-	-	-	-
11. BOGOR Mun.	176	78	19	8	11	6	2	12	9	1	-	13	5	8	2	1	10	4	2	3	-	-	-	-	-	-
12. Tjirebon*	1 088	849	102	24	10	50	70	54	10	9	21	43	42	174	192	150	51	21	12	16	1	1	-	-	-	-
13. Krawang	1 003	262	104	47	44	11	24	38	15	6	16	12	20	5	13	11	10	5	48	22	14	5	-	-	-	-
14. Purwakarta	350	308	130	7	83	33	26	25	8	7	2	13	57	1	23	23	82	12	19	6	9	2	-	-	-	-
15. BANDUNG Mun.	1 164	329	87	65	25	32	13	9	13	5	8	37	37	43	20	22	15	27	18	10	9	8	-	-	-	-
16. Tjiandjur	1 077	1 908	436	60	176	45	146	185	206	80	278	110	65	308	116	133	198	69	61	68	32	8	-	-	-	-
17. Garut	1 107	497	10	98	51	108	82	36	6	22	17	23	7	11	11	25	-	-	-	-	8	2	-	-	-	-
18. Bandung**	1 891	1 161	441	50	100	40	93	11	294	18	65	83	107	97	46	31	125	131	83	73	17	1	11	-	-	-
19. Sukabumi	1 156	2 310	627	210	214	217	96	216	127	129	160	125	223	102	87	404	156	269	126	50	12	3	8	3	-	-
20. Lebak	522	373	57	117	86	26	-	1	33	-	12	27	27	2	30	12	3	7	13	4	13	4	2	1	10	-
21. Pandeglang	529	87	49	-	15	18	2	19	1	-	6	-	-	17	9	-	3	9	9	-	13	6	1	6	2	-
22. Bekasi	832	110	48	62	17	11	-	1	-	6	-	1	-	-	-	-	3	12	-	-	-	-	-	21	11	1
23. Tanggerang	1 022	286	159	25	8	6	-	2	6	-	17	-	12	60	126	24	14	58	3	5	23	6	29	5	10	6
24. Bogor***	1 570	524	1 993	75	20	42	46	70	64	60	37	7	6	6	-	91	391	485	272	329	162	115	147	74	16	2
TOTAL	21 089	11 966	4 387	1 321	1168	930	878	999	901	524	770	657	884	1107	793	1034	1153	1123	679	592	313	161	198	110	49	9

* Tjiribon Regency - Backlog fighting - weeks 29-46; Surveillance-containment activities started in week 41.

** Bandung Regency - Backlog fighting - week 44 (1969) through week 18 (1970) with surveillance-containment action.

*** Bogor Regency - Active search for cases and outbreak containment began in week 51.

TABLE 2

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

Age Group	No. Examined (A)	No. with Take (B)	No Take (C)	Unvac-cinated (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:

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

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

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

ANNEX 1

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

Age group	No. examined	% Unprotected
<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

Age group	No. examined	% Unprotected
< 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

Age group	No. examined	% Unprotected
< 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

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