Inter-Regional Seminar on Surveillance
and Assessment in Smallpox Eradication
New Delhi, India, 30 Nov - 5 Dec 1970
World Health Organization 1971
WHO/SE/71.30 pp 13-23

REVIEW OF THE STATUS OF SMALLPOX IN THE SOUTH-EAST ASIA REGION

by

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Since 1967 the incidence of smallpox in South-East Asia has steadily decreased in spite of substantial improvements in reporting. The number of cases in the different countries of the Region, as notified to WHO, is presented in Table 1. The incidence of the disease is by far the highest in India and Indonesia, the largest and most densely populated countries of the Region. As the eradication of smallpox in South-East Asia will depend to a great extent on the results achieved in India and Indonesia, a detailed picture of the smallpox situation in these two countries is first presented.

India

Smallpox incidence has always been high in India and has shown a characteristic seasonal and annual pattern (Fig. 1). The majority of cases occur between December and June with a significantly lower incidence during the summer and autumn months. Explanations for this seasonal variability have been attributed to a number of factors affecting the transmission of the virus or its viability. These include variations in atmospheric humidity and ultra-violet radiation, and the relative immobility of the population during different seasons. A full explanation, however, has never been elucidated.

In past decades the annual incidence of smallpox has risen to a sharp peak every 5 to 7 years. This is believed to result from a gradual increase in the number of susceptibles due to a slackening of control measures during the years that follow

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an epidemic. This accumulation of susceptibles finally forms an ideal terrain for the flare-up and extension of endemic foci.

In Figure 2 it is noted that in the last 20 years the maximum incidence has shown a steady downward trend. However, during the past two years, the annual total of cases has fallen below 30 000 for the first time.

Time does not permit presentation of data regarding each State. Although certain States are the main contributors to the total, the highest incidence annually reported shifts each year from one State to another. Notably, however, Tamil Nadu has remained free from smallpox since May 1969.

The National Smallpox Eradication Programme (NSEP) was launched in India in 1962. The objective of the programme was mass vaccination of the total population in the country. Although from 1962 to 1966 approximately 60 million primary vaccinations and 440 million revaccinations were performed, the incidence of reported smallpox cases rose above 80 000 in 1967. In view of this alarming figure, a joint Government/WHO assessment of the programme was undertaken and the assessment team noted inter alia: "On the basis of the findings it is concluded that the NSEP is still far from achieving its objective of smallpox eradication in most areas.....The major problems are the result of lack of supervision and proper organization in the programme, faulty execution and an unduly complex methodology".

On the basis of the conclusions and recommendations of the assessment team, a plan of operation was prepared and was signed by the Government and WHO in September 1970.

The previous strategy of eradication based on a mass vaccination campaign was altered to emphasize the surveillance and containment of outbreaks. The containment component of the programme is in an early phase of development, but gradually its importance is being recognized at State and District levels.

Prompt reporting of all cases is a sine qua non for ensuring successful containment. In 1967, the assessment team estimated that the number of smallpox cases reported in the States visited represented not more than 10% of the cases which had actually occurred. However, recent observations made during the investigation of a few smallpox outbreaks that occurred in Rajasthan, indicate an improvement in the notification system at least in this State. The figures recorded appeared to represent approximately 30 to 50% of the true incidence.

At present, information on smallpox cases is channelled from the Primary Health Centres through the district level to both Health Statistics and NSEP at State level. Unfortunately, complex administrative procedures have resulted in discrepancies between the figures recorded in the official health statistics and the NSEP at the State as well as at the Central level.

Since 1962, freeze-dried smallpox vaccine has gradually replaced the liquid vaccine initially used in the NSEP. Under a bilateral agreement, the USSR has supplied one hundred million doses of freeze-dried smallpox vaccine every year. In addition,

the indigenous production of vaccine has been stepped up with UNICEF/WHO assistance and the present annual total capacity of the four production Institutes is estimated to be 60 million doses. Further steps have been taken this year to increase the indigenous capacity to one hundred million doses, which, in India, is defined as the amount of vaccine needed for performing a single vaccination with the rotary lancet.

The multiple puncture vaccination technique employing the bifurcated needle was introduced in 1969. Although the use of this technique has been recommended as the most efficacious and one which results in considerable vaccine economy, rotary lancets are still used in many areas of the country.

Indonesia

Indonesia achieved freedom from smallpox before World War II, but the disease was reintroduced in 1947, and during subsequent years became endemic in Java and the other islands. During the period 1958 to 1965, the reported incidence increased sharply, from 121 cases in 1958 to 46 000 in 1965. Though Java has accounted for the majority of cases in recent years, extensive outbreaks have occurred, as well, in Sumatra, Sulawesi, Kalimantan and Bali.

The campaign to eradicate smallpox was launched in early 1968, preceded by a national seminar held in January of that year. During the seminar, a plan of action for Java and Bali was drawn up. The most important features of this programme, which has been implemented with WHO assistance have been:

- Exclusive use of (a) freeze-dried smallpox vaccine and
  (b) bifurcated needle for multipuncture vaccination

- Uniform organizational pattern at sub-district, regency and provincial levels throughout the country;

- Method of recording vaccinations on a simple tally sheet, family and household registers being proscribed;

- Emphasis on surveillance - containment action, containment being the responsibility of mobile teams operating from central, provincial and regency levels; and

- Priority to primary vaccination of new-borns and never-successfully vaccinated persons, and revaccination of children below 14 years and of migrant groups.

During 1968 the smallpox eradication programme progressed on these lines in Java and Bali. The results were assessed in June 1969 by a joint Government/WHO team, which formulated recommendations for the strengthening of surveillance and containment.

Table 2 compares the incidence of smallpox in Indonesia between January and June in 1969 and 1970. Bali retained its smallpox-free status throughout 1969 and 1970. East Java, Central Java and Kalimantan achieved freedom from the disease in 1970.

In West Java the number of regencies reporting smallpox decreased during 1970 from 24 in the first quarter to 8 during the third quarter. The main eradication efforts have now been redirected to West Java, Sulawesi and Sumatra.

The Bio Farma Institute in Bandung is supplying the major portion of the vaccine needs of the programme. The Institute, which had initially encountered some difficulties in regard to standards of bacterial count, has since overcome these. The potency and stability of the vaccine have been consistently satisfactory. The present production capacity is 1.6 million ampoules per year.

Burma

The smallpox eradication programme began in Burma in 1963. Following World War II, one to two million persons were vaccinated each year until 1957, after which the figure rose to 3 million, approximately one-third being primary vaccinations. With this increase in activity, smallpox incidence had begun to decline by the time the programme was initiated.

A plan drawn up by the NSEP divided the country into operational units, each representing a population of approximately 20 000. One vaccinator was assigned to each of these units. During the first three years of the campaign (1963-1966), each operational unit was divided into three sub-units, the aim being to vaccinate the total population of one sub-unit by performing both primary and revaccinations during the first year and to carry out during that period only primary vaccinations in the remaining two sub-units. During the second and third years, this operational cycle was continued in the second and third sub-units with revaccination of the population and primary vaccination of the younger age-groups. As this approach was not practicable in areas with many migrants and/or with poor communication facilities, a slightly modified plan was adopted in these areas which envisaged vaccination of the total population during the first few months of the first year and concentration in subsequent years on primary vaccinations.

During the first round of vaccination 20 million were vaccinated. A second round of vaccination was undertaken from 1967 to 1969, and 24 million more vaccinations were performed.

The vaccine used since the inception of the programme has been exclusively freeze-dried, supplied by WHO and the USSR. Efforts to produce vaccine locally at the Burma Pharmaceutical Industry were begun a few years ago with UNICEF/WHO assistance. The present installed capacity is 0.5 million ampoules per year and it is expected that the production will meet the national needs in 1972.

The vaccination technique employed is the scratch method using ordinary surgical needles. The introduction of the bifurcated needle and the multi-puncture technique is presently under consideration.

The last outbreak of smallpox occurred in 1969; the source of infection was traced to a neighbouring country.

The programme has been assessed recently by a joint Government/WHO team which formulated the strategy for the maintenance phase.

Ceylon and Thailand

Both these countries have remained smallpox-free during the last few years. In Ceylon, the last smallpox case notified was an imported case which occurred in 1967; none has been reported since. In Thailand the last two cases of smallpox were recorded eight years ago.

The situation in these two countries shows several common features:

- The health services conducted a successful vaccination campaign in the 1950's and early 1960's;
- They are not in immediate proximity to smallpox endemic areas and
- Freedom from smallpox has resulted in a reduction in routine vaccination programmes, particularly in regard to primary vaccination of new-borns and pre-school children. In both countries a significant number of unprotected persons is accumulating (Table 3).

From Table 3 it is noted that during recent years the number of primary vaccinations reported was low in comparison to the number of new-borns. Furthermore, in a small scale survey carried out this year among Ceylonese children, 96% of those under one year of age were unprotected and 79% of children below 5 years. Liquid vaccine is exclusively used in Ceylon and taking into account the known instability of such vaccine, it is presumed that a moderate proportion of the vaccinations performed may have been unsuccessful.

During the scar surveys undertaken in Thailand in 1969, it was found that the proportion of unprotected in the age-group below one year was 83%; in the age-group 1-4 this percentage was 62%; and in the age-group 5-14, was 15%.

Such a situation is certainly a cause for concern. Taking into consideration the deficiencies of surveillance, a very serious problem could result if smallpox were reintroduced into either of these two countries.

Nepal

The pilot project for smallpox control began in 1962 covering the area of the Kathmandu Valley, and a few years later a nation-wide eradication programme was begun with the aim of vaccinating the entire Kingdom by 1972. At present the programme is in operation in 8 of the 14 zones into which the country is divided, involving 75% of the total population.

During the last decade, the reported smallpox incidence in Nepal has never been high although it is assumed that only a negligible percentage of cases has been notified in the past. The main reasons for this under-reporting are the lack of organized basic health services in many parts of the country, difficult communications and superstitious beliefs common among the population.

An important target, therefore, for the smallpox eradication programme in Nepal has been to organize an effective reporting/recording system with adequate containment measures.

The geographical distribution of smallpox cases reported is of interest. During recent years 99% of all reported cases have been from the Terai, in the southern part of the country, bordering the Indian States of Bihar and Uttar Pradesh. In these two States, the implementation of the NSEP is still far from successful, and as various mobile segments of the population, i.e. migrants, labourers and pilgrims, can cross the border unchecked, smallpox cases are readily imported into Nepal.

Since the beginning of the programme, freeze-dried smallpox vaccine supplied by WHO has been used in Nepal. In 1969, the multiple puncture technique employing the bifurcated needle was introduced.

During recent months greater attention is being given to the surveillance and containment components of the programme. Four containment teams, each to cover two zones, have been recently established. These teams are responsible for outbreak containment and for active search for smallpox cases.

Summary

Smallpox Eradication Programmes have given highly encouraging results in recent years, a smallpox-free status being achieved in certain areas and a marked decline in the incidence of the disease in all others. However, these promising results must not lead us to feel complacent. In smallpox-free countries, surveillance and routine vaccination of the unprotected must be vigilantly continued to contain outbreaks resulting from an imported case. In countries, where endemic foci still exist, vaccination by the multiple puncture method and the use of potent, freeze-dried vaccine must be complemented by strengthened reporting, surveillance and containment measures, if such foci are to be finally eliminated.

TABLE 1

SOUTH-EAST ASIA REGION
REPORTED SMALLPOX INCIDENCE BY COUNTRY, 1961 - 1970

Country	1961-1965	1966	1967	1968	1969	1970 to October
Burma	481	6	0	181	69	0
Ceylon	112	0	1	0	0	0
India	258 056	32 616	84 902	35 179	18 694	7 096
Indonesia	99 483	35 283	13 478	17 350	17 972	9 089
Maldives	0	0	0	0	0	0
Mongolia	0	0	0	0	0	0
Nepal	1 315	164	110	249	163	78
Thailand	35	0	0	0	0	0
TOTAL	359 482	68 069	98 491	52 959	36 898	16 263

TABLE 2

INDONESIA
SMALLPOX INCIDENCE JANUARY-JUNE, 1969 AND 1970

	1969 (Jan.-June)		1970 (Jan.-June)	
	Cases	%	Cases	%
West Java	6 740	76.7	4 128	53.5
Central Java	1 205	13.7	28	0.3
East Java	17	0.2	0	0
JAVA TOTAL	7 962	90.6	4 156	53.8
Bali	0	0.0	0	0
Kalimantan	28	0.3	0	0
Sulawesi	106	1.2	942	12.2
Sumatra	693	7.9	2 624	34.0
INDONESIA TOTAL	8 789	100.0	7 722	100.0

TABLE 3

CEYLON AND THAILAND
PRIMARY VACCINATIONS PERFORMED YEARLY

	Ceylon	Thailand
Estimated Population	12 088 000 (mid-1968)	34 738 000 (mid-1969)
Estimated Population below 15 years	4 848 000	14 937 000
Estimated Number of Newborns	386 000	1 320 000
Primary Vaccinations		
1965	272 000	NA
1966	292 000	NA
1967	336 000	1 044 000
1968	271 000	1 002 000
1969	NA	864 000 (to October)

Figure:1 INDIA - SEASONAL DISTRIBUTION OF SMALLPOX CASES BY MONTH, 1956 - 1963

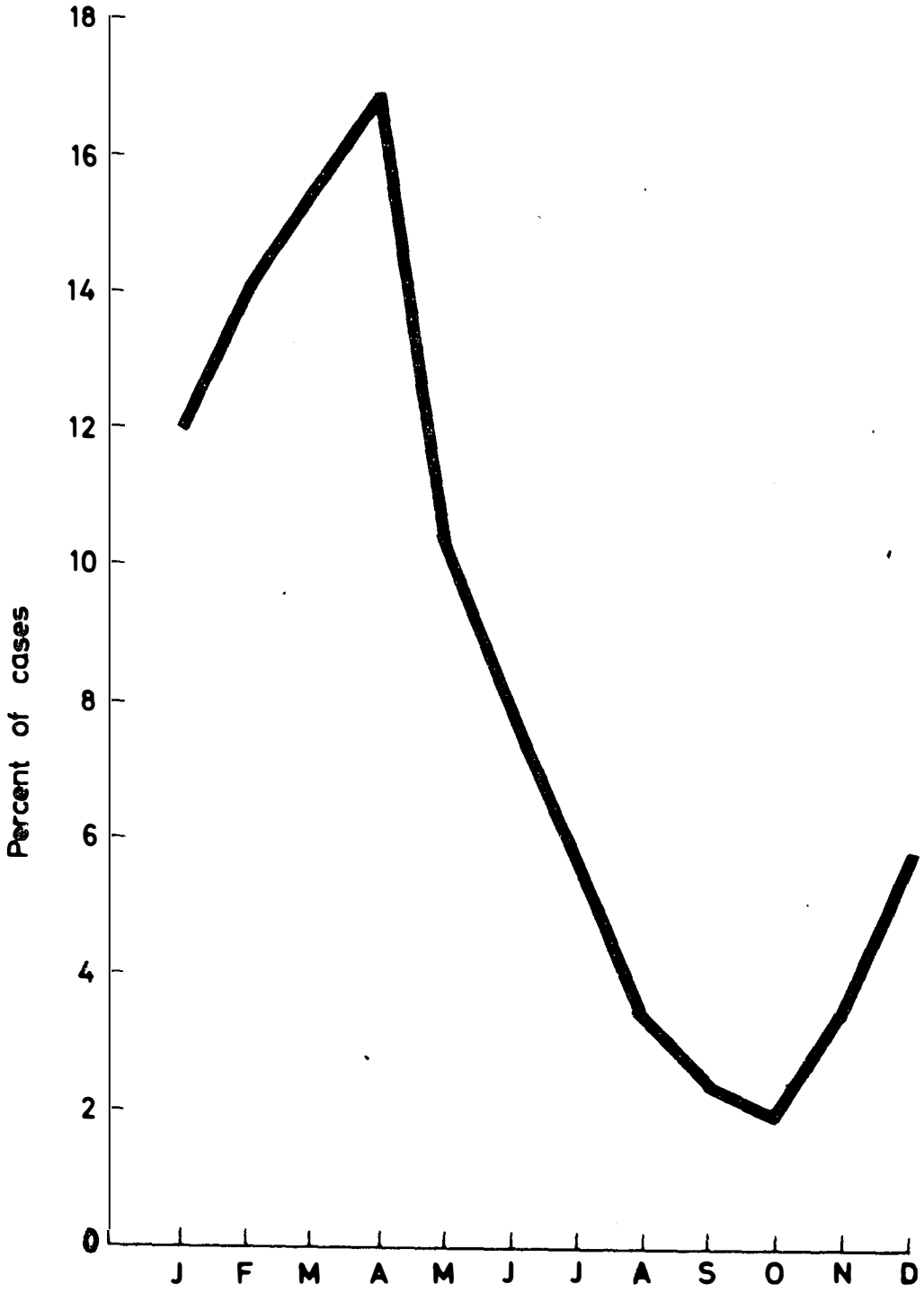

Figure: 2 INDIA - SMALLPOX CASES REPORTED, 1950 - 1970