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SURVEILLANCE OF SMALLPOX IN EAST PAKISTAN

by

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Introduction

In 1967 a revised plan for smallpox eradication was prepared by the Government of East Pakistan with WHO assistance in which the surveillance component was given due importance. Since then, the organization and the approach to surveillance in East Pakistan have been changed several times on the basis of experience gained during the field operation.

Organization and Methods of Surveillance in East Pakistan

Reporting

A requisite for effective surveillance is a well functioning reporting system based on an organized network of reporting points through which information is collected and transmitted to the executive level in charge of containment measures. Action aimed at containment of infective foci is necessary and without which the enthusiasm and interest of workers and the public would gradually wane, thus turning the notification system into another administrative routine full of errors and a burden to all concerned.

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In East Pakistan, health services are operated in almost 60% of the Districts by two separate bodies, Local and Government. From the basic unit of the Union up to the level of District (Union-Thana-Subdivision-District), the public health structure is administered along two lines with separate groups of workers. In past years, this system had proved to be rather inefficient and cumbersome, suffering frequently from lack of cooperation between the organizations concerned. As a result, reporting has been very much delayed and incomplete, thus preventing the authority concerned from defining the real problem of smallpox.

Aware of the fact that the above system could not provide a sound structure for smallpox surveillance, the authorities agreed to the proposal of a new reporting and surveillance system incorporating the use of surveillance teams. Figure 1 shows the outline of the reporting system now in force as compared with the old one. In the new scheme the Subdivisional Medical Officer of Health is now a key person for collection of data from lower levels and for the direct transmission of data to the headquarters of the smallpox eradication programme. Administrative links with district and division were thus put on the side line of the reporting channel.

Advantages of the present system may be summed up as follows:

1. Cancellation of duality in reporting system.

2. More accurate and more speedy reporting.

3. Prompt action in response to report.

In order to strengthen further the reporting network, malaria surveillance workers were requested to notify any pox-like disease that they came across during their tours in the field. As they are supposed to visit 3 000 houses every month, their intelligence reports considerably enhanced the effectiveness of surveillance. Their reports are screened by the Sanitary Inspector posted at Thana level and by the Subdivisional Medical Officer of Health concerned. Independent screening is also conducted by the Divisional Surveillance Teams.

Fire-fighting teams

Epidemiologic investigation and organization of containment measures were previously the primary responsibility of personnel posted in the area - Union, Thana, Subdivision. District and Divisional levels, having no field personnel, were concerned mainly with administrative problems of the health services. With the introduction of the new reporting system, it was considered necessary to establish fire-fighting teams, trained in surveillance work, to assist in the field. On the basis of experience gained with a surveillance team attached to central headquarters, the original idea of one surveillance team in each District was abandoned in favour of having one fire-fighting team at each of the four divisional headquarters in addition to one attached to the headquarters office. Each team consists of four vaccinators with a Sanitary Inspector as a

leader and is administered by Headquarters Smallpox Eradication Programme through the Divisional Deputy Director of Health.

The fire-fighting teams are responsible for the investigation of reported cases, planning and organization of containment measures, and the screening of reports submitted by malaria surveillance workers.

Smallpox Incidence in the Light of Surveillance Activities

Smallpox has always been considered to be a serious public health problem in East Pakistan. Smallpox incidence for the past 15 years shows a cyclical pattern typical for endemic countries (Fig. 2).

The trend in case-fatality rates during the last 10 years is shown in Figure 3. A decline of about 40% in case-fatality rates has occurred over the past 10 years, a substantial proportion of this decline having occurred since the eradication programme began. This is attributed to improved notification. Case-fatality rates among cases investigated by the surveillance teams during the last two years were found to be about 30% which is similar to those reported from other endemic Asian countries. The higher rates of 50% to 70% were undoubtedly largely the result of under-reporting as a death attracts more attention so far as the recording of vital statistics is concerned.

So far as accuracy and promptness are concerned, reporting is better during the last two years but it is not yet fully satisfactory. Thus in 1969, of 1925 cases reported from the Province, fully 69% were cases detected by one surveillance team. This plus the fact that only 30% of the affected Districts were covered by this team suggests that the number of cases would have been much higher had all the affected areas been thoroughly investigated. During 1970, five surveillance teams have been engaged and all affected Districts have been covered. They detected 665 attacks, 45% of the total cases recorded.

Of 42 reported outbreaks in 1969 and 1970, 17 reports were received through routine channels as compared with 25 which were brought to the notice of surveillance teams by other sources such as members of the public, press, drivers, missions, etc. (Table 1). After investigation, the diagnosis of smallpox was confirmed in the case of 21 foci of the 42 (50%), 10 of which were detected with the help of supplementary methods, for example, exploration of unofficial reports. That the public is familiar with the symptoms of smallpox and that their reports are valuable from the point of surveillance was further demonstrated by the fact that of 25 notifications coming from lay persons, smallpox was correctly recognized in 10 of 25 reports.

Of 21 negative reports received, 17 were proved to be chickenpox and the rest were diagnosed as measles or secondarily infected scabies. Two reports were found to be false.

In all, 1 699 smallpox cases were investigated during the two year period. In 1969, there were 9.9 additional cases found for each case reported as compared with only 4.4 additional cases for each case reported in 1970 despite the fact that more personnel were engaged in investigation (Table 2). This is believed to reflect the overall improvement in reporting.

Results of Epidemiological Investigation

Emphasis put on the surveillance component of the programme provided valuable epidemiological data regarding the pattern of occurrence of smallpox in East Pakistan. This has contributed to the definition of the problem of the disease in the country and on these grounds a new strategy for the systematic vaccination campaign has been worked out.

Origin of outbreaks

Studies were carried out to ascertain the conditions which favour persistence of smallpox in order that the problem of its endemicity might be fought more efficiently.

In 1967, a joint study was conducted by SEATO and WHO in a rural area 40 miles from Dacca and in 1970, a study of outbreaks in a border area of the northern part of the Province

Two-thirds of the source cases in outbreaks in the Dacca area study had been infected in a city with a population of over 100 000 population whilst in the second study, smallpox was found to persist for more than 9 months in remote rural areas with limited communication.

These studies suggested the presence of two patterns of disease:

1. Crowded conditions in urban slums areas inhabited by constantly moving, floating population may help to sustain the transmission of infection and from these slums, the disease is introduced into adjacent rural areas.

2. Poorly vaccinated, remote rural areas, cut off from other parts of the District by bad communication and scarcely attended by health personnel may also sustain transmission of infection over extended periods.

Epidemiological characteristics of investigated cases

The majority of cases which were investigated occurred during the period January to June which is the time of the usual seasonal increases in incidence in East Pakistan. Almost 70% of all cases investigated occurred in children less than 15 years of age (Table 3). There were no significant differences in attack rates by sex.

Of 1 125 cases for which information regarding previous vaccination was determined, 838 (74%) had either no scar (537) or had a negative history of vaccination (301). More than 90% of children age 0 to 4 years and more than 75% of children aged 5 to 14 years had never been vaccinated. However, among older patients 44% had a scar of vaccination or a history of having been vaccinated at some time in the past(Table 4).

The case-fatality ratio was 32% overall (Table 5). It was highest (49%) in unvaccinated preschool children. The high death rate (26%) in vaccinated persons

over 15 years of age is undoubtedly due to cases occurring in persons vaccinated many years previously.

Scar surveys

The scar survey, a simple technique to ascertain the immunity level of a population, constitutes an integral part of the working methods for epidemiological investigation.

In East Pakistan the pioneer work in this field was done by the SEATO Laboratory which with WHO conducted the first survey in the rural area of Matlab, 40 miles from Dacca. In 1968 and in following years, scar surveys were carried out in rural areas of five Districts in connection with the investigation of epidemic foci or in screening areas for undetected cases of smallpox. Additionally, persons residing in the area under the jurisdiction of the Dacca Municipality were examined before the commencement of the mass vaccination campaign in Dacca.

Results of these surveys are compared in Table 6. The proportion of persons without vaccination scars was found to be more or less the same in rural areas surveyed by SEATO and those surveyed in connection with surveillance activities. About 20% of these populations had never been vaccinated. Analysis of the results by age group, however, shows a major difference among those less than 4 years of age. While 65% of preschool children in Matlab were unvaccinated, there were only 40% found unprotected in other areas. As one might expect, a much higher level of immunity was found in the urban population irrespective of age group. Only 10% of 5 033 individuals examined in the Dacca Municipality area had never been vaccinated.

Dissemination of Information

Dissemination of data obtained through surveillance is an essential part of the system. It not only assists the implementaion of control measures but indicates the effectiveness of the eradication programme as well. Further, it helps to create an atmosphere for good cooperation between peripheral and central levels by assuring the reporting sites that data submitted are being looked at and analyzed.

Beginning in January 1970, the headquarters office of the programme began to publish a monthly news bulletin which is prepared on the basis of weekly reports received from the field. Besides an analysis of the trends in smallpox incidence, the progress of the programme throughout the Province as well as problems encountered during field operations are discussed. In the section devoted to surveillance activities, examples of investigations carried out are presented in order to give guidance to local authorities in their efforts to improve their work in this respect.

Summary

The concept of surveillance as an integral part of the smallpox eradication programme has been fully recognized in East Pakistan and has been given organizational backing in terms of support for an improved reporting system and establishment of the fire-fighting teams.

Information obtained through investigation of smallpox outbreaks contributed considerably to present knowledge regarding epidemiological patterns of the disease in the country and this, in turn, has had a substantial impact on the programme itself in terms of new concepts of strategy in field operations.

Knowing that smallpox in East Pakistan is mainly a problem of the childhood population, emphasis is placed, during the mass vaccination campaign, on a thorough coverage of this population stratum. Urban areas are given priority and special attention is paid to assessment of remote, isolated areas to assure that there are no pockets of susceptibles large enough to sustain smallpox transmission.

With the emphasis on surveillance, the reporting of cases has sharply improved during the last two years and, in the future, it is expected that officially reported cases will continue to account for the larger proportion of total cases recorded. In this connection, the use of complementary methods for improvement in the accuracy of reporting, such as notification through malaria workers, should be further stressed.

TABLE 1

INVESTIGATED OUTBREAKS BY METHOD OF DETECTION, EAST PAKISTAN 1969, 1970

Method of Detection	No. of Foci		Total	Diagnosis of Smallpox Confirmed		Total
	1969	1970		1969	1970	
Routine Notification	6	11	17	6	5	11
Other	8	17	25	5	5	10
Total	14	28	42	11	10	21

TABLE 2

REPORTED AND DETECTED CASES BY YEAR, EAST PAKISTAN 1969, 1970

Year	No. of Smallpox Cases Reported	Additional Cases Detected by Investigation	Detection Rate
1969	105	1 034	1:9.9
1970	150	665	1:4.4

TABLE 3

AGE AND SEX OF SMALLPOX CASES INVESTIGATED BY SURVEILLANCE TEAMS, EAST PAKISTAN - 1970

Age	Sex		Total	%	
	M	F			
< 4	146	163	309	26.6	69.3
5 - 14	257	239	496	42.7	
15+	181	175	356	30.6	
Total	584	577	1 161	100.0	

TABLE 4

VACCINATION STATUS OF CASES PRIOR TO EXPOSURE, EAST PAKISTAN - 1970

Age	Vaccinated		Unvaccinated		Total
	Scar	History of Vaccination*	No Scar	No History of Vaccination	
< 4	19 (7%)	7 (2%)	136 (46%)	131 (45%)	293 (100%)
5 - 14	93 (20%)	13 (3%)	270 (57%)	100 (21%)	467 (100%)
15+	114 (32%)	41 (12%)	131 (37%)	70 (20%)	356 (100%)
Total	226 (20%)	61 (5%)	537 (48%)	301 (27%)	1 125 (100%)

* Cases which died or otherwise could not be examined for presence of vaccination scar.

TABLE 5

OUTCOME OF ILLNESS BY AGE GROUP AND VACCINATION STATUS

Age	Total		Vaccinated Before Exposure		Unvaccinated	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
4	293	138 (47%)	26	7 (27%)	267	131 (49%)
5 - 14	476	113 (24%)	106	13 (12%)	370	100 (27%)
15 +	356	111 (31%)	155	41 (26%)	201	70 (35%)
Total	1 125	362 (32%)	287	61 (21%)	838	301 (36%)

TABLE 6

COMPARISON OF RESULTS OF SCAR SURVEYS CARRIED OUT IN RURAL AND URBAN AREAS

Area	0 - 4			5 - 14			15+			Total		
	No. Examined	Without Scar	%	No. Examined	Without Scar	%	No. Examined	Without Scar	%	No. Examined	Without Scar	%
1 Matlab	18 400	11 987	65.2	34 273	5 050	14.7	50 798	2 789	5.4	103 471	19 826	19.1
2 Rural Areas	1 683	656	39.9	3 181	754	23.7	2 741	281	10.2	7 605	1 691	22.2
3 Urban Areas	1 387	318	23.2	1 951	133	6.8	1 695	35	2.0	5 033	486	9.6

1 Conducted by SEATO Laboratory in cooperation with WHO

2 Barisal, Pabna, Tangail, Sylhet, Dacca Districts

3 Dacca Municipality

FIGURE 1

SUBMISSION OF SMALLPOX REPORTS

Administrative Level	No.	Old Reporting Channel	Revised Reporting Channel
Province	1	Director of Health Services	Director of Health Services
Division	4	Divisional Director of Health	Div. Director of Health
District	19	Civil Surgeon / District Health Officer	Civil Surgeon / District Health Officer
Subdivision	58	Medical Officer of Health	Medical Officer of Health
Thana	409	Sanitary Inspector	Sanitary Inspector
Union	4 049	Health Assistant	Health Assistant

——— Submission of original copy of the report

- - - - Submission of copy of the report for information

FIGURE 2

SMALLPOX INCIDENCE IN EAST PAKISTAN

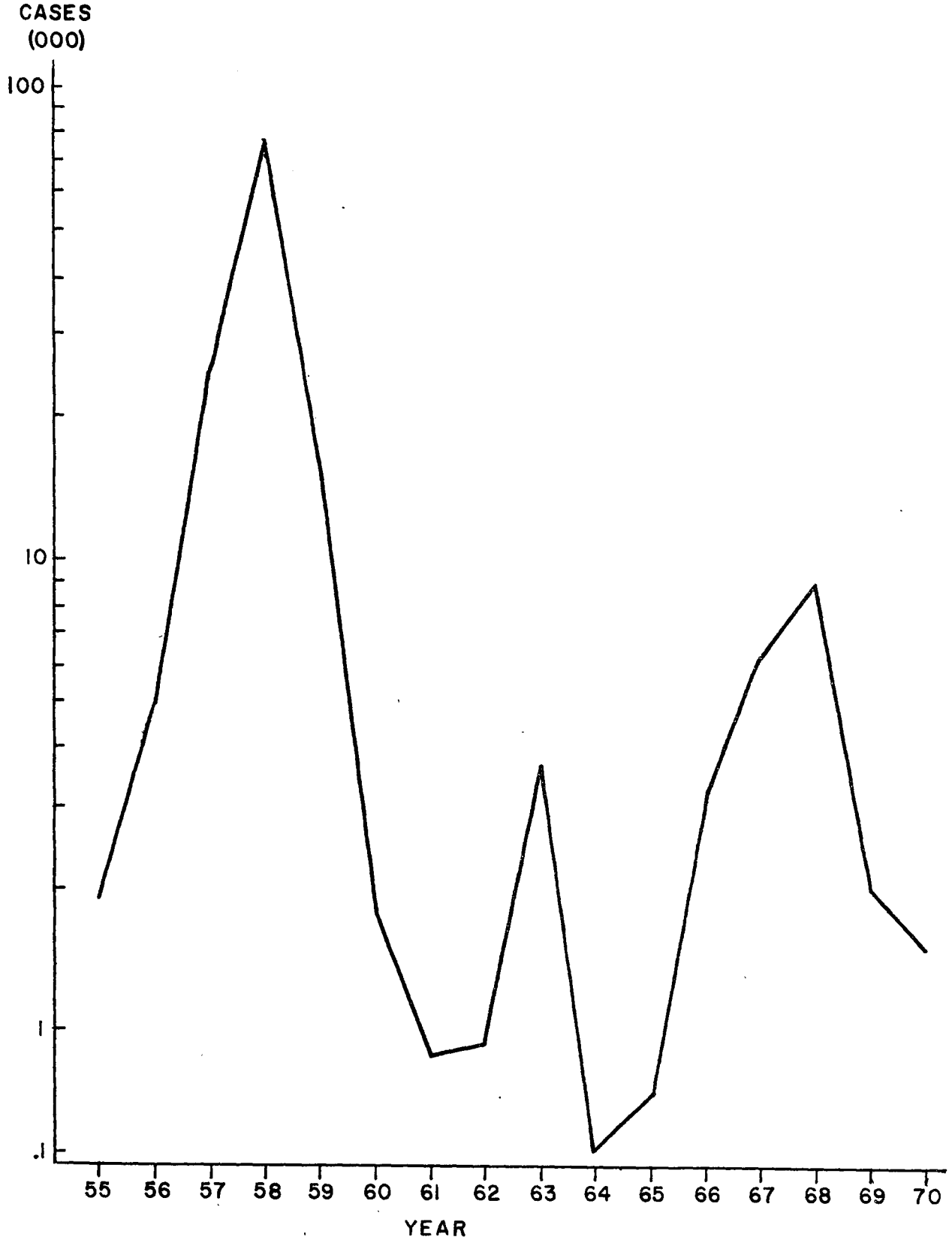

FIGURE 3

SMALLPOX FATALITY RATE - EAST PAKISTAN