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To: Smallpox Staff

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1. Overview

Throughout the Asian subcontinent, declining rates of transmission are now occurring. The implications of this are suggested in figure 1 which shows cases by week of onset in Sind Province for 1972 and 1973. It is probable that the seasonal curves for this province approximate those elsewhere on the subcontinent.

Beginning about week 38 both in 1972 and 1973, the curve of incidence rose steadily, if occasionally irregularly to reach a maximum during week 10 in 1972 and week 17 in 1973. A few rough calculations for the 1972 - 1973 season show as follows - during the two weeks at the lowest point of the season (weeks 37 and 38) only 55 cases were detected. During the 30 weeks (15 incubation periods) between the lowest point of the curve (week 38, 1972) and the highest point, (week 17, 1973), 4 572 cases were recorded. Each case thus gave rise to an average of 5.5 cases during each of the subsequent incubation periods. At the highest point of the curve (weeks 17 and 18), 604 cases were detected and between then and the next low point in the curve, 2 546 cases were detected. During this latter period of 18 weeks (about 9 incubation periods), it may be readily calculated that each case occuring at the peak of the season gave rise to an average of only 0.5 cases during each of the subsequent incubation periods.

Various approaches may be used in analysis of these data but what is abundantly clear is that transmission is now substantially less than it was only two weeks ago. At this time, therefore, containment measures, even though unimproved in quality, will result in the prompt cessation of a much higher percentage of outbreaks. In each area, the number of outbreaks on the lists should now begin to decline rapidly. However, if the same effort can be sustained during the May to September period as was made in March, more teams and more personnel will be available to deal more effectively with each remaining outbreak and, in consequence, the effectiveness of containment, rather than remaining constant, should improve. The number of cases and number of outbreaks could fall dramatically within the next 8 to 12 weeks if the present effort is sustained.

The areas now heavily afflicted with smallpox and where the greatest efforts will be required are surprisingly small. Since the first of the year, more than 90% of all cases have occurred in an area which is equivalent in size to Turkey or Zambia or the State of Texas. With additional resources, especially for these areas, there is every reason, I believe, to think that a concerted effort during the summer should bring us to September with few enough foci so that the final interruption of transmission could be quickly achieved.

With the recognition that the final break-through could be achieved within the next several months, additional support has been offered by various member governments. A vital contribution has been the donation by Sweden of 12.3 million kroner ($2.8 million) for activities in India; additional large supplies of vaccine have been given by Canada and the USSR, as well as several other governments; as indicated earlier, $900 000 was provided in January by the Director-General with the agreement of the Executive Board; and many governments are making available key public health staff to assist.

While the high summer temperatures and the monsoons will make the working conditions during the coming months anything but pleasant, bear in mind that, if all goes well, this could be the last and only summer requiring such an all-out effort!

2.0 Smallpox - eradicated in Indonesia

An international commission convened by WHO met in Jakarta between 15 and 25 April and, after detailed review of records and activities and extensive field visits concluded:

> "The requirements for smallpox eradication as established by the World Health Organization Expert Committee on Smallpox Eradication have been fully met, and thus the eradication of smallpox in Indonesia is considered to have been achieved".

This is truly a remarkable achievement of which Indonesia and its programme staff are justifiably proud. It should be noted that the smallpox programme begun in Indonesia as recently as July 1968 - the last case was detected in January, 1972, only 3½ years later.

In 1969, 17 972 cases were reported and 10 081 cases in 1970 (one-third of the world's total that year). Smallpox incidence declined in 1971 to 2 100 cases and, finally, to 34 in 1972.

Notably, the total cost of the programme (including both national and WHO expenditures) - from July 1968 through April 1974 - was slightly less than US. $.04 per capita.

3.0 Highlights of progress and campaign activities

3.1 India

Principal attention focuses on Bihar, Uttar Pradesh and West Bengal which, together, account for almost 94% of India's cases.

Bihar which has so far reported more than half the world's total cases, recorded an explosive increase in incidence beginning in mid-February (figure 2) Improved reporting undoubtedly exaggerates the rapidity of spread of the disease. Nevertheless, the magnitude of the problem is considerable - the 7 137 cases recorded in week 13 represents, in fact, a record for the largest number of cases ever recorded in a given week by one state/province.

Altogether 14 WHO and Indian epidemiologists are presently engaged in the campaign. The active case search week conducted in mid-March revealed extensive epidemics as shown below:

Districts: Outbreaks were present in all 31 districts:

No. of foci	No. of districts
Over 100	12
30 - 99	12
1 - 29	7
Total	31

Blocks: Of a total of 586 blocks, 422 (70%) were affected.

Villages: Villages experiencing cases within the preceeding four weeks totalled 3 684 or 4.7% of all villages in Bihar.

Municipalities: Of 66 municipalities, 44 (66%) were affected.

As a result of these extensive epidemics, Biharhas so far been the source of a formidable number of importations this year - perhaps as many as 1 000 - in other states and Nepal.

Although the outbreaks are widespread, most are occurring in the eastern part of the state. During the last six weeks, additional personnel have reinforced the programme, substantial improvements have been made in the administrative and operational aspects of the programme, and strong support at the state level has been given. At present, over 400 outbreaks are being contained each week. Campaign activities will be maintained and further strengthened during the summer monsoons during which 24 Indian and WHO epidemiologists as well as 10 surveillance teams will be working.

Uttar Pradesh. Through mid-March (week 11), incidence was maintained in the range of 400 to 600 cases per week but rose sharply at that time and has remained above 1 000 cases weekly since. The increase occurred primarily in the eastern part of the state adjoining Bihar.

At present some 14 Indian and WHO epidemiologists are working in Uttar Pradesh and while resources have been extensively mobilized, support for the programme at the state level is less than in Bihar or West Bengal. Adequate motivation of the lower levels of campaign personnel who are on the front-line of the battle has taken time and still requires improvement in Uttar Pradesh as well as in the other endemic areas.

During the search weeks in January and February, 0.22% of the 135 000 villages searched had new outbreaks, but in the March search the percentage increased to 0.35%. The largest numbers of outbreaks were found in Varanasi, Faizabad, Allahabad and Gorakhpur Divisions in the eastern part of Uttar Pradesh. Districts with the largest number of active outbreaks after the March search are listed below :

Districts	No. of active outbreaks after March search (fifth search)
Azamgarh*	88
Gorakhpur*	79
Bijnor	59
Ballia*	58
Bareilly	57
Basti*	53
Barabanki	38
Gonda*	38
Moradabad	35
Ghazipur*	30
Other 44 districts	377
Total	912

* Situated in eastern part of U.P.

These 10 districts account for approximately 60% of all outbreaks.

West Bengal. Similar to Uttar Pradesh, reported cases increased sharply in mid-March and have remained at higher levels since. The increase has occurred mainly in the north and middle zones of the state.

	Reported smallpox by month			
	Jan	Feb	Mar	April (up to week 16)
North	197	285	456	711
Middle	246	198	1 083	890
South	165	238	280	365
Total	608	721	1 819	1 966

Currently, the most affected districts are Jalpaiguri, West Dinajpur and Malda in the north and Murshidabad, Purulia and Burdwan in the middle zone. The increase in incidence in these areas is mainly attributed to late detection of unreported foci. An analysis of outbreak data for January and February by the state surveillance teams is shown below.

	Interval between occurrence of 1st case and detection in West Bengal		
	14 days or less	15-28 days	29 days or more
Total no. of outbreaks	201	66	27
Total no. of cases	465	394	273
Average no. of cases	2.3	6.0	10.1
Outbreaks with 1 case only	65%	30%	11%

It is apparent that delayed detection has resulted in delayed containment and larger outbreaks, the main cause of inter-village transmission. Although importations from Bihar are frequent extensive indigenous transmission has also occurred. As of 22 April, 517 foci were known in the state. Of these, 133, (115 from Bihar and 18 from elsewhere) were due to importations, but the remaining 384 were due to indigenous transmission.

Other areas in India

A number of the problems in other areas of India have originated in importations from Singhbum District (Bihar), the site of an extensive steel mill complex. More than 400 outbreaks are known to have originated from importations from this focus. Orissa, in March, recorded 325 cases of which 175 (54%) occurred in Mayurbanj District, adjacent to Singhbum. And, in Madhya Pradesh, 20% of outbreaks were due to importations, most being from Singhbum. Both states, however, have generally done an exemplary job in containing importations and in stopping indigenous transmission. In all other states except Assam, smallpox is now under control or rapidly approaching a nil incidence. In Assam, however, reporting is very delayed and incomplete and control measures, although recently strengthened, remain problematic.

3.2 Bangladesh

The reduction in incidence in Bangladesh this year, despite better reporting, and the absence of a sharp seasonal increase in cases is most encouraging. However, Bangladesh, like certain of the Indian states, has experienced an increase in smallpox incidence and in the number of infected villages during the time when seasonal transmission is greatest.

	Dec	Jan	Feb	Mar	Apr
Smallpox infected villages	181	309	522	579	914
Smallpox infected thanas	61	82	117	111	125
No. of active smallpox cases	1 560	1 469	1 636	1 665	1 990
No. of cases per outbreak	8.6	4.8	3.1	2.9	2.2

However, the number of cases per outbreak has fallen steadily and dramatically from 8.6 cases per outbreak in December to only 2.2 cases per outbreak in April. Increasingly more rapid detection and effective containment are believed to account for this. With decreasing rates of transmission and improvements in the administrative operation, it is believed that the number of infected villages will decline at the rate of about 50% per month from May onwards.

Within the recently integrated health scheme, specific individual responsibility for smallpox has now been identified at each level subsector/thana/district/subdivision. Additionally, under the present emergency plan, provision is made for one Family Welfare Worker and one locally hired emergency vaccinator to remain in the affected village for 15 consecutive days to vaccinate first, household and bari contacts and all residents and visitors within 100 yards of the cases and, subsequently, all residents and visitors within a one-half mile radius. No village is considered to be free of smallpox until six weeks have elapsed since onset of the last case

and a special visit has been made by higher level staff to certify this fact.

Notably, the principal problem areas now are the same ones which last harboured smallpox in 1970 when Bangladesh first interrupted transmission. Three districts of the 19 account for 740 of the 914 infected villages (81%).

District	No. of infected villages (30 April)
Mymensingh	382
Rangpur	257
Rajshahi	101
16 other Districts	174
Total	914

3.3 Pakistan

North West Frontier and Baluchistan provinces are now believed to have interrupted transmission. However, Hyderabad and Tharparkar in Sind Province and Lahore District in Punjab Province are still heavily infected. In April, 1 537 cases were reported from Pakistan - 75% from these 3 districts only. Cases in other districts of Punjab and Sind are attributed mainly to importations from these 3 districts. There have been 439 outbreaks in Hyderabad and Tharparkar alone during the first quarter of 1974, one-third of them being single case outbreaks. Detection of the outbreaks has generally been delayed in these districts thus permitting further spread before effective containment can be performed. However, only 52 of the 439 outbreaks (12%) continued to have cases two weeks after the date of containment, an indication that control measures have been of reasonably good quality.

As North West Frontier and Baluchistan have become free from indigenous smallpox, WHO advisers from these two provinces have been moved to work in more problematical areas. Presently 4 WHO staff are working in Sind and one medical officer in Punjab. Three additional national medical officers have also been attached to the programme in southern Sind since March. In the two Districts of Hyderabad and Tharparkar 150 health workers are now fully engaged, plus over 150 malaria workers assigned by the Government to assist particularly in case detection and reporting. Monthly meetings have been held since October in which district health officers and district smallpox eradication officers meet to discuss the programme and coordinate their activities. Also in every district, monthly meetings are now the practice in which the district programme director has the opportunity to meet and discuss field problems with vaccinators.

A regular one week per month active case search continues to be carried out in all districts of Sind and Punjab and in vulnerable districts of North West Frontier and Baluchistan. The active case search in 19 805 villages in March revealed 104 cases not detected through other systems.

3.4 Ethiopia

Additional Ethiopian health workers have recently been assigned to assist the Ethiopian programme and efforts are now directed toward control of all known foci before the onset of the June rains makes travel a major problem. Unfortunately, the principal problem areas remaining are situated in the exceptionally difficult central highlands where travel is largely on foot and by mule and where cooperation from villagers is not always good. Efforts have been made to secure a helicopter for the use of the teams during May but so far without success. Nevertheless, smallpox incidence is fully 26% below that of last year despite better case detection due to the assignment of more teams to the problem areas.

3.5 Nepal

Importations continue to pour across the Nepalese border from India but, remarkably, continue to be detected and contained expeditiously by Nepalese programme staff. The achievement of Nepal in accomplishing this despite a still developing health structure and difficult transport and communication is one of the more remarkable achievements of the global programme.

4.0 Districts recording 100 or more cases in a given month

	Number of districts with 100 or more cases			
India	Jan	Feb	Mar	Apr
Bihar	13	19	22	(18)
Uttar Pradesh	10	3	13	14
West Bengal	3	2	7	(7)
Assam	0	1	1	(1)
Madhya Pradesh	1	0	1	(1)
Orissa	0	0	1	1
Jammu & Kashmir	1	0	0	(0)
Maharashtra	1	0	0	0
Meghalaya	1	0	0	0
Bangladesh	4	5	5	5
Pakistan	3	3	4	3
Ethiopia	2	2	3	(1)
Total	39	35	56	(51)

( ) As yet incomplete

Although reports for April are incomplete for India and Ethiopia, it is anticipated that Bihar, Uttar Pradesh and West Bengal will show a further increase in the number of problem districts. Hopefully, April will represent the peak. If all proceeds as hoped, June should show a drop to less than half the April total. Even now, however, the number of problem districts is still comparatively small at this the height of the epidemic season.

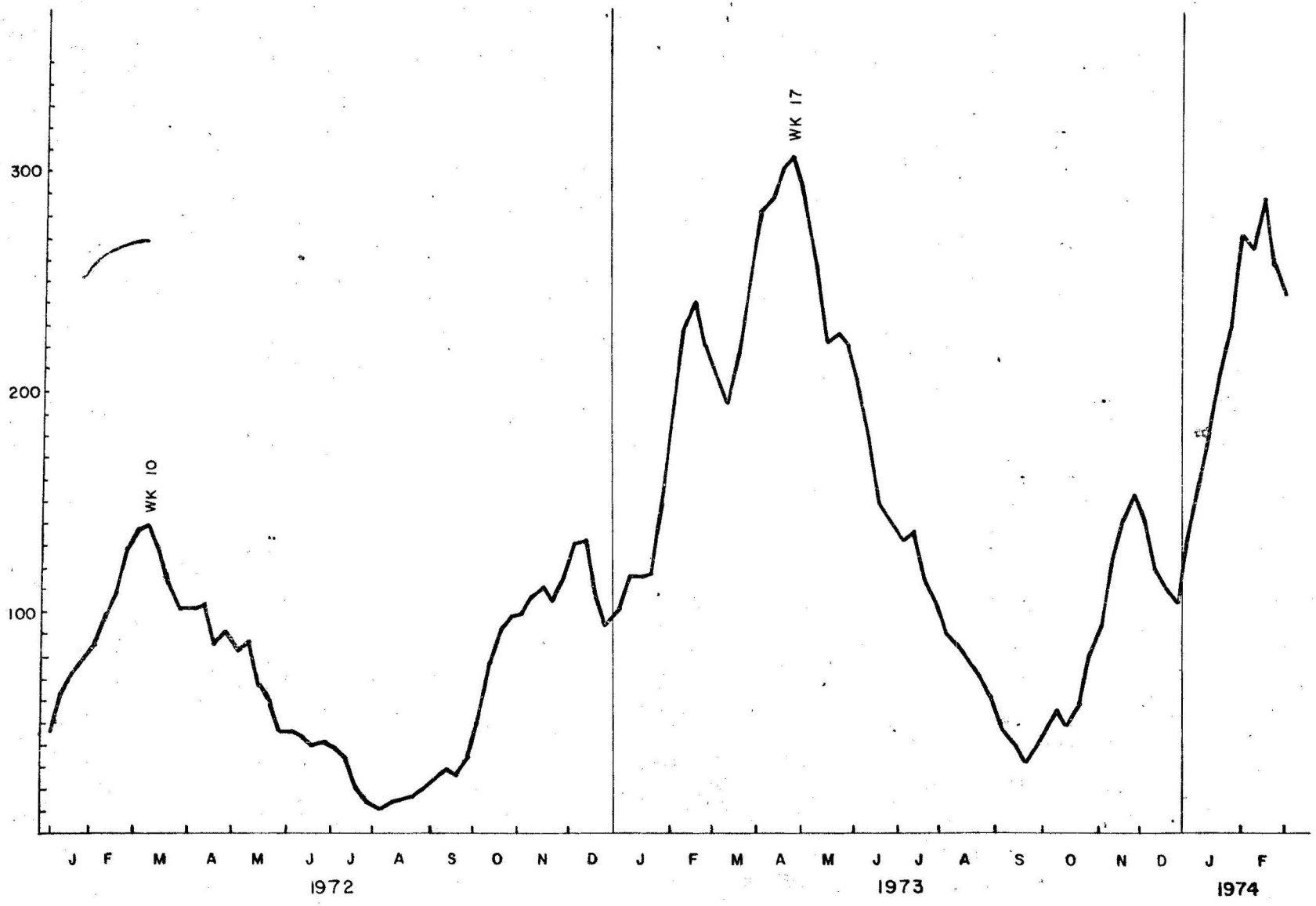
The world's 10 most heavily affected districts in March were as follows:

Rank	Country - State/Province	District	Cases
1	India - BIHAR	Dumka	2 263
2	India - BIHAR	Purnea	1 281
3	India - BIHAR	Katihar	1 149
4	India - BIHAR	Singhbhum	915
5	India - BIHAR	Monghyr	829
6	India - BIHAR	Nawada	667
7	India - BIHAR	Bhagalpur	657
8	Pakistan - SIND	Hyderabad	655
9	India - BIHAR	Saharsa	626
10	India - WEST BENGAL	Burdwan	605
Total			9 647

Surprisingly, the total number of cases in these districts accounts for approximately 40% of the world's total incidence in March.

Smallpox Cases - SIND, Pakistan
1972-1974 (week of onset)
(3 weeks moving average)

Figure 1



WHO

Reported smallpox by week

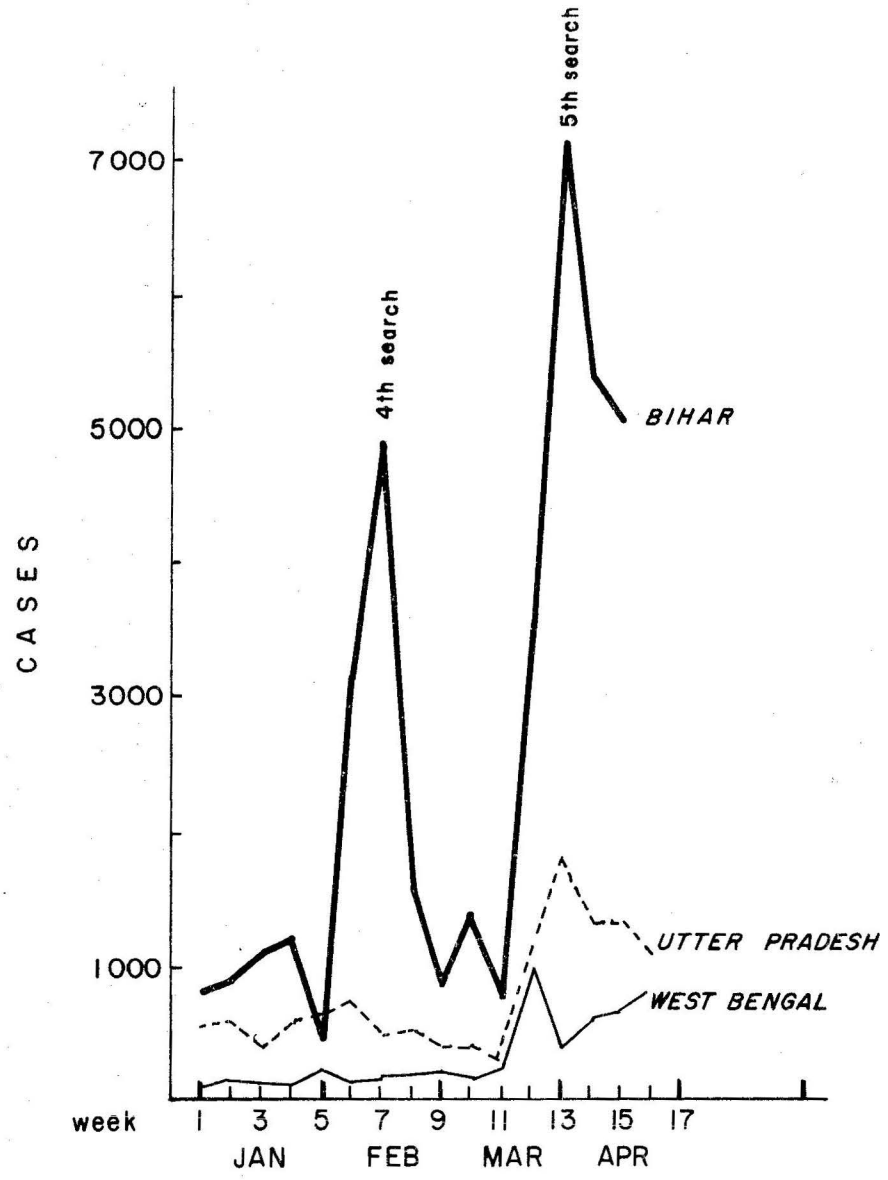



Figure 2.