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To: Smallpox Staff

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1.0 Introduction - "Realm of the Final Inch"

The countdown has passed the 100 mark; the last case of variola major may already have occurred; and with a greatly reinforced programme in Ethiopia, hopes for an accelerated demise of smallpox are high. Although the situation is highly encouraging, we are entering a most critical phase where optimism and/or complacency could prevent us from reaching our ultimate goal. Professor Holger Lundbeck, Director of the Swedish National Bacteriological Laboratory, has written to caution us that Solschenitzyn's "Rule of the Final Inch" (from "The First Circle") might well have been written with the smallpox eradication programme in mind.

> "The rule of the Final Inch! The realm of the Final Inch! In the Language of Maximum Clarity it is immediately clear what that is. The work has been almost completed, the goal almost attained, everything seems completely right and the difficulties overcome. But the quality of the thing is not quite right. Finishing touches are needed, maybe still more research. In that moment of fatigue and self-satisfaction it is especially tempting to leave the work without having attained the apex of quality. Work in the area of the Final Inch is very, very complex and also especially valuable, because it is executed by the most perfected means. In fact, the rule of the Final Inch consists in this: not to shirk this crucial work. Not to postpone it, for the thoughts of the person performing the task will then stray from the realm of the Final Inch. And not to mind the time spent on it, knowing that one's purpose lies not in completing things faster but in the attainment of perfection".

2.0 Certification of Eradication

Among some of your WHO colleagues in the programme, as well as among national staff, I sense still a lack of appreciation of the importance of documenting clearly and thoroughly what has been (or is being) done to confirm that a given country is smallpox-free. It must be appreciated that the smallpox programme is a global one and that so long as smallpox persists in any country, or is believed to persist in any country, costly vaccination and quarantine programmes will continue. Thus, with the occurrence of the last case, it will be crucial to all countries that each be satisfied that all other countries are indeed smallpox-free.

Those working at field level know well all the many procedures being followed to assure that no focus persists. Increasing confidence comes with the passage of time, as countless rumours are checked and found to be not smallpox and as doubtful areas are searched and again searched. However, unless what is being done and has been done is thoroughly documented, the confidence which is felt at national level cannot be conveyed to others.

It is not uncommon to hear in conversation from various quarters, including some in the medical profession, that they "know", for example, that scattered cases of smallpox are occurring in various African countries. To counter this sort of idle rumour, we have offered on behalf of the governments to investigate with a joint national-WHO team any such rumours which are sufficiently specific to give us an indication of place and time where cases have occurred or a name of someone who claims to have seen cases. Results of the investigation we have indicated would be made available to the person reporting such information. A number of such rumours have been checked - all with negative results so far - but I'm sure there will be more. The value of this exercise should not be underrated for clearly it is important in building confidence in the programme.

Certification by International Commissions represents a second and more essential measure in providing necessary confidence to all countries. For good reason, members are selected from among those of recognized competence who would be expected to be critical and demanding. The Indonesian Commission was an excellent case in point. Although the programme's activities were well documented and programme staff were readily able to explain fully what had been done and how they had done it, some commission members remained sceptical until the Commission's field assessment and validation was virtually completed. In the end, the Commission was unanimous in agreeing that eradication had been achieved. However, the fact that the Commission did proceed in a careful, deliberate manner and with a sceptical attitude provided substantial confidence in the conclusions reached. We hope and expect that all Commissions will be as careful and thorough in their examination.

A third approach in conveying an understanding of and confidence in the programme is through publication of what is being done and the results. Scientific publications are of value in this regard and all staff have been and are encouraged to publish their observations in the scientific literature. Some have been hesitant to present their observations during a period of only three or six months, for example, or for an area encompassing only a city or a District. Keep in mind, however, that the whole is but the sum of many small parts and a description of a segment of the programme, by virtue of the detail which is possible to include, may convey more than it is possible to convey in a more comprehensive report.

Lastly, the value of the lay press should not be under-estimated. Recently, in Bangladesh, two journalists of national repute (New York Times and London Sunday Times) have each spent several weeks with the programme. Both have published lengthy, descriptive articles detailing the activities of the programme, the problems and solutions and the results. Written by independent observers reporting simply what they themselves observed, such reports are of immense value in the educational process. Certainly, there will be others who will ask to do the same. Time spent by staff in explaining the programme and showing what is being done and how, is, in my view, time well spent.

In brief, however confident we, any of us, feel that this or that area or country is smallpox-free, keep in mind that our ultimate objective must be to convey fully this confidence to other governments, to the scientific community and to the public. Time spent in doing this is time well spent since, upon our ability to do this, rests many important decisions.

3.0 Bangladesh

As of 18 October, only six infected villages remained on the list. The last confirmed case occurred on 15 September. Should the search which began on 24 October fail to turn up additional cases, this could represent the world's last case of variola major. The last known case of variola minor occurred in Botswana in November 1975. What remains in Ethiopia is, by laboratory appraisal, an intermediate type strain, similar to those found throughout western and eastern Africa. Its behavior in Ethiopia, however, is puzzling in that case fatality rates there are only one percent contrasted to five to ten percent in other parts of Africa. Whatever, variola major it is not and thus the significance of the last case of what has been, by far, the most feared and devastating disease known to mankind.

Programme staff in Bangladesh are understandably cautious in declaring the country to be smallpox-free. There are good reasons for this. In one District, Barisal, evidence of suppression of reports was recently discovered; work during last September-early October was curtailed because of religious holidays (Eid and Durga Puja); and searches during the monsoon-flood period and immediately thereafter were inevitably less thorough than desired because of difficulties in transport. Strenuous efforts have been made to mount a really effective country-wide search commencing 24 October. Until the results of this search are known and unsatisfactory areas rechecked, it will not be possible to say with confidence that Bangladesh is considered to be smallpox-free. Hopefully, a positive answer will be forthcoming by mid-November.

4.0 India

Despite the 1 000 Rupee reward and continuing search programmes, no further cases have been discovered since May. The fact that no cases since May are known to have been imported from Bangladesh (or even transferred from Bangladesh to collect the reward) is surprising.

In the recently endemic states, publicity about the programme and the quality of searches have vastly improved with time. Data to support this are voluminous but a few summary examples are illustrative.

3.1 West Bengal (population 44.6 million) - August search assessment

In the August search, 8 461 search workers reported visiting all but 388 of the 49 677 villages/municipal wards of the state. Subsequently, assessment was conducted by 1) District level staff (all areas) 2) State Surveillance Teams (8 of 19 Districts) and 3) Special epidemiologists (high risk areas). The data deriving from these different assessments cannot be directly compared but, for simplicity, are presented below in tabular form:

Assessment Group	No. of Villages/ Wards Assessed	Percent Searched	No. of Individuals Questioned	% of persons who knew Last Search	Recognition Card	Reward	Where to Report
District Staff	1 519	98	60 312	77	77	74	69
Surveillance Teams	862	83	29 843	57	63	56	53
Special Epidemiol.	1 099	91	30 369	62	67	54	59

4.2 Assessment of May Search - High Risk States

Shown below are the summary results of assessment of the May search in the high risk states, i.e. those recently endemic and those bordering Bangladesh.

State	No. of Villages	No. of Villages Assessed (%)	% which had been searched	No. of Persons Questioned	% of persons who knew			
					Last Search	Reward	Recognition Card	Where to Report
Bihar	82 000	11 000 (13)	92	179 000	66	60	53	51
Uttar Pradesh	143 000	1 724 (1)	85	51 390	46	44	36	30
West Bengal	49 700	2 300 (5)	90	63 000	48	59	53	50
Assam	20 500	4 277 (21)	88					
Meghalaya	5 000	300 (6)	94					
Tripura	5 300	500 (9)	96	13 017	82	66	65	57

4.3 Assessment in an area where activities during past 12 months have been less intensive

Maharashtra State has experienced no smallpox since September 1974, and is geographically distant from Bangladesh. Eradication programme activities have thus been less intensive. Results of a July assessment in Bombay and Poona, two major urban areas of the State, are thus of interest.

	No. of persons questioned	% of persons who knew			
		Last Search	Reward	Recognition Card	Where to Report
Poona Municipality	651	45	41	37	26
Poona District	663	28	22	21	12
Bombay	1 718	54	33	41	25

At the same time and for comparison purposes, two further questions were asked: 1) what is the capital of the State of Maharashtra (answer: Bombay); and 2) what is the capital of India (answer: Delhi). The results, as analysed for residents of the Corporation (Bombay), the municipality (Poona) and villages were little different. Correct responses ranged from 16.9% to 19.8% for each of the questions.

4.4 Dissemination of information

In Calcutta, Drs. Roy and Sinha conducted an interesting study to determine how people had learned about the reward for reporting a smallpox case. In all, 252 people were queried of which 60 percent knew of the reward. Of those who knew of the reward, 73% had heard about it from a search worker; 13% had read of it on posters; 10% had heard of it by the portable loudspeakers; and 3% had read about it in the newspaper or seen it advertised in the cinema. A slightly different study in Nalanda District, Bihar, revealed that 491 of 731 men (67.2%) had learned of the reward from search workers or by radio and 240 (32.8%) by reading of slogans stencilled on walls. For women, the data were quite different. Fully 305 of 353 women (86.4%) had heard of the reward from the searchers or by radio and only

48 (13.6%) from reading stencilled slogans.

In these areas, at least, it is clear that the verbal information conveyed by search workers is of paramount importance in educating the populace.

4.5 India no less than other recently endemic countries, now faces two major problems in endeavouring to be certain that no further endemic foci persist. First and foremost is the problem of complacency and, almost certainly, a tendency on the part of some workers to immediately assume that a case with rash is not smallpox, simply because India is now believed to be smallpox-free. The second is the quality of search in states and municipal areas where no smallpox has been detected for a year or more. In many such states, the quality of search has never approached the level of quality found in the high risk areas.

During the coming year, the question must be asked again and again - "if smallpox were still present, where would we be most likely to discover it?" For India at this point in time, I wonder if our primary concern might not be those states which are believed to have been smallpox-free and in which search has been of a much lower quality than in the high risk areas.

5.0 Nepal

No cases have been discovered since April, but monthly cycles of search are continuing. On 7 September, the reward for discovery of a smallpox outbreak was increased to 1 000 Rupees. As in India, "rumour registers" have been established and all cases entered are investigated by District staff.

Assessment of the surveillance system was recently conducted in four districts of the eastern terai and three districts of the western terai with the following results:

	% of Persons who knew			
	Last Search	Recognition Card	Reward	Where to Report
Eastern Terai	47	28	22	29
Western Terai	15	10	12	7

Special efforts to improve the situation in the western terai will be made during subsequent surveillance cycles.

6.0 Ethiopia

With strong support from the government, provision of additional national and international staff and now four helicopters to assist in transport, the programme is now moving in high gear.

Present staff are as follows:

Admin. Region	No. of Infected Villages (week 41)	Health Officers and Sanitarians	Assistant Surveillance Officers	Vaccinators Dressers & Drivers	International Staff
Gojjam	74	18	5	164	2
Shoa	12	6	5	36	2
Wollo	2	6	5	32	2
Hararghe	2	10	-	32	2
All Others	0	22	9	77	5
Total	90	62	24	341	13

The total of 440 staff is a substantial increase over the 100 staff working with the programme at the beginning of the year.

As described in the WER, the principal problem is Gojjam where a number of areas have not been able to be approached for some months. Within the past two weeks, however, all areas have at last been able to be penetrated: As expected, additional outbreaks were found (20 in week 41 alone); containment is in progress in all, although not as yet at the intensity desired.

Outside of Gojjam, the only new outbreaks discovered between weeks 39 and 42 were two in Hararghe. The cases are among nomads near the Somali border southwest of the mountains. A source has not yet been discovered. Search, supported by helicopter, is in progress.

The Ambassel area in Wollo is again approachable and it is expected that the outbreaks in Ambassel, the last in Wollo, will be closed within the week. The Merhabete - Menz and Gishe complex is said to be under good containment and the last previously unapproachable areas of Menz and Gishe are expected to be penetrated this week. The Tegulet and Bulba complex is also expected to be eliminated within the week, but further search is being conducted along the Awash River Valley.

Meanwhile search is continuing throughout the other Administrative Regions (Provinces).

In brief, by the end of the year, it now seems entirely likely that all known smallpox will be eliminated from Ethiopia, except for Gojjam. The infected area in Gojjam is approximately 3 000 to 3 500 square miles in size. With the staff now available, this last endemic focus should be able to be eliminated rapidly. But how rapidly will depend on local political problems and this is impossible to forecast.

7.0 Mozambique

A major alarm was sounded in August when Mozambique reported six cases of variola minor during week 33; then nine cases in week 34; and, finally, two cases during week 35. Query of these reports indicated that the cases had been diagnosed clinically by local health personnel although not confirmed by laboratory. The source of infection was not clear but suspected was Malawi since some of the cases had occurred among persons returning from that country. Notably, Mozambique's last recorded case occurred in February 1969; the last

documented case in Malawi was in December 1969; and the last case in Tanzania, another bordering country, was September 1970. The implications, if these indeed were cases of smallpox, were profound. If imported, Ethiopia was the most probable source, but this implied hundreds of miles of travel by the index case from remote difficult-of-access Ethiopian endemic areas to remote Mozambique areas. It seemed most unlikely. A second, doubtfully more plausible, but appalling explanation was that smallpox had persisted undetected for more than five years in this area of southern Africa. If so, this would cast a very dark shadow indeed on the quality of surveillance throughout a large segment of Africa.

Accordingly and with government agreement, Dr. Nick Ward (formerly Bangladesh smallpox advisor, now based in SEARO) departed on an emergency appraisal mission. He arrived on 19 September.

The outbreak had occurred in five villages in Maua District of Niassa Province. The villages were perhaps 100 kilometers from the Malawi border but many of those living in the villages had recently returned from that country. All 17 cases had been seen and diagnosed by two nurses at the Maua Dispensary. One had had six years' experience and had previously seen smallpox, but many years before; the second had never seen a case. A large outbreak of chickenpox had been occurring in the villages from which the suspect smallpox cases came.

The dates of onset of the cases ranged from 11 August to 7 September. The age distribution of the 17 cases was as follows:

Age	No. of cases
Under 1	0
1-4	1
5-9	5
10-14	4
15-24	4
25+	3
	17

Despite extensive search, only four of the 17 cases could be positively identified but two of these were said to have been among the most severe.

Case No.	Age	Sex	Onset of fever	Onset of rash	Vaccination	Vaccination Scar	Previous Smallpox	Previous Chickenpox
2	28	M	31.8	1.9	No	No	No	No
5	35	M	18.8	21.8	1966	Yes	No	No
15	19	M	5.9	5.9	1974 1975 (31.8)	Yes	No	No
16	3	F	4.9	5.9	1.9.75.	Yes	No	No

All four cases showed evidence of extensive rash, mainly with central distribution and lesions of varying shape and size. No lesions were seen on palms or soles.

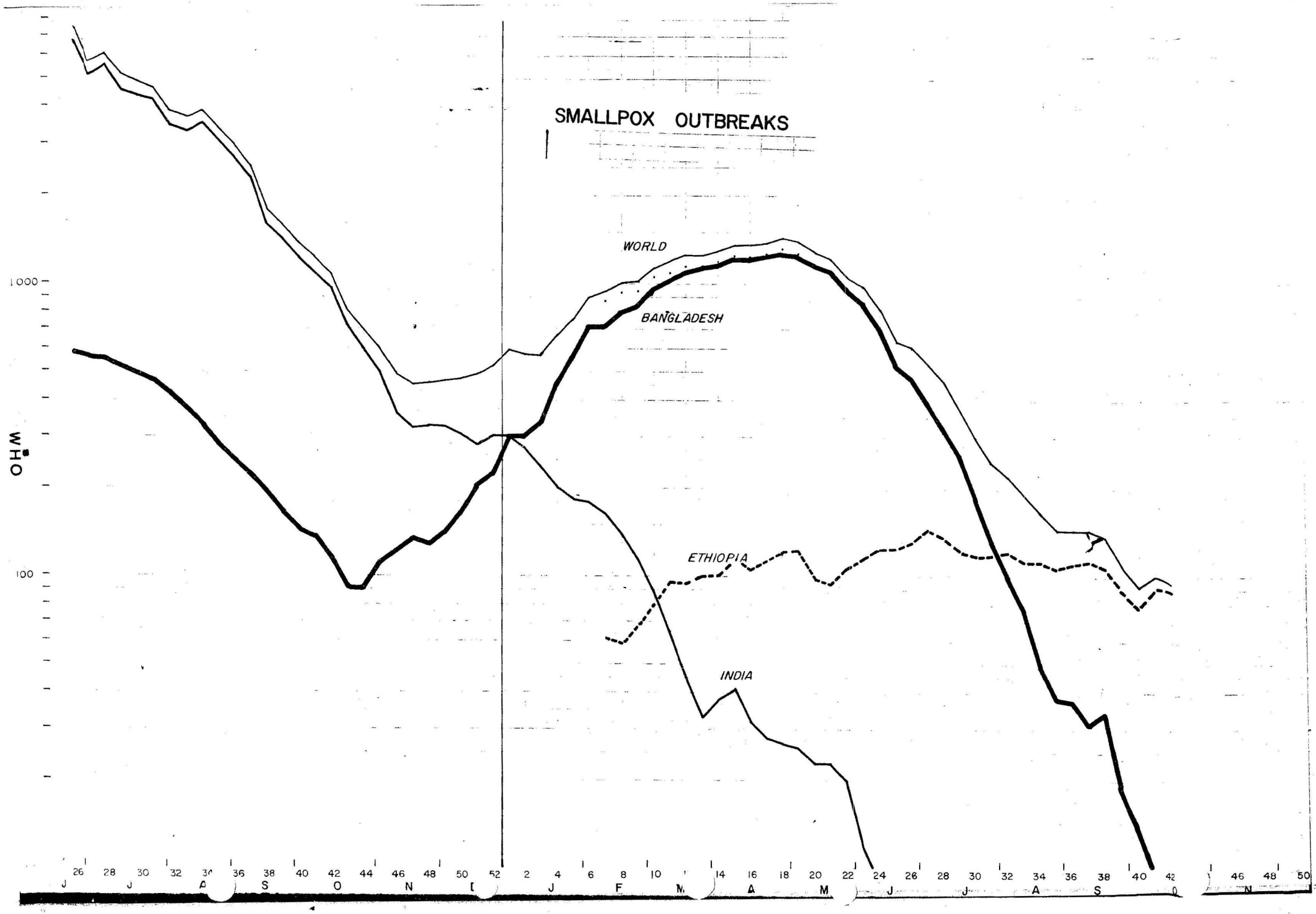
Because of failure to positively identify all reported cases, 12 surrounding villages were comprehensively searched. No evidence of recent smallpox was found, but there were many cases of chickenpox. Villagers recognized smallpox from the recognition card but denied having seen cases for more than five years. Two children, aged 10 and 15, had pockmarks as a result of smallpox infection five years previously.

More than 95 percent of the villagers had been vaccinated in containment; take rates approached 100 percent.

Laboratory specimens revealed varicella particles in scabs from two of the four patients listed above. Varicella CF antibody titres were all $\geq$ 356. Vaccinia HAI titres were 10 or less in three and 80 in one of those recently vaccinated.

In brief - chickenpox!

But, let us recognize that this is not the first nor will it be the last false alarm. Zambia, Kenya and Tanzania, for example, all have recently had suspect cases requiring careful documentation to be sure that smallpox could definitivelybe excluded from diagnosis. Joint national-WHO teams, acting as in Mozambique, are crucial to provide the necessary assurance that eradication has indeed been achieved.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