



WORLD HEALTH ORGANIZATION
ORGANISATION MONDIALE DE LA SANTÉ



WHO/SE/75.75

ORIGINAL: ENGLISH

INDEXED

THE EXPERIENCE OF KURARA PHC, HAMIRPUR DISTRICT, JHANSI DIVISION
IN THE ORGANIZATION AND DEVELOPMENT OF THE SMALLPOX ERADICATION CAMPAIGN

by

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This paper describes the experience of one of the Primary Health Centres (PHC) of Uttar Pradesh State of India in the organization of smallpox eradication activities, which culminated with the interruption of smallpox transmission at the beginning of July 1974. This was achieved despite the fact that two neighbouring PHCs remained heavily affected with smallpox until September and November 1974, respectively. Success is attributed to good organization of smallpox search, surveillance and containment activities, together with planned systematic vaccination of the population.

Materials and Methods

Kurara PHC is situated in the north-west corner of Hamirpur District, one of the southern Districts of Uttar Pradesh (see map). Its northern borders follow the Jamuna river which separates it from Kanpur District. On the south-east border, the Betwa river separates the PHC from adjoining Somerpur PHC of Hamirpur District. The western border with neighbouring Kadaura PHC of Jalaun District has no natural boundaries. The population of Kurara PHC is 98 820, consisting mostly of agricultural workers. The small town of Hamirpur, the District administrative centre, is situated in the north-eastern corner of the PHC area. The bordering Kadaura and Somerpur PHCs were the most heavily afflicted PHCs in their Districts in 1973 and 1974, having, respectively, 9 and 13 outbreaks in the year 1973 and 27 and 26 outbreaks in the year 1974.

This paper describes the smallpox eradication activities in Kurara PHC for the last three years, when the first of the authors was Medical Officer in charge of the PHC. From March 1973, he was assisted by the second author.

Data concerning age, sex and vaccination status of the patients was collected during epidemiological investigations in the affected villages on standard smallpox outbreak investigation forms. Data relating to numbers of vaccinations performed was compiled from reports of containment and vaccination teams.

Operational methods changed from year to year.

In 1972, mass vaccination was performed in the affected villages and the villages within a five mile radius. Incomplete vaccination coverage in and around affected houses in some villages led to long-lasting outbreaks in two villages. Therefore, during mass vaccination of the southern part of the PHC which was affected by smallpox in 1972, a new approach was used to achieve more complete vaccination of the population. Initially, a vaccinator with a supervisor made a scar survey and prepared a list of all inhabitants in the villages, but performed no vaccinations. Then a vaccination team performed vaccinations in the village following the list prepared. From the end of 1972, more emphasis was placed on the surveillance and containment of outbreaks.

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Beginning in March 1973, a complete weekly search of the entire PHC was conducted once every three weeks. The search was followed by prompt containment in villages found to be affected. Containment measures included the immediate vaccination of all close contacts of the patients, vaccination of all inhabitants of 30 houses situated nearest to those affected, and complete primary vaccination in the entire affected village.

To insure complete vaccination of the surrounding houses and primary vaccination of the entire village, the 1972 approach was used. After vaccinating immediate contacts, the containment teams spent one day conducting a scar survey and preparing a list of all inhabitants. Only after this did they continue vaccination.

Containment of outbreaks was more rapid and effective when the outbreaks were found soon after onset of the first case. To improve epidemiological surveillance, all medical personnel of the PHC were requested to ask about cases whenever they visited villages. Specially to be contacted were local leaders, school children and teachers, and the local priests who pray for smallpox - the Bhats and Malies. In addition to the systematic searches conducted every three weeks, each vaccinator was given a special day once a week to search for smallpox in the circle of villages allotted to him. Vaccinators were asked to prepare a plan of the villages visited with the main places marked to permit supervision and assessment of their activities.

When the systematic search programmes were planned, utilizing the standardized Workers Schedule PHC Form 1, the programme of each worker was planned in such a way that the supervisor could visit villages supposed to have been visited by the worker during the two previous days. In accordance with WHO operational guidelines for smallpox control during the autumn campaign 1973, more stress was put on timely follow-up visits to affected villages.

Whenever the vaccinators were not occupied in containment and search activities in 1973 and 1974, a special plan for systematic vaccination was given to them so as to increase the level of immunity in the villages in their circle. These plans called for vaccination work to be started only after completion of the list of inhabitants prepared during the vaccination scar survey.

Smallpox eradication work at the end of 1973 and in 1974 was organized strictly in accordance with the instructions of the WHO and the Government of India. Containment teams resided in infected villages at night and vaccinators were permanently posted for follow-up until the last scab had separated from the last infected patient. Containment teams before beginning vaccination prepared a list of all inhabitants in standardized Containment Books. As an additional measure beyond those routinely called for, they painted the results of vaccination on the walls of each house with the aid of stencils. Shown were the number of visits made, the number of vaccinated and unvaccinated members of the family, the number of primary vaccinations and revaccinations performed and the number remaining to be vaccinated.

Results

During 1972-1974, 28 outbreaks occurred in the PHC area. Most occurred in winter, corresponding to the expected seasonal pattern (Table 1). Each year, infection was introduced into the area during November-December, some three to four months after transmission had been stopped. The first outbreaks in 1972 and 1974 were reported late and two secondary outbreaks occurred. Infection also spread locally during 1973 (two outbreaks) because of late reporting of outbreaks in the villages of Sheoni and Todapur. In addition to these four outbreaks with local spread of infection, there were four others - one in 1972, two in 1973 and one in 1974 - for which the source of infection could not be found but it is believed that infection probably came from other outbreaks in the PHC area. Thus, not more than 8 of the 28 outbreaks (28%) resulted from spread from local sources, while 20 (71%) were introduced from outside the PHC. Five outbreaks came from the bordering Somerpur PHC of Hamirpur District and four from Kadaura PHC of Jalaun District.

The introduction of weekly search programmes on 2 March 1973 helped to improve the speed of the reporting of outbreaks. In 1973-1974, 77% of outbreaks in Kurara PHC were reported not more than 20 days after onset of rash of the first case (Table 2). The results of containment also greatly improved, reaching the point in 1974 where 7 out of the 8 outbreaks were contained with no more than three cases of smallpox. No outbreaks had cases more than 21 days after detection in 1974. In contrast, during 1972-1973, three outbreaks, of which two were reported late, had cases more than two months later. After the last outbreaks with one case only (on 1 July 1974) in Sheikhoopur village, no further cases of smallpox occurred in the Kurara PHC area.

During 1972-1974, 157 cases of smallpox occurred in Kurara PHC (Table 3). These were more or less equally distributed among females and males. Almost half (44%) occurred among children below five years of age. There was only one case among persons 15 years of age and older. The overall case fatality ratio was 24.2%. It was highest among infants less than one year of age (63.6%) and lowest among those 5 to 14 years of age (14.9%).

Previous vaccination status was determined by the presence or absence of vaccination scars. Only 15.5% of those affected by smallpox had been vaccinated before (Table 4). Case fatality ratios among those previously vaccinated was one-third the ratio observed among those never vaccinated (Table 5).

Discussion and Conclusions

a) Containment

The method of mass vaccination in the affected village, followed by the vaccination of the whole population within a five mile radius, as used for smallpox control in 1972, proved ineffective in prompt containment of outbreaks. The first two of the six outbreaks which occurred in the PHC during that year lasted a very long time, with forty cases and ten deaths in all. To improve the completeness of vaccination coverage, Dr. Usmani introduced the method of a quick scar survey during which a list of all inhabitants of each house in the village was compiled before the start of vaccination. In each of the last four outbreaks that year, no cases of smallpox occurred more than three weeks after detection. This method continued to be employed and additionally in 1974, survey figures and numbers of vaccinations performed were painted on the walls of the houses with stencils.

In 1973 the Government of India and WHO set down priorities which included, first, complete vaccination of the inhabitants in the affected households and 30 surrounding houses and, second, primary vaccination of the unvaccinated population of the village to the extent possible. At the same time, night halts in the infected villages by containment teams was stressed in order to achieve complete vaccination of the population.

Fortnightly follow-up visits to the affected villages were introduced initially and, later, were carried out more frequently. Eventually this was changed to permanent posting of one and then two vaccinators in each affected village with frequent visits by supervisory staff. This improved containment noticeably to the extent that during 1974, there were no outbreaks with new cases more than three weeks after detection of the outbreak. This occurred despite the fact that two outbreaks during 1974 were reported more than one month after onset of rash of the first case. Previously two of five such outbreaks were long-lasting.

b) Epidemiological investigation

The rapidity of detection of outbreaks visibly improved after the introduction in March 1973 of the special weekly searches for smallpox. As can be seen from Table 2, the percentage of outbreaks reported more than 20 days after onset of the first case

decreased, but there was still room for improvement. Therefore Dr. Usmani introduced, in mid-1973, an extra search day each week for each vaccinator in his vaccination circle. This helped to detect some outbreaks which developed between regular searches. To improve the quality of searches, Dr. Usmani ordered the workers to make a schematic plan of each village visited, marking on these all the important places where people gathered and the houses which they had visited during the search. A more convenient schedule for search was introduced at the same time to improve the quality of supervision.

The pattern of occurrence of smallpox cases by age, sex and vaccination status of patients in Kurara PHC was similar to that elsewhere in India, with most cases occurring in small children and about 80% of cases occurring among the unvaccinated. Case-fatality ratios were the same as have been observed elsewhere on the sub-continent. The much lower case-fatality ratios among vaccinated children under 5 years old is understandable as, in the main, they were vaccinated nearer the time when they contracted infection in comparison with children of 5-15 years of age who frequently had not been vaccinated since infancy.

Acknowledgements

The authors would like to extend their appreciation to all Health and Family Planning workers of Kurara PHC who, by their intensive sincere work, helped to achieve full control of smallpox in the PHC territory.

TABLE 1. SEASONAL DISTRIBUTION OF SMALLPOX OUTBREAKS
IN KURARA PHC, HAMIRPUR DISTRICT

Year	MONTHS												TOTAL	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Outbreaks	Cases
1972	1*	2 (1)		1 (1?)			1				1		6	54
1973	1	3 (1)	3 (1)	4 (2?)			1	1				1	14	74
1974	1	2 (1)			3 (1?)	1	1						8	29
TOTAL	3	7	3	5	3	1	3	1			1	1	28	157

* Outbreak in Para village, date of onset of rash in the first case was 28 November 1971.

(1) Number of outbreaks with local source of infection.

(1?) Number of outbreaks with unknown source of infection.

TABLE 2. SURVEILLANCE-CONTAINMENT WORK IN KURARA PHC
HAMIRPUR DISTRICT, JHANSI DIVISION

Year	REPORTING			CONTAINMENT				Number of outbreaks with 1-3 cases
	Total Outbreaks reported	Outbreaks reported \leq 20 days after first case		Outbreaks with cases occurring 21 days after reporting				
				Late-reported outbreaks		Outbreaks reported in good time		
Number	%	Number	%	Number	%	Number	%	
1972	6	4	67	1	50	1	25	3
1973	14	11	79	1	33	0	-	7
1974	8	6	75	0	-	0	-	7
TOTAL	28	21	75	2	29	1	5	17

TABLE 3 SMALLPOX CASES AND DEATHS BY AGE AND SEX

Age (years)	Male		Female		Total		
	Cases	Deaths	Cases	Deaths	Cases	<u>Deaths</u> Number Percent	
<1	5	4	6	3	11	7 63.6	
1-4	34	7	24	11	58	18 31.0	
5-14	45	8	42	5	87	13 14.9	
15+	0	0	1	0	1	0 -	
Total	84	19	73	19	157	38 24.2	

TABLE 4 VACCINATION STATUS OF SMALLPOX CASES

Age (years)	Cases	Vaccinated	Unvaccinated	Unknown	Percent Vaccinated
<1	11	1	8	2	9.1
1-4	57	9	44	4	15.8
5-14	86	14	62	10	16.3
15+	1	0	1	0	-
Total	155	24	115	16	15.5

TABLE 5 INFLUENCE OF VACCINATION STATUS ON FATALITIES FROM SMALLPOX

Age (years)	Vaccinated			No Vaccination Scar		
	Cases	<u>Deaths</u> Number Percent		Cases	<u>Deaths</u> Number Percent	
<1	1	0 -		9	6 66.7	
1-4	9	1 11.1		44	17 38.6	
5-14	14	1 7.1		62	8 12.9	
15+	0	0 -		1	0 -	
Total	24	2 8.3		115	31 27.0	

