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A SHORT REPORT ON EPIDEMIOLOGICAL INVESTIGATIONS OF SMALLPOX OUTBREAKS IN 1969 IN A FEW VILLAGES OF NELLORE DISTRICT OF ANDRAPRADESH - INDIA[1]

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Introduction

The activities of the WHO/ICMR Smallpox Research Unit, Infectious Diseases Hospital, Madras, were extended to include the investigation of a few villages of Nellore District, Andrapradesh, with the kind permission of the Government of Andrapradesh, and the Director General, Indian Council of Medical Research. This was necessitated by the lack of smallpox cases in Madras city as well as in the State of Tamil Nadu for the past 10 months.

The Assistant Director of Health Services, Andrapradesh, reported that the most recent cases had occurred in Siripuram, Nellore District, on 1 October 1969. Because of Nellore District's proximity to Madras city, investigations of these outbreaks were undertaken. Although not exhaustive, these investigations permitted the salient features of the outbreaks in the different villages to be adduced from the information available.

Topography of the area

Nellore, the headquarters of the District, is 100 miles north of Madras city on National Highway No. 5 which runs between Madras and Calcutta. Kavali, one of the major towns in Nellore District, is the headquarters of Kavali Taluq and is 35 miles north of Nellore on the same highway. These two towns are important stations of the Madras-Calcutta Railway which runs almost parallel to the highway. A canal, parallel to and between the railway and the sea, connects Madras and Vijayawada, a town 250 miles north of Madras.

The studies were confined to a few villages within a 15- to 20-mile radius of Kavali Town. Kavali, six to eight miles from the sea shore, is one of the major towns in the locality; because of the markets, cinemas and other amenities, it is frequently visited by people from surrounding villages who come to buy food grains and other commodities.

There are several hamlets inhabited by fishermen between the sea and the canal. These hamlets are almost isolated by the canal and backwaters and, therefore, are rarely visited by public health staff. However, all of these people come to Kavali regularly to sell their fish and to buy food, etc. Because Kavali is an important centre where people from different villages mingle, it may serve as a centre for transmission of disease. Apart from the market places, there is a vacant plot of land adjacent to an old temple which is the usual place of shelter for villagers who come to Kavali. At times these villagers stay overnight, if not longer, before returning to their respective villages.

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Village outbreaks

Kavali's (Fig. 1) first case of smallpox was a seven-year-old unvaccinated child infected in Butchireddipalayam in the middle of January 1969. Between January and March, 10 cases and two deaths occurred. No cases were reported after 12 March. As Kavali is a very large town, detailed investigations were not undertaken by the Unit.

The outbreak next appeared in Isakapalli Pattapalam, a fishing village of about 1000 persons, situated between the shore and the canal and surrounded by backwaters. Between March and September there were over 100 cases and 21 deaths, 20 of which occurred among unvaccinated children. The disease was introduced either from Kavali, to which the villagers frequently travel by bus to sell their fish, or from Punnapudi Pattapalam, a fishing village five to eight miles south.

In May the outbreak spread to Isakapalli (population 1482), a village about one mile away. The first family affected was that of a merchant who stated that he sold various commodities to smallpox patients from Isakapalli Pattapalam. Of 24 in his family, 11 developed smallpox. Between May and October, 26 of the approximately 300 families experienced 42 cases of smallpox. The frequency of cases among vaccinated and unvaccinated household contacts is shown in the table below:

TABLE 1. FREQUENCY OF CASES IN HOUSEHOLD CONTACTS

	Vaccinated		Unvaccinated	
Household contacts	No. of contacts	No. of cases	No. of contacts	No. of cases
Adults	34	2	25	3
Children	24	1	18	10
	54	3 (6%)	43	13 (30%)

During July smallpox spread from Isakapalli to Kurapattapalam, a fishing village of 70 persons. Between July and September, 22 cases, including four deaths, occurred.

Labbaipalayam, a mile north of Isakapalli, was infected during August and eight cases occurred among the 150 residents.

In Bommipalayam, a railway station 13 miles north of Kavali, the first case occurred in a person who waited at a bus stand in Kavali for several hours with a smallpox patient proceeding north from Isakapalli via Karachi. Six cases subsequently occurred among the 50 residents of the village.

The smallpox patient (noted above), with his family, had waited at the bus stand for several hours, having been denied transport on several buses. After some time, they managed to secure transport on a bus but were subsequently detained en route by health authorities who isolated the patient and his family. No further transmission of smallpox occurred from this patient either to the village where he was isolated or to his home village.

In October cases first occurred in Yanadhi, three miles north-west of Kavali. The first had gone to Kavali two weeks before and had stayed overnight on temple land with villagers from Isakapalli. Among 52 villagers, 12 developed smallpox. Two cases (both adults) occurred among 27 previously vaccinated persons and 10 cases among 24 of those who were unvaccinated (Table 2).

In Javagu (population 100), a single case occurred, the sister of a case in Isakapalli whom she had visited during his illness. The disease did not spread in this village.

TABLE 2. YANADHI HAMLET - DETAILS OF THE MEMBERS OF THE VARIOUS FAMILIES WITH REFERENCE TO AGE, SEX AND VACCINATION STATUS

Hut	Sex	Age	Date of attack	Previously vaccinated	Developed smallpox
A	M	35	20 October	+	Yes
	F	25	20 October	+	Yes
	F	20	5 October	0	Yes
B	M	45		0	
	F	35	25 October	0	Yes
	M	20	17 October	0	Yes
	F	12	31 October	0	Yes
	F	10	1 November	0	Yes
	F	9	31 October	0	Yes
	F	7	30 October	0	Yes
	M	5	1 November	0	Yes
C	M	35		+	
	F	28		+	
	F	12	25 October	0	Yes
	M	3	25 October	0	Yes
D	M	60		+	
	F	50		+	
	M	35		+	
	F	25		+	
	M	12		0	
	F	10		+	
	M	8		0	
	M	7		0	
E	M	50		+	
	M	35		+	
	F	28		0	
	F	6		+	
	F	5		+	
F	M	30		+	
	F	25		+	
	M	12		+	
	F	7		0	
	F	5		+	
	M	3		0	
	M	1-1/2		0	
G	M	30		0	
	F	25		+	
	F	8		+	
	F	3		+	
	F	2		0	
H	M	30		?	
	F	22		+	
	F	10		+	
	M	6		0	
	F	4		+	
	M	7/12		0	
I	M	32		0	
	F	20		0	
	M	12		+	
	M	10		+	
	M	5		+	
	F	3		0	

Summary of investigations

In the few villages studied, over 200 cases of smallpox with 31 deaths occurred during 1969.

Isakapalli Pattapalam experienced the most serious epidemic with over 100 cases and 21 deaths and was a major focus, directly or indirectly, for transmission of the disease to other areas. This hamlet of fishermen is almost isolated, with backwaters all around and is probably infrequently visited by public health staff. When our staff wanted to visit the village, they were dissuaded by the local health staff who stated that the people were dangerous and that an investigator might not come out alive. Although no boats were made available, one of the team waded through backwaters and met the village chief who provided all information requested.

More detailed investigations were conducted in Yanadhi, Bommipalayam and Isakapalli to determine patterns of transmission. In all there were 325 families in these three villages with a population of 1584. A total of 32 families experienced 60 cases.

Among 126 familial contacts of primary cases, 28 (22.2%) developed smallpox. Of 71 contacts who had been vaccinated, 6 (8.5%) developed the disease, while of 55 unvaccinated contacts (i.e. no vaccination scar), 22 (40%) became ill.

TABLE 3. ATTACK RATE AMONG FAMILY CONTACTS OF SMALLPOX CASES

	Vaccinated			Unvaccinated		
	Contacts	Cases	Attack rate	Contacts	Cases	Attack rate
Adults	44	5		29	5	
Children	27	1		26	17	
	71	6	8.5%	55	22	40.0%

Of the index cases in families, 24 of 32 were over 15 years of age and approximately half had been vaccinated at some time in the past. There was little difference in the transmission rates between those previously vaccinated and those who were unvaccinated.

Observations

In family studies of index patients in the three villages, it was observed that approximately half of the population had not been vaccinated before. This may not be representative of the vaccination status of the population as a whole, as information from two of the unaffected villages revealed very high levels of coverage. These two villages, however, belonged to a different block and perhaps the health staff in this block were more effective and alert.

The three hamlets, Isakapalli Pattapalam, Kurupattapalam and Labbaipalayam, situated between the sea shore and the canal and inhabited by fishermen, contributed most of the cases. It is quite possible that people in such villages are neither easily accessible for nor amenable to vaccination; however, no serious attempt seems to have been made to take containment measures when the epidemic broke out. If immediate containment measures had been taken at Isakapalli Pattapalam (or better yet, in Kavali), the remaining villages could have been protected from smallpox. This study therefore demonstrates the importance of surveillance and immediate containment measures in the control and prevention of spread of infection from village to village.

Since the small villages do not have markets, people from these villages go periodically to nearby towns to purchase commodities, for recreation and relaxation, and for the sale of their produce. Such villagers form almost a migratory population. The towns usually have some meeting place for these villagers and provision for them to spend a day or two. This study has shown that such meeting places can be the source of transmission of infection from village to village. Hence in any control programme, such areas have to be closely watched and the opportunity should be taken by the public health staff to protect all villagers who come to such places. Perhaps permanent vaccinators should be stationed at these places. This would help in achieving a better vaccination coverage of the people living in villages surrounding the town.

This study has also brought out and confirmed our previous finding in different outbreaks: that very few persons who were vaccinated at least once contract smallpox unless they are adults who were only vaccinated in infancy but not successfully revaccinated. Therefore, in places such as these, there is a strong case for immediate house-to-house vaccination of all the people irrespective of their previous vaccination status.

Acknowledgements

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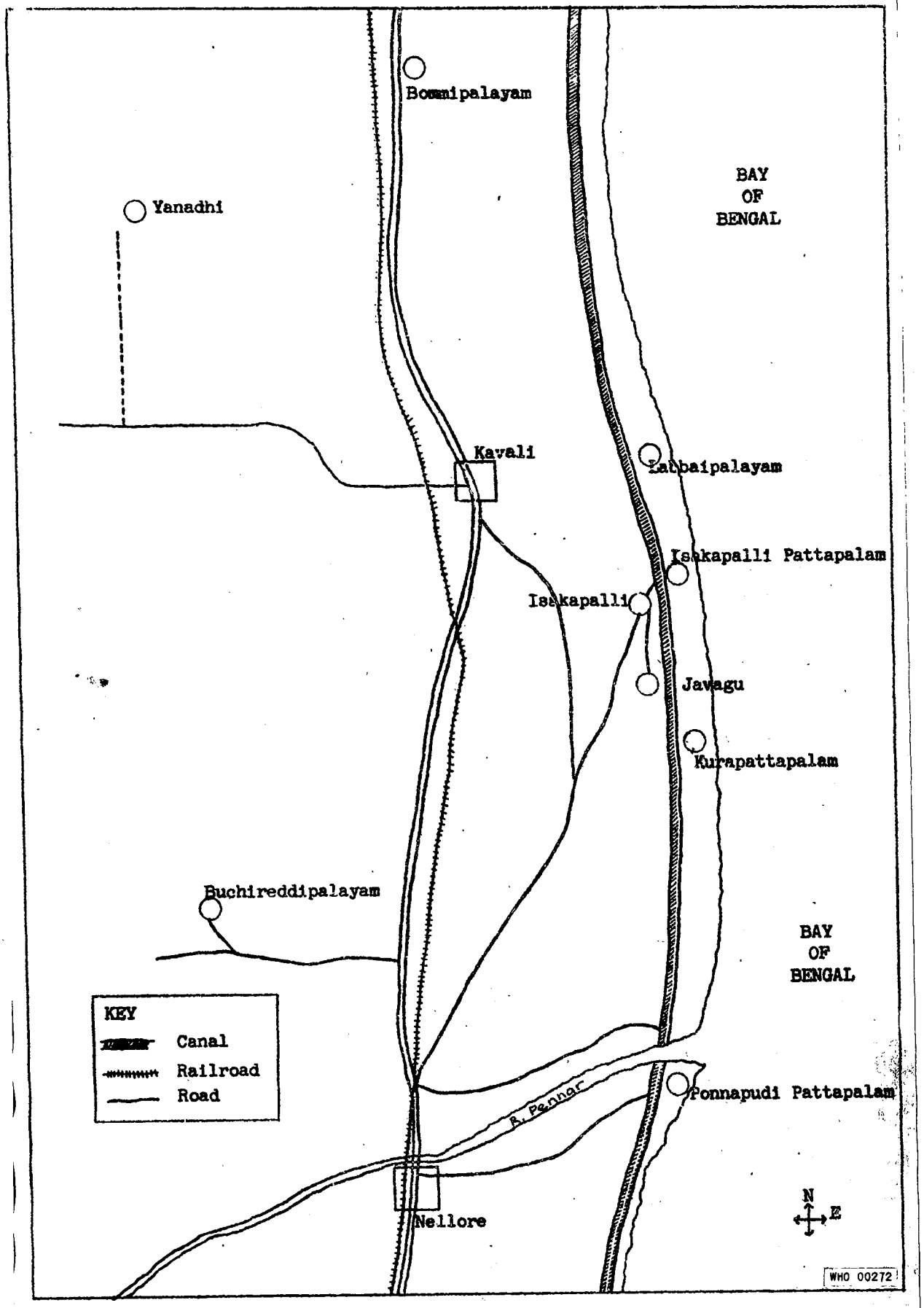
Figure 1. Relative position of various villages studied*



*not to scale