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ASSESSMENT AND EVALUATION OF THE NATIONAL SMALLPOX ERADICATION PROGRAMME IN DIFFERENT PARTS OF INDIA

(To be presented to the WHO Expert Committee on Smallpox, Geneva - 14 - 20 January 1964)

by

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This paper contains an account of an independent assessment and evaluation, including epidemiological investigation of epidemic conditions, conducted in three different places, after pilot projects and national smallpox eradication programme had been carried out in different parts of India. The study was necessitated by the fact that a large number of cases of smallpox continued to occur even after the reported coverage of more than 80 per cent of population by the health authorities in all the areas with which they dealt.

The assessment revealed that a large number of cases had occurred among people who had not been vaccinated, particularly those belonging to the most vulnerable age group, i.e., under 5 years of age. Some other important findings highlighted in this paper may serve as good pointers for bridging the gaps in the programme to achieve the ultimate objective of eradication.

1. Introduction

The Government of India, taking note of the oft-recurring epidemics of smallpox in the country, decided in the year 1958 to appoint an expert committee to examine the question of smallpox in all its aspects and suggest ways and means for its eradication. This committee, in collaboration with similar committees formed in the constituent States of India, examined the problem and made certain recommendations, which are embodied in a report of the expert committee, brought out in 1959. One of the recommendations contained in the report was the initiation of pilot projects in the States of the Union, including Delhi State, with a view to working out a methodology for ultimately launching an eradication programme, gathering first-hand experience of the difficulties that would present themselves during the course of the vaccination drive, and collecting data from practical experience for estimating the requirements in personnel and finances for the eradication programme.

1.1 Why the Need for an Assessment Arose

The Corporation of Delhi, with an estimated population of 2.8 million, started to implement a pilot project from November 1960, with a full complement of additional staff specially recruited and trained for the purpose. This pilot project was allowed to merge with the attack phase of the national smallpox eradication programme, and it was expected that this phase would be completed in one year's time, but in view of the special difficulties encountered in connection with the large numbers of floating population - people engaged in construction works and brick kilns, domestic servants, etc. - the mass vaccination programme was allowed to continue for another year. It was surprising, therefore, that Delhi, in which the programme had covered more than 3 million people by the end of 1962, should have reported a high incidence of smallpox in December 1962 and in January and February, 1963, even though freeze-dried vaccine had been used exclusively from March 1962. (The records of the local Infectious-Diseases Hospital alone showed that during these three months as many as 152 patients were admitted, of whom 21 died).

It was realized that the success of the campaign depended on the efficient manner in which the vaccination programme was conducted and that the occurrence of such a large number of cases was a pointer to the existence of possible lacunae - organizational or technical or both, and recommendations were made to the Government that the programme be subjected to an independent assessment and evaluation, including an epidemiological investigation of the epidemic conditions.

1.2 Appointment of a Committee

Acting on the above recommendations, the Ministry of Health appointed a small committee*, in which WHO and USAID were also represented.

*The members were:

(1) Dr S.C. Seal, Directorate General of Health Services (Chairman)
(2) Col. S.L. Kalra, New Delhi.
(3) Dr Harald Frederiksen, USAID, New Delhi.
(4) Dr M. Radovanovic, WHO, New Delhi.
(5) Dr P.K. Topa, Patwadangar, Nainital (U.P.)
(6) Dr L. Ramachandra, Rural Health Training Centre, New Delhi.
(7) Dr K.C. Patnaik, New Delhi (Member - Secretary)

The terms of reference of this committee were:

(1) To conduct an independent assessment and evaluation of the smallpox eradication programme in the Union Territory of Delhi by taking random samples of the population in different parts of the territory.

(2) To assess the registers and records of the vaccination work of the Corporation.

(3) To find out whether the cases occurring in Delhi were indigenous or imported, and also their vaccinial status.

(4) To assess the immunity status of the population, as a result of the vaccination programme during the attack phase, and

(5) To report on the difficulties, if any, encountered by the vaccination staff during the programme and the steps that should be taken to overcome them in the maintenance phase of the programme.

The Committee completed its findings on 15 March 1963 and submitted its report by the middle of May 1963.

2. Criteria for Assessment

As this was the first time such work had been undertaken in India and records of similar work in other countries were not available, the Committee evolved, at the outset, certain criteria and methods for assessment. Once the criteria were fixed, the planning and carrying out of an assessment on a uniform pattern became fairly easy. The criteria for assessment were worked out for the different phases of the eradication programme, viz. -

(i) the attack phase,
(ii) the maintenance phase,
(iii) the conditional certification of eradication.

Details of the different criteria are given in Appendix I.

3. Methodology of the Assessment

The details of the methodology adopted for this assessment and the forms used have been given in Appendices II to VI. The following steps were taken:

(1) An experienced statistician was assigned to plan and draw up samples for assessment. Random sampling of the Union Territory of Delhi by zones was carried out, and 18 areas were selected to give a representative sample of the entire population. This sample contained about 12 000 people, i.e., 0.4 per cent of the total population of roughly 3 million.

(2) For the purpose of determining the adequacy of the vaccinations and for record keeping, the vaccination registers of the sample areas were examined, and a sub-sample of these records (covering 500 to 1 000 families) was verified in the field, for primary vaccinations and revaccinations separately; the results were then scrutinized in respect of both quality and quantity. A fresh enumeration was also undertaken to verify the coverage.

(3) Both the vaccine supplied to the field and the vaccine used for assessment work were tested for quality.

(4) Challenge vaccinations were carried out in sample areas to determine the current immunity status of the population.

(5) An epidemiological study of the current smallpox cases and deaths and those occurring in the immediate past in different areas was made to find out the nature and origin of the cases, whether they were imported, and the vaccinial status of the patients, etc. and also the number of reported cases and vaccinial status of the population in the area. Along with this study, a review was made of the adequacy of clinical diagnosis of cases and notification by local medical practitioners and by public and voluntary agencies.

(6) In the course of the field visits and verification of the recording of vaccination work, the difficulties encountered in the vaccination work and in its supervision were noted.

(7) Special consideration was given during the field work to the role of the floating population engaged on construction works in brick kilns, etc. and to the internal migration and movements of the families.

(8) The attitude and response of the public in general and of the communities in particular were taken into consideration so as to be able to advise on further improvement of such public response and co-operation.

So that the assessment work might be conducted efficiently, teams of experienced sanitary inspectors were requisitioned from adjoining States, and lady health visitor trainees from a local health school were mobilized and given orientation training in the technique of vaccination as well as in the field duties they were expected to carry out to assist the members of the technical committee. This training was also supplemented by trial field work under the supervision of the committee members.

4. Conclusions from the Assessment in Delhi

4.1 Findings

The important findings of this assessment in Delhi were as follows:

(1) Eighty per cent or more of every sector of the population by age, sex and residence had not after all, been covered by the campaign through primary and revaccinations. The actual coverage was found to be only 63 per cent, and this short-fall was accounted for by the location, during field investigations, of several vulnerable pockets, most of which were among migratory workers such as those in labour camps and brick kilns, inhabitants of slums, and domestic servants, most of whom were migratory.

(2) The interruption of transmission had not been achieved. As many as 346 cases with 66 deaths were reported up to 11 May 1963. The investigation showed the proportion of imported to local cases as being 1 : 3.6. Cases occurred mainly in 25 foci, in only 6 of which the infection could be considered to have been introduced from outside; in the remaining 19, they resulted from autochthonous infection.

(3) Of the cases, only 15.2 per cent of the patients had a history of previous vaccination, and death had occurred in only 5 per cent. The fact that 84.8 per cent of the cases occurred among the unvaccinated population clearly indicated a quantitative rather than qualitative deficiency in the campaign.

(4) Adequate facilities for the following, to satisfy the criteria for entering into the maintenance phase, were not available up to the time of assessment:

(a) A system of surveillance of births to compensate for deficient reporting, and

(b) A system of surveillance to detect and report smallpox cases and to reduce the time-lag for remedial action to be taken (there was an average delay of 24 days between the onset of the first case and the removal of any case from the area).

(5) In the vaccination programme, the short-comings noted were as follows:

(a) Enumeration of families and the recording of data and results were highly incomplete and irregular; this caused great difficulties in assessment and was a serious impediment to the elaboration and proper utilization of the data necessary to obtain evidence as to whether the criteria were being met at every stage of the programme.

(b) There was a lack of uniformity in the use of abbreviations in the recording of results, leading to a lot of confusion.

(c) Although amongst the vaccinated population, an overall immunity level of 84.0 per cent was reached, sizeable pockets of incompletely vaccinated population, particularly children under 5 years of age, were left, for epidemic conditions to continue (see Appendix VII). The population coverage should therefore be even higher than 80 per cent in all sections if the development of herd immunity is to be sufficient to avert epidemic rise.

(d) It also appeared that sufficient awareness had not been created amongst the population, and that effective health education measures had not been adopted before launching the vaccination programme in a particular area.

4.2 Problems Relating to the Vaccination Campaign

Certain tangible difficulties investigated by the Assessment Committee are briefly mentioned below:

4.2.1 Migration and Movement of Population

There is a large influx of labour population and movement of labour every year to and from neighbouring States in connection with the various development projects in the city of Delhi. These workers usually live in temporary huts in overcrowded and insanitary conditions, and in several places a large number of cases were found among them after an infection was brought from outside or acquired in the city itself, as most of these people were not protected by vaccination.

In addition, there was internal migration of the families from one area to another, which increased the chances of their being missed in the campaign.

4.2.2 Absenteeism and Refusals

The assessment team noted a fair amount of absenteeism in Delhi, where people remain out of their houses in connection with services, trades, business and school attendance. This required a certain number of repeated visits in order to complete the vaccination programme; the number of refusals was practically negligible.

4.3 Summary and Conclusions

From the findings of the Assessment Committee, it is very clear what an assessment can actually reveal. This assessment not only brought out the weak links in the organization and execution of the vaccination programme, but also lacunae in respect of adequate supervision, reporting of cases, surveillance and adequate measures in detecting cases and carrying on mass vaccination of contacts around the epicentres of smallpox. It also revealed that a sample coverage of 80 per cent of the population by vaccination and revaccination may not be enough to interrupt transmission of infection, unless the coverage is uniform in all areas and sub-sectors and in all groups of population, including migratory groups.

It showed that in order to stop the influx of the susceptible population and smallpox cases from outside the city, special vigilance squads are necessary to tackle specifically the problem of the floating population.

The above findings were taken into consideration in making appropriate recommendations to overcome the short-falls and defects noted and to ensure that the eradication campaign would be carried out efficiently so as to achieve the desired success.

5. Assessments in Other Parts of the Country

It was felt that assessments of the eradication programmes on the same pattern as had been adopted in Delhi should be undertaken all over the country, particularly in areas where the programme was considered to have been completed.

Under this plan it was decided that the programme should be evaluated, in the first instance, in at least one district in each State so that the results obtained might be used to bridge the gaps and to indicate further steps to be taken in order to meet the criteria for the successful completion of the attack phase.

The District of Mysore in Mysore State, where the work was supposed to have been completed, was selected, and the assessment was carried out under the auspices of the recently set-up National Institute of Communicable Diseases, Delhi.

5.1 Mysore District

The specific features of this evaluation of the Mysore District programme carried out by the National Institute of Communicable Diseases, in collaboration with the State Health Department, were that -

(1) It was completed within the specified period of 10 days as per plan; and

(2) The independent element of the evaluation was assured by drawing the team leaders as well as senior health inspectors of the State from districts other than that under evaluation. The evaluation data were collected by eleven teams headed by the officers of the Mysore State Department of Public Health and the National Institute of Communicable Diseases. The evaluation lasted from 7 to 16 October 1963. It was carried out in 11 areas (7 rural and 4 urban), selected on a stratified basis at random to represent the different topographical and social features in the District.

The objectives of this assessment were also to evaluate -

(a) the enumeration records,

(b) primary vaccination and revaccinations,

(c) registration of births,

(d) staff for mass vaccination, for mopping up and for verification of the results of vaccination,

(e) organization for epidemiological investigation and remedial action,

(f) arrangements for production, storage, testing and distribution of vaccine, and

(g) the results of challenge vaccinations.

The assessment revealed that -

(1) Errors in enumeration of family members had been negligible.

(2) There were considerable deficiencies in the coverage for primary vaccination. Only 84 per cent of those needing protection had been covered, whereas the target for primary vaccination should be 100 per cent, and verification should also be made of 100 per cent of the primary vaccinations. Only 29 per cent of those receiving primary vaccination were infants under 1 year of age, and a large number of the primary vaccinations were given to persons over 17 years. This reflects a cumulative deficiency in the primary vaccination over years - obviously a result of lack of adequate staff. Vaccination of all susceptible groups on a 100 per cent basis as part of the target is essential.

(3) The population basis for reckoning the coverage should be that of a village (including attached hamlets, if any) and not of a taluk. In the urban areas this should be on the basis of a ward.

(4) The time-lag between the mass drive and mopping-up operations in many areas of Mysore District was too long - in a few cases as long as ten months. Mopping-up operations should immediately follow the mass drive.

(5) The registration of births left much to be desired. The number of infants registered was between 16 to 51 per cent in five of these areas, 93 per cent in one area and 100 per cent in the remaining two.

(6) The arrangements for reporting, investigations and remedial action were better in the rural areas than in the urban areas of Mysore. It would be profitable to utilize sources such as the Epidemic Diseases Hospital, crematoria, burial grounds, etc., for obtaining information regarding the occurrence of smallpox and for instituting epidemiological investigation and local action to prevent the spread of the disease.

(7) There were no arrangements for the cross-reporting of cases between the municipal and district health organizations, or between taluks and districts, nor is there inter-state notification.

(8) Protection is essential for and should be given to vulnerable groups such as infants, servants, dhobies (laundrymen), barbers, contacts of cases, workers in hospitals, social workers and nomads.

(9) The infectious diseases hospitals should have facilities for sterilization of linen and incineration of fomites.

(10) The stock position of vaccine and the storage facilities were satisfactory.

(11) The permanent vaccination staff of the public health organization was inadequate in quantity as well as quality. It will be necessary to increase the staff in order to keep pace with the rise in population. The practice of deploying the permanent district staff for this mass programme

is to be discouraged. This creates a temporary vacuum in the district and delays the mopping-up operations and the regular primary vaccinations in their areas.

(12) There is a need for toning up the present supervisory organization at all levels to ensure better concurrent as well as consecutive supervision. This will eliminate the defects observed in vaccinating procedures and recording of results and the drawbacks observed in verification of primary vaccinations. A spot map locating the cases would be highly useful.

(13) Auxiliary health workers such as midwives, health visitors and others should be trained in the technique of vaccination and in verifying the results. They can be entrusted with the responsibility for giving timely primary vaccinations to all infants in their areas; and

(14) A radical revision in the technique of vaccination would be beneficial to the programme, organizationally and technically. The use of acetone or spirit (instead of soap and water) would save a great deal of time per vaccination. The use of one sterile pin per individual, using the multiple pressure technique, would be ideal. Deep dabbing of the vaccine over the scarified areas instead of superficial smearing, as at present, would be a great improvement.

Summarizing the above, the authorities of the National Institute of Communicable Diseases have stated as follows:

"It was observed in Mysore District, where the national smallpox eradication programme is claimed to have been completed, that some qualitative and quantitative deficiencies were present. Adequate coverage everywhere is yet to be achieved. The district, as a whole, is not at present ready for routine maintenance operations.

"There is a large need for health education in the national smallpox eradication programme."

5.2 Palghat District (Kerala State)

Here, fourteen teams carried out the evaluation from 25 November to 4 December, 1963. Three teams worked in urban and eleven in rural areas. The evaluation covered 3 per cent of the population in urban and 1 per cent in rural areas (stratified samples), as well as 0.1 per cent of challenge vaccination.

The assessment revealed the following:

5.2.1 Primary Vaccinations and Recommendations

The deficiencies in the coverage for primary vaccinations were considerable. Only 76 per cent of those needing protection had been covered, whereas, as stated before, the target for primary vaccination should be 100 per cent. Verification was very poor: only 19 per cent, instead of 100% of the primary vaccinations were verified. The vulnerable population in the community must be protected.

Only 11.7 per cent of those receiving primary vaccination were infants under 1 year of age. A large number of the primary vaccinations were given to persons over 17 years. This reflects a cumulative deficiency in the primary vaccination over years, obviously a result of lack of adequate staff (quantity and/or quality).

It was found that 78.7 per cent of those needing revaccination had been covered. The total vaccinated (primary plus revaccination) were 77.3 per cent (Range 55.2 to 94.9 per cent).

Figures of coverage by the National Smallpox Eradication Programme showed that there were a number of rural areas in which the percentage coverage was as low as 52.6 per cent (Range 52.6 to 76 per cent) in areas where the coverage was below the 80 per cent target.

5.2.2 Enumeration of Families and Maintenance of Family Registers

The errors, when viewed in the light of changes in the vital and social events in the communities, are not significant. However, it was noted that in a majority of cases the vaccinial status and history were not entered at all.

Action needed:

(i) To ensure a hundred per cent successful primary vaccination of all the infants;

(ii) To ensure that all the persons needing primary vaccinations are covered;

(iii) Verification of 100 per cent of the primary vaccinations; and

(iv) Proper history taking and recording.

5.2.3 Programme Target and Time Limit

The rate of 75 vaccinations per vaccinator per day is not possible in the widely separated house-holds of rural Kerala, and an increase in the number of workers of the vaccinator category is needed. In the rural areas of the District, no mopping up was carried out and the vaccination staff were very inadequate. At present it is at a ratio of 1 per 75 000 population. The numbers are shortly expected to be augmented, but even then there will be only 1 per 40 000 people.

The registration of births, though not 100 per cent, was fairly satisfactory.

5.2.4 Epidemiological Investigations and Remedial Measures

The existing arrangements were sketchy and inadequate, both in urban and rural areas. There were no arrangements for cross-reporting of cases within or outside the State.

Production and testing of liquid lymph vaccine were satisfactory. The Public Health Laboratory, Trivandrum, could raise their output to 10 million doses from the present 5 million doses per annum.

A crude index of the achievements of the programme, i.e. comparing those susceptible before the eradication programme with present observations, is a success rate of nearly 50 per cent. Thus, if the programme is not to revert to the pre-national smallpox eradication programme stage in a few years, more concerted and effective measures have to be taken. The district is not at present ready for routine maintenance operations.

5.2.5 Other Points

Radical revisions in the technique of vaccination and in the use of spirit in place of soap and water are suggested. The handicaps of the rotary lancet at present in use warrant trying out the scarification technique. If the use of the lancet is to persist, the first essential is to have a standardized smaller rotary lancet and, secondly, to dab the vaccine deeply over the scarified area as a routine. Certain fields for research have been indicated.

References:

1. Control of Smallpox and Cholera in India, by the Expert Committee of the Indian Council of Medical Research, Government of India, 1959.
2. Pilot Project Committee Report, Government of India, 1961.
3. Report of the Committee for Assessment and Evaluation of the Smallpox Eradication Programme in Delhi, 1963.
4. Assessment reports of Mysore District and Palghat District (so far not published).

CRITERIA FOR ASSESSMENT

A Criteria for Assessment of the Attack Phase

1. More than 80 per cent of every sector of the population must have been vaccinated or revaccinated by the campaign within a period of two years. (All attempts should have been made to cover 100 per cent of the population).

2. (a) Virtually all primary vaccinations must have been successful.

(b) More than 50 per cent of the re-vaccinations in persons over 25 years of age vaccinated more than five years before must have been successful, as evidenced by vesiculation six days after vaccination.

(c) Challenge of those vaccinated or re-vaccinated by the campaign (within the past two years) by re-vaccination (at the time of assessment) should generally not have resulted in primary or accelerated takes (the sample would include vaccinated persons as control).

3. Apparent or virtual interruption of transmission must have been achieved (i.e. virtually all cases should be proved to be imported or introduced).

4. Adequate facilities must be available to meet the criteria for the maintenance phase without interruption of the continuity of the campaign.

B. Criteria for Assessment of the Maintenance Phase

1. A high level of immunity must have been maintained (since the attack phase) by routine vaccination or virtually all infants and by re-vaccination of more than 80 per cent of the population once more within five years, whereupon the new generation will be re-vaccinated at several points of school attendance (i.e., at ages 5, 10 and 15).

(a) If reporting of births is less than 90 per cent complete, a system of surveillance should have been set up for detection of all births, for the successful implementation of the policy of routine vaccination of all infants.

(b) If routine re-vaccination is inadequate to maintain a high level of immunity in more than 80 per cent of the population, periodic mass re-vaccination should have been started to supplement routine re-vaccination.

2. (a) Virtually all primary vaccinations must have been successful.

(b) More than 50 per cent of the re-vaccination in persons who had not been re-vaccinated before and had their primary vaccination prior to the campaign must have been successful, as evidenced by vesiculation six days after vaccination.

(c) Challenge of those vaccinated or re-vaccinated by the campaign (within the past years) by re-vaccination (at the time of the assessment) generally should not have resulted in primary or accelerated takes (the sample would include unvaccinated persons as controls).

3. Facilities and measures for case detection, laboratory confirmation, case investigation and contact vaccination, along with the maintenance of a high level of immunity in the community, should be sufficient to limit the spread of infection from imported cases to the first generation of cases (i.e., introduced cases).

(a) If reporting of mortality (due to all causes) is less than 90 per cent complete, it would be presumed that reporting of smallpox is also incomplete, in which event a system of smallpox surveillance and pox surveys (of those born since the attack phase) should have been started to supplement the inadequate reporting of smallpox.

C. Criteria for Assessment of Conditional Certification of Eradication

1. Transmission must have been interrupted for more than three years.

If reporting of mortality (due to all causes) is less than 90 per cent complete, apparent interruption of transmission (as evidenced by the absence of reporting cases and deaths) would be subject to confirmation by the results of smallpox surveillance and pox surveys (of those born since the attack phase) The pox surveys would be incorporated either in the system of surveillance or in cycles of mass vaccination, supplementing inadequate routine re-vaccination.

2. The area from which eradication of smallpox is to be declared should be neither contiguous with areas of continued endemicity nor exposed to the unrestricted influx of smallpox cases. Thus, interruption of transmission would have been synchronized throughout the area within the barriers of quarantine (i.e. the national territory).

3. The criteria for successful maintenance must have been and must continue to be met until global or true eradication of smallpox renders maintenance unnecessary.

METHODS USED FOR THE ASSESSMENT

1. Review basic records of vaccination and inspection of takes.

2. Verify records for sample households (500 to 1 000).

   (a) Completeness of enumeration.

   (b) Coverage of vaccination (by age-group, sex and locality for primary vaccination and re-vaccination separately).

   (c) Quality of vaccination and re-vaccination.

   (d) Quantity and quality of inspection.

3. Sample level of immunity by re-vaccination (the sample would include primary vaccinations as control).

4. Review adequacy of reporting.

   (a) Smallpox cases and deaths (by age-group, sex and locality).

   (b) Deaths (all causes).

   (c) Births.

5. Review adequacy of clinical diagnosis and laboratory confirmation of chickenpox and suspected smallpox.

6. Review findings and adequacy of case investigations.

7. Review adequacy of remedial measures in response to reported or detected cases.

8. Review adequacy, facilities, difficulties and methods of vaccination, supervision and evaluation (particularly their efficiency, efficacy and economy).

9. Review proposed policies and facilities for maintenance of smallpox eradication.

10. Review school attendance and other groupings (i.e. communities, floating population, migration, etc.).

11. Review adequacy of facilities for surveillance of births and smallpox.

12. Review the past co-operation of official and non-official agencies and prospects of co-operation further developing with other agencies, particularly those undertaking or interested in surveillance and intelligence of epidemic diseases and vital evens (i.e. NMEP, family planning, Registrar General of Vital Statistics, Panchayati Raj, community development projects and Bharat Sewak Samaj, etc.).

13. Review the attitudes and response of the public in general and communities in particular as well as the prospects of further improving the response.

14. Review status of smallpox eradication in continuous areas, and the possibilities of influx and of checking the influx of smallpox cases.

15. Ascertain whether the freeze-dried vaccine produced or supplied meets the minimum standard of quality and will be available in the quantities required by the campaign for the area concerned.

ASSESSMENT OF SMALLPOX ERADICATION PROGRAMME

FORM FOR COLLECTING INFORMATION THROUGH FIELD INVESTIGATOR

Sl.No.	Name of the Person	Sex	Name of the father or guardian	Occupation	Date, month and year of birth	Vaccinated or revaccinated not at house before or during the campaign			Vaccinated or revaccinated at house during the campaign. Date of vaccination or revaccination with results. No. of scars. If not vaccinated, state reasons.	Assessment		Date of attack	Are there permanent smallpox marks or history of smallpox?	Since when living in the house or having left the house (use "arrived" if from outside Delhi; use "moved", if from within Delhi).
						Primary vaccination - whether carried out in infancy or late in life. Age when primary vaccination is/was given, if this information is obtainable.	Presence of scars of successful primary vaccination. State number of scars.	Date of last vaccination		Date of revaccination or vaccination	Result			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Key to the form on the reverse

Key to the Form for Collection of Information from the Field

1. Write serial number for each individual in the family.

2. Write name of person, starting with the head of the family.

3. & 4. Obvious.

5. Write occupation of the persons.

6. Write date, month and year of birth, at least month and year.

Items 7, 8 and 9 relate to the vaccination and revaccination "Before the campaign" or not done at the house during campaign.

7. Write date (approximate) of primary vaccination, if done. If no primary vaccination was done before the campaign, write 'nil'.

8. State number of scars if primary vaccination was done.

9. Date of last vaccination means last primary vaccination or revaccination. If primary, write "P" and date; if revaccination, write "R" and date.

Item 10 relates to vaccinations or revaccination in the houses done during the campaign.

10. Indicate approximate date of vaccination - primary or revaccination, and note the number of scars. If primary, write "P", the number of of scar and the date. If revaccination, write "R", the number of scars and the date.

11 & 12 relate to vaccination to be done by you during the assessment.

11. Date of vaccination.

12. Read results on the 6th day.

If vesicle, pustule, ulcer or dried scab, record as such; otherwise write "no reaction".

13. Date of attack of smallpox, if any.

14. Note if any mark is seen or there is history only without definite mark.

15. Ascertain since when the family has moved into the present house and has been living there, or when they left the house (use "arrival" if they came from outside Delhi and "moved" if they have moved from within Delhi).

ASSESSMENT OF SMALLPOX ERADICATION

DESIGN OF CARD FOR ASSESSMENT THROUGH VACCINATION AND FIELD INVESTIGATION

1-2. Locality:) Specific address of the household:
3-6. Serial No. of individual listed) Name of head:

7. Sex: M (1) F (2)

8. Occupation: NK (0) at home (1) at School (2) Housewife (3) Service (4) Labour (5)
Shopkeeper (6) Unemployed (7) Agriculture (8) Others (specify) (9)

9-10. Age (in yrs): Less than 1 (1) 1 (2) 2 (3) 3 (4) 4 (5) 5-9 (6) 10-14 (7)
15-26 (8) 25-44 (9) 45+ (10) NK (11)

11. Present or absent when visited by the Assessment team:

Present and co-operative (1) Present but not co-operative (2)

Absent (3)

FOR THE PERSONS PRESENT AND COOPERATIVE:

Particulars of vaccination done before the Campaign

12. Primary vaccination: Not done (0) Done: 'In infancy (1) in childhood' (2) While adult (3) Can't say when (4) NK (5)

13-14. Specific age (in yrs) when primary vacc. done:

Not available (0) .. 1 (1) 1 (2) 2 (3) . . . . . .

15. Number of scars of primary vaccination: None (0) 1 (1) 2 (2) 3 (3) . . . . . NK (9)

16. Revaccination: Done (1) Not Done (2)

17. No. of scars of revaccination: None (0) 1, 2. . . . . NK (9)

Particulars of vaccination done during campaign

18. Primary vaccination: Not done even though not done before.

Done in	1960	1961	1962	1963
At home				
Elsewhere				

19. No. of scars from Primary vaccination: None 0 1 2 3 4

20. Revaccination: Not done 0 Done in 1960 1961 1962 1963

21. Reasons if not vaccinated: Absent Refused Sick Excluded Others NK

22. Particulars of vaccination done by the Assessment Team.

	Not done even though not done before					Done
	Absent	Refused	Sick	Excluded	NK	
23. Primary vaccination:						
24. Revaccination:						

25. Results of vaccination: Not read No reaction Vesicle Pustule Dry vesicle Ulcer

26. The person has: Pock marks | No pock mark but history of smallpox | No history or pock mark

27. When attacked?

Before 1960	In 1960	1961	1962	1963	NK

28. Since when living in the present house?

Before 1961	Since 1961	1962	1963	NK

29. Since when living in Delhi?

Before 1961	1961	1962	1963	Since	NK

Appendix V

INFECTIOUS DISEASES HOSPITAL

CASE STUDY

Schedule No. Date of investigation..... Investigator .....

Name

Age Sex Occupation

Name of head of family . . . . . .

Local address . . . . . .

Date of admission to the hospital. . . . . .

Date of first symptom. . . . . .

By whom reported - Relative, vaccination staff, medical attendant, others. . .

Residential status - Permanent, semi-permanent, visitor. . . . . .

Duration of stay in Delhi. . . . . .

If visitor, date of arrival in the city. . . . . .

History of contact (within three weeks) with known case - present, absent. . .

Vaccination status before attack - Nil, primary, revaccination . . . . . .

Last date of vaccination or revaccination. . . . . .

Result: Recovered, died . . . . . .

Date of discharge or death. . . . . .

Imported/local:

Appendix VI

HOME VISITING NOTE

Patient contacted - Yes/No.

If not, reasons: _____

Since when living in the city: _____

If recent, date of arrival: _____

Date of last vaccination or revaccination: _____

Movement during four weeks prior to symptom: _____

Contacts:

Sr. No.	Name	Vaccination date of last vaccination or revaccination	If suffered from smallpox	Date

ASSESSMENT OF SMALLPOX ERADICATION

Zone _____ Date of _____

Index house no. _____ Enumeration & vacc. _____

Field team no. _____ Reading results _____

Tabulated by _____ Tabulation _____

TABLE 16: Percentage distribution of persons with "takes" among all persons vaccinated or revaccinated by the Assessment Team by age, sex and locality.

Age in years	Male			Female			Both sexes		
	No. of persons seen*	No. with "takes"	%	No. of persons seen*	No. with "takes"	%	No. of persons seen*	No. with "takes"	%
1	2	3	4	5	6	7	8	9	10
Less than 1	68	21	45.59	82	44	53.66	150	75	50.00
1	75	18	24.00	98	23	23.47	173	41	23.70
2	129	23	17.83	109	26	23.85	238	49	20.59
3	149	37	24.83	136	37	27.21	285	74	25.96
4	149	30	20.13	125	29	23.20	274	59	21.63
5-9	567	62	10.93	492	83	16.87	1 059	145	13.69
10-14	241	18	7.47	338	26	7.69	579	44	7.60
15-24	218	13	5.96	493	62	12.58	711	75	10.55
25-44	213	16	7.51	906	150	16.57	1 119	166	14.83
45+	200	23	11.50	192	51	26.56	392	74	18.88
Not known	7	-	0.00	33	-	0.00	40	-	0.00
All ages together	2 016	271	13.44	3004	531	17.68	5 020	802	15.98

*Number of persons vaccinated or revaccinated by the Assessment Team, including those whose results could not be read by the Team.