The SEP Report, Volume IV, Number 2. Proceedings of the Seminar on Smallpox Eradication and Measles Control in Western and Central Africa. Lagos, Nigeria, May 13-20 1969. Part II.

SMALLPOX ERADICATION IN AFRICA: PRINCIPLES FOR ACTION IN THE MAINTENANCE PHASE

B. Binson[1]

INTRODUCTION

The methods of smallpox control now in use are in complete contrast to those aimed at suppressing epidemics of the disease. The campaigns now being conducted are no longer solely concerned with dealing with epidemics, but, by virtue of their continuity and coverage, are aimed at the eradication of smallpox.

The criticisms to which the use of the word "eradication" has been subjected in connection with the control of communicable diseases, are well known, and especially so in respect of the efforts to eradicate smallpox, an aim which has been considered to be too ambitious. Fortunately, spectacular results have countered these arguments and have demonstrated that the objectives cannot be dismissed *a priori* as utopian.

Facts have shown that smallpox eradication is possible and that we may hope, provided that we do not prematurely "eradicate" the programmes, to remove the disease from the list of those occurring in Africa.

THE CRITERION OF ERADICATION

Eradication may be defined as the long-term elimination of the clinical disease by the carrying out of a vaccination programme which results in the interruption of transmission and the creation, among the population, of sufficient immunity so that imported cases of smallpox no longer constitute a danger.

Given the fragmentary character of experience acquired in smallpox control, and taking into account the seasonal and geographic variations in incidence of the disease, it is not possible to provide a universal definition in quantitive terms (i.e. duration of time without cases, etc.) as to when eradication has been achieved.

A recent investigation covering nine countries in West Africa* has shown that, in these countries, smallpox is a disease which is both endemic and epidemic in character, with epidemics separated by periods of low incidence lasting for three to four years. Thus, a decrease in incidence cannot necessarily be considered to be the result solely of action taken against smallpox.

Before a country can be said to be smallpox-free, particularly in regions in which the disease is both endemic and epidemic in character, the period which must elapse with no endemic cases must be determined on the basis of the longer-term periodicity of the disease.

The following definitions are proposed:

- a smallpox free country is one in which no cases of endemic smallpox have occurred for a period at least equal to the usual period between epidemics.

- a country which is exposed to the disease is one in which transmission has been interrupted for a period less than the normal period between epidemics.

---

[1]Chief Medical Officer, Institute of Hygiene, Abidjan, Ivory Coast.

* July 1968 - Smallpox in the Ivory Coast and in neighbouring countries (Dahomey, Ghana, Guinea, Upper Volta, Liberia, Mali, Sierra Leone and Togo)

Thus, at the present time, none of the countries studied may be considered as "smallpox free", even if the disease is not endemic, and those in which the greatest steps forward have been taken must still be considered as "exposed to the disease". In these countries, eradication may be considered as having been achieved when no endemic cases of smallpox have occurred for five years, provided that, as long as the disease still occurs in adjacent countries, the immunity of the population is maintained.

PROGRAMME OF ACTION IN THE ATTACK PHASE

Smallpox eradication calls for perfect planning.

Experience has shown that a mass campaign, if properly carried out, may be enough to interrupt transmission, eliminate the remaining foci, and leave behind only isolated residual cases, due to the persistence of the virus in remote areas or to imported cases.

It is at this stage that maintenance activities should begin which are aimed at further increasing the vaccination coverage and improving the results already obtained. The persistence of smallpox is possible only by transmission from one person to another, the elimination of susceptibility leads to the eradication of the virus.

The disease is considered to be no longer endemic when no case has been reported for a certain period of time after a systematic vaccination campaign. The determination of the length of this period is linked with the quality of the system of surveillance available. In a country equipped with an effective system of surveillance, it may be accepted that "one or two years" would be enough time for smallpox to manifest itself by spreading from an unknown focus to a region under surveillance. In a country which borders on an infected area, and in which surveillance is still inadequate, this period may be insufficient and the attack phase may have to be supplemented by one or more mass campaigns.

STRATEGY OF THE MAINTENANCE PHASE OF ERADICATION

We may define a maintenance programme as the sum of all those planned permanent activities aimed at protecting a country or region from imported cases of smallpox.

Most frequently, mass campaigns are entrusted to specialized teams because they cannot be assigned to inadequately developed or merely inactive local health services. The campaigns cover the various communities at intervals to assure adequate coverage of newborns and immigrants.

When a period of time has elapsed such that it is certain that smallpox has disappeared, mass campaigns are no longer worthwhile, since the effort involved is out of proportion to the risk. Provided that new programmes can be satisfactorily substituted, the discontinuance of such campaigns would be beneficial.

It would be unreasonable to assign to specialized teams, capable of covering an entire country in three years, the responsibility for vaccinating each year all new arrivals over the whole of the territory. Utimately, progressive integration is necessary for economic reasons. However, only those responsibilities and duties should be assigned to the general health services which they are capable of undertaking. It is known from experience that integration is not an easy matter and in all probability, there is not a single African country in which, when the attack phase has been terminated, all the maintenance activities can be entrusted to the local health services. Whatever, smallpox control activities must be integrated in a stepwise manner if the results obtained are not to be endangered.

It must also be recognized that in a country in which an endemic case of smallpox has not occurred for years but which remains in a state of alert because surveillance is still inadequate in neighbouring countries, it will be necessary to continue with a much more aggressive vaccination programme.

PLANS FOR THE MAINTENANCE OF ERADICATION IN THE IVORY COAST

The last cases of smallpox in the Ivory Coast were observed in June 1965. The attack phase (third mass campaign) is being completed and a maintenance programme is in course of study. In view of the situation in neighbouring countries, the maintenance of a high level of immunity is necessary.

We envisage a limited degree of integration, with the public health units being entrusted with a specific proportion of the work, depending on their capabilities, as determined by investigations carried out on the spot. For this appraisal, population data have been obtained for each locality and age-group, and the birth rate, infantile mortality and annual figures for emigration and immigration have been determined.

Because of its triennial rhythm, the mass campaign has not achieved complete coverage; a high proportion of young people and immigrants remain susceptible and must be protected. Maintenance vaccination must cover, in addition to infants, who are the first priority, certain children who do not attend school and are, therefore, less easily reached for vaccination purposes than school children, and immigrants, both at the frontier and in the outlying suburbs of towns, where they tend most often to settle.

Some 50 public health units will be called upon to cooperate in the vaccination of newborn and young children in areas for which they are resposnbile. Wherever they exist, the maternal and child care services (PMI), and the hygiene and school medical services (IMS) will participate in the activities.

National programmes for the control of communicable diseases are in course of implementation, to which will be linked smallpox control activities associated with surveillance and maintenance. The mobile teams of the Service des Grandes Endemies will have an important part to play.

Localities not included in these programmes and those not covered for various reasons, will be visited by teams from the Institute of Hygiene.

Vaccination coverage of children born after the last visit of a specialized team will have to be practically complete. A simple formula has been worked out for determining the numbers which should be vaccinated. This formula is based on the size of the population in question, taking into account the date of the last visit and the death rates of the different age groups. This figure will be considered, for each locality, as the minimum number of vaccinations necessary to obtain adequate coverage. Those in charge of the mobile teams will have this method of calculation explained to them but will be left free to vaccinate systematically all persons without a vaccination scar.

The population of the Ivory Coast increases by about 40,000 each year as a result of immigration. Uncontrolled crossings of the land frontiers constitute a danger which must be eliminated by vaccinating all foreigners not in possession of a valid certificate, whatever the length of stay envisaged. While surveillance at the air and maritime frontiers functions normally, control of the land frontiers must be introduced. The places where such control will be carried out have been selected and plans have been made to implement such control. Inter-state cooperation is desirable, since it would be advantageous for the competent authorities to come to an agreement to collaborate in covering the land frontiers rather than to do so in isolation as a single frontier post should be sufficient to control all crossings in a given sector.

Legislation aimed at protecting the population of the Ivory Coast against smallpox has been developed over the years. The attack phase of the programme has thereby been facilitated and, providing that certain changes are made, the legislation in force should assist in the maintenance of eradication. In addition to compulsory vaccination, compulsory notification of cases and treatment, and powers given to the authorities to take urgent measures, the possession of a medical vaccination card, are also compulsory. The issuance of a vaccination card has been an important factor in the success of the mass campaigns, since it facilitates control and stimulates a high proportion of attendance. This practice is indispensable in the maintenance phase.

The obligation of parents and employers have been laid down in the legislation. The same applies to the periodic revaccination of administrative personnel, and every applicant is required to present a valid certificate. Special provisions applicable to public health personnel are to be proposed. It will also be requested that the issuance of certain official documents (identity cards, construction licenses, hunting licenses, driving licenses, etc.) should be made subject to the presentation of a valid certificate, and finally, that the requirements already imposed on air lines and shipping companies, in respect to the issue of licenses, should be extended to cover rail and road transport.

CONCLUSIONS

The development of smallpox control in Africa has shown that the eradication of this disease is an attainable objective on a continental scale.

The specialized attack teams of the preventive services have everywhere proved their effectiveness.

In the maintenance phase, provided that their responsibilities are not out of proportion to the equipment and funds available to them, the local health services, by their participation, should improve the level of immunity.

There is no great difficulty in stopping the advance of epidemic smallpox, and it is only logical to make the effort necessary to eliminate the endemic disease.

When the disease has apparently disappeared, and it seems, at first sight, that there is no need for the activities to be continued, eradication can be maintained successfully only if those responsible persevere and if the authorities, who provide the necessary funds, give their continuing support.