

**HANDBOOK FOR  
SMALLPOX ERADICATION PROGRAMMES  
IN ENDEMIC AREAS**



**WORLD HEALTH ORGANIZATION**

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FOREWORD AND INTRODUCTION

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## FOREWORD

This Manual has been developed as a guide for WHO staff and senior staff of National Smallpox Eradication Programmes. The principles set forth and the procedures suggested have been based on extensive staff and consultant experiences in field epidemiology and in different types of vaccination campaigns, as well as on recent experiences with smallpox eradication programmes in several parts of the world.

To date, however, no programme of the magnitude and general character of the present project has ever been undertaken and thus there is much which is yet unknown. It is also evident that no manual could provide a satisfactory single blue-print which would be universally applicable, considering the many smallpox endemic countries and the vast differences in present health structures, personnel and policies, population characteristics and attitudes, geography and climate. Further, it is clear that the many countries which have thus far become smallpox-free have achieved this status by a number of different approaches. The Manual, therefore, has been developed not as a rigid text but as a description of basic principles which, in the informed judgement of the many who participated in its preparation, should facilitate the progress of eradication nationally and globally. Purposefully, every effort has been made to simplify methods and procedures, recognizing, of course, that in a few countries a more complex and sophisticated scheme may be elaborated from these basic principles. A Manual such as this must continually evolve as the global programme progresses and must constantly be subjected to query and criticism. In cognizance of the fact that the most vigorous testing and scrutiny of the principles set forth will take place during the first years of the programme, the Manual has been distributed initially in "draft" form with the expectation that a more definitive text would be developed after a year's experience.

From all concerned, comments and suggestions with respect to the Manual are welcome.

## INTRODUCTION

"The global eradication of smallpox is well within the bounds of possibility. The only reservoir is man; infection is manifest; carriers do not exist; and successful Jennerian vaccination provides effective immunity. Its eradication is a matter of concern to all countries as those now free constantly run the risk of the introduction of the infection from endemic areas."

- WHO Expert Committee on Smallpox,  
1964

### 1. World Health Assembly Action

The urgency and desirability of a global programme for smallpox eradication was unanimously affirmed by a resolution initially proposed by the USSR delegation, at the Eleventh World Health Assembly in 1950. Intensified vaccination programmes followed in many of the countries with endemic smallpox. However, progress was slow. As was stated in the Report of the Director-General to the 1965 World Health Assembly: "Failure on the part of individual countries to develop programmes and on the part of those experiencing difficulties in achieving eradication has resulted principally from the lack of necessary funds for personnel, vaccine and supplies or from failures in the conduct of the vaccination campaigns or in the establishment of competent surveillance or maintenance vaccination activities." It was pointed out that no insurmountable technical problems had been encountered.

Although each Assembly held subsequent to 1950 continued to endorse unanimously the concept and desirability of global smallpox eradication, the Eighteenth World Health Assembly in 1965 dealt with the problem with particular emphasis and unanimously declared "The world-wide eradication of smallpox is to be one of the major objectives of the Organization", and requested the Director-General to make available the increased amount of technical guidance and advisory services in order to accelerate the programme. The Nineteenth World Health Assembly allocated over US\$ two million from the regular budget for assistance with global smallpox eradication, noting, however, the need for substantial additional material support to be provided by bilateral and multilateral agencies.

In 1967, the Twentieth World Health Assembly passed unanimously the resolution (WHA20.15), the full text of which is as follows:

#### SMALLPOX ERADICATION PROGRAMME

The Twentieth World Health Assembly,

Having considered the Report of the Director-General<sup>1</sup> on the smallpox eradication programme; and

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<sup>1</sup> Document A20/P&B/7.

Noting that smallpox continues to represent a serious world health problem notwithstanding the progress being made in the global eradication programme,

1. INVITES countries where the disease is still present to initiate or intensify their programmes leading to the eradication of smallpox as soon as possible;

2. RESOLVES:

(a) to urge the government of the countries whose eradication programmes are progressing slowly to adopt prompt measures within their available resources to eliminate any administrative difficulties that may be hampering their campaigns, and to give the highest possible priority to the provision of funds, personnel, and supplies needed to complete those campaigns as soon as possible;

(b) to recommend to the governments which are producing smallpox vaccines that special care be taken in the preparation of smallpox vaccine to ensure that it meets the purity and potency requirements established by WHO, and that in the endemic countries, freeze-dried vaccine should be used;

(c) to urge the countries where migrant sections of their populations constitute a constant threat of interstate transmission of the disease, to initiate or intensify a strict surveillance programme of this group of the population;

(d) to recommend that until such time as smallpox is no longer a world-wide problem, the countries where the disease has been eliminated or where an eradication programme is proceeding, establish maintenance programmes and epidemiological surveillance services;

3. REQUESTS Member States and multilateral and bilateral agencies to provide technical, financial and other support for programmes in endemic countries, particularly in the form of freeze-dried vaccine, transport and equipment; and

4. REQUESTS the Director-General:

(a) to continue to elaborate and implement the detailed plan, including the co-ordination of all international, bilateral and national efforts, with the objective of achieving global smallpox eradication in a predetermined time;

- (b) to intensify the research programme; and
- (c) to report further to the Executive Board and the World Health Assembly.

Eighth plenary meeting, 17 May 1967  
A20/VR/3

Since the 1966 Assembly, substantial additional support has been provided by the USSR in the form of a vaccine donation to WHO of 75 million doses plus considerable bilateral assistance in the form of vaccine provided to countries in Asia and Africa; the United States of America has offered bilateral aid in the form of technical and material assistance to 19 West African countries; a number of other countries have offered to WHO vaccine and transport to be employed in the programme.

## 2. The Smallpox Problem Today

Once a world-wide problem causing millions of cases annually, the reservoir of smallpox has progressively receded to the point that less than 70 000 cases have been recorded annually for the past three years. Endemic areas are now confined to a few countries in South America, sub-Saharan Africa and six countries in Asia. Although each of the endemic countries is now conducting vaccination programmes of a greater or lesser degree of intensity, their efforts to date have not been adequate to achieve a smallpox-free status and to maintain this status.

The problem of smallpox, however, is one shared by all countries of the world. The reintroduction of the disease into the non-endemic countries is feared, and with good cause. The mortality rate is high among non-vaccinated persons who contract variola major. In the United Kingdom and Sweden during outbreaks in 1962 and 1963, death occurred among 40 per cent. of unvaccinated persons despite good medical care. Costs of vaccination, quarantine and control programmes in the non-endemic countries are high. Czechoslovakia has estimated that it expends annually over US\$ one million (US\$ 0.073 per person) in maintenance vaccination, and the United States of America, US\$ 20 million annually (US\$ 0.112 per person). The United Kingdom has estimated that the average cost during a normal year is US\$ 0.65 million (US\$ 0.01 per person), but when smallpox outbreaks occurred in 1961 and 1962, additional expenditures incurred during the outbreaks were estimated to be US\$ 3.8 million.

## 3. Rationale and Strategy for Smallpox Eradication

The rationale and strategy with respect to the smallpox eradication programme was set forth by the Director-General in his Report to the 1965 World Health Assembly. The following is taken from this Report:

Of all the infectious diseases, smallpox, in its epidemiological behaviour, lends itself uniquely to an eradication effort. Directly transmitted from person to person, without known insect or animal reservoirs, rarely occurring in sub-clinical form, smallpox may quickly be detected in an area. The victim of the disease is generally incapable of transmitting the virus for more than two weeks and is rendered essentially permanently immune against a subsequent attack. Since the disease has a two-week incubation period, prompt identification of a case permits the initiation of effective containment measures.

Eradication can be accomplished in a comparatively simple and straightforward manner by rendering immune, through vaccination, a sufficiently large proportion of the population so that transmission is interrupted. The infinitely greater stability of freeze-dried smallpox vaccine unqualifiedly recommends this preparation for field vaccination programmes.

In densely crowded areas where infected individuals may contact a large number of persons, a very high proportion of the population should be successfully vaccinated to interrupt transmission. In sparsely settled areas, with comparatively little crowding, the disease may, in fact, spontaneously disappear until imported subsequently from more distant infected areas.

Cities, towns and villages, although reasonably accessible geographically for vaccination, represent the most important reservoirs of the disease and sites of transmission. In large urban areas particularly, crowding is greatest and infected individuals normally come into contact with the largest numbers of persons. A fertile soil is provided especially in the lowest socio-economic sectors, where response to vaccination is normally poor, where unprotected individuals from unvaccinated rural areas commonly migrate, where maintenance vaccination programmes are difficult to carry out and where birth-rates are high.

It is necessary for the eradication programmes to develop a systematic plan for the detection of possible cases and the concurrent investigation regarding the source and site of acquisition of infection, their vaccination status and the prompt instigation of containment measures. Detailed epidemiological investigation of all cases as to the reasons for their occurrence and the means by which they are being spread can be one of the most effective instruments to provide continuing guidance and direction to the vaccination programme. In the simplest terms, each case which occurs suggests the possibility of flaws in the programme. An outbreak, however small, demands a full critical review with appropriate revisions of the programme and immediate action. Even in countries with limited local health services, a systematic surveillance plan can and must be developed as an essential component of the eradication programme.



Until all endemic countries have completed valid eradication programmes and until at least a three-year period has elapsed without documented cases anywhere in the world, maintenance programmes of vaccination will be required in each of the countries. Methods for the conduct of maintenance programmes are expected to vary widely from country to country. Certain specific groups, however, will require particular emphasis.

- (1) Urban populations, especially those in densely crowded lower socio-economic areas.
- (2) Migrants and nomads who might be expected to transmit the disease widely and those recently entering urban areas from less well vaccinated rural districts.
- (3) Schoolchildren among whom disease may pass quickly and thence to the community at large.
- (4) New-born babies.
- (5) Dispensary and hospital staff including laundry personnel. The high risk of disease transmission among these groups has repeatedly been demonstrated.

Some countries may elect to carry out intensified programmes augmented by continuing vaccination programmes in health centres and elsewhere; others may incorporate vaccination into other types of immunization and disease control programmes. Whatever the approach, it is most important to reach specifically the groups noted above and to achieve as near total coverage of the population as possible. Finally, it should be noted that the development of the general health services is of the utmost importance in carrying out an effective maintenance programme.

#### 4. Summary

Dr V. T. Hevat Gunaratne, President of the Twentieth World Health Assembly stated at the Assembly, 26 May 1967:

"On smallpox eradication we have decided to strengthen our resolve to make individual and collective efforts to intensify the fight against this dread disease. The eradication of smallpox is within our reach. The achievement of this important undertaking now depends exclusively on our will and determination."

A confirmatory appraisal of the problem is also provided by Dr Fred Soper, 1967 Léon Bernard Foundation Prize winner and former Director of the Pan American Health Organization:<sup>1</sup>

"Our generation has no excuse to offer future generations if we continue to permit half of the human race to suffer from smallpox while we attempt to defend ourselves with costly and inefficient quarantine and vaccination certificates.

The selling has been done; the tools are available; support has been assured; the programme is already well advanced. The only question is whether our national and international administrative agencies can measure up to the challenge."

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<sup>1</sup> Soper, F. (1966) Smallpox-World changes and implications for eradication, Amer. J. publ. Hlth, 56, 1652-1656.