

MASTER

WORLD HEALTH ORGANIZATION  
INTER-REGIONAL SEMINAR ON SMALLPOX ERADICATION

Bangkok, 11-16 December 1967

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11 December 1967

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ANNEX 2

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WORLD HEALTH ORGANIZATION  
INTER-REGIONAL SEMINAR ON SMALLPOX ERADICATION  
Bangkok, 11 - 16 December 1967

*SR Green Arrow  
SURVEILLANCE*

LIST OF WORKING PAPERS

- 1-2 Smallpox Eradication Unit Surveillance Report I and II
- X Unedited Report of Scientific Group on Smallpox Eradication
- 3 Studies of the Efficacy and Durability of the Bifurcated Needle - Dr E. Shafa
- 3A-3B National Communicable Disease Center Smallpox Eradication Program (2 documents)
- 4 Smallpox Eradication in Thailand
- 5 The Smallpox Eradication Programme in Iran
- 6 Status of Smallpox Eradication Activities - Burma
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Opening Speech for the

Dec. 1967

WHO Inter-Regional Seminar on Smallpox Eradication

Dr D. A. Henderson  
Chief Medical Officer  
Smallpox Eradication Unit  
WHO Headquarters - Geneva

On behalf of the World Health Organization and on behalf of the participants of this Conference, I wish to express our appreciation to the Government of Thailand, particularly His Excellency the Prime Minister, and the Ministry of Health for the most cordial welcome we have received and for the many efforts which they have already made to make this Conference possible.

We are this year embarked on an historic mission - a programme to eliminate once and for all the most serious disease known to mankind. Never in history have the nations of the world joined in a common effort to achieve a goal such as this. The programme was initiated ~~in 1966~~ <sup>in 1966</sup> by unanimous vote in the World Health Assembly. During the past year, support has come from many countries in the form of donations to the Organization and in bilateral support to the endemic countries. You should know, in fact, that the principal donors of additional support are, in fact, two countries who do not always agree - the Soviet Union and the United States of America. This programme, as smallpox itself, does not recognize political differences or political boundaries.

So far as we can determine, 28 countries in three continents currently experience endemic smallpox; there are, however, 39 others who by reason of geographic proximity and population movements are constantly threatened by disease introductions and the reestablishment of endemic foci. Of the 28 endemic countries, 22 are located in Africa, 5 in Asia and one in South America. I am sure you will be pleased to know that in this, the first year of the programme, 21 of the 28 countries have already undertaken special intensive programmes of smallpox eradication. A substantial proportion of

the 39 countries which border on these endemic zones have also initiated special programmes of vaccination to improve their immunity <sup>as well as</sup> and intensified programmes of surveillance.

Perhaps, paradoxically, the reported number of cases of smallpox this year has increased in every geographic region, in the Americas, in Africa and in Asia. Increases in the Americas and in West Africa have been comparatively small and are, in major part, accounted for by improved reporting resulting from surveillance programmes inaugurated at the time of development of eradication efforts in each of these areas. In Asia, however, the story is different. The increase in the incidence of smallpox has been substantial. Major epidemics have swept India - Pakistan reports an increasing incidence - in Indonesia, epidemics have erupted in many parts of Java. The disease is not confined to the rural and remote areas. It presently afflicts every major city in these countries including the capitals themselves. In many cases, the cities are in fact more heavily infected than the rural areas. Although, as previously noted, 75% of the reported cases of smallpox occur in Asia, this undoubtedly understates the comparative seriousness of the problem in this region. Recent surveys indicate that smallpox is more poorly reported here than elsewhere, including Africa. Probably not more than 10% of the cases in Asia are now recorded - the real total of cases in the 5 endemic Asian countries during 1967 is probably approaching one million. From India, from Pakistan infection spread this year to Kuwait, to Oman, to Czechoslovakia, to Germany, to the United Kingdom. Next year it may be Thailand or Burma or Laos or Vietnam or Malaysia or the Philippines.

The problem is shared by us all. During this Conference, we hope to discuss the problems posed by smallpox to all countries represented, to discuss the approaches to combat it in endemic regions and to prevent its introduction into non-infected areas.

We at WHO have redoubled our efforts to assist you in your efforts to combat smallpox.

1. As first priority, we are endeavouring to assure adequate supplies of potent freeze-dried vaccine for all countries. Donations to the Organization have increased. In 1966, 3 million doses only were distributed; in 1967, 13 million doses, and, next year, we anticipate that the number will rise to 56 million doses. The Soviet Union, through bilateral assistance, is providing this year more than 100 million doses of vaccine; the United States, 40 million doses. In co-operation with UNICEF, additional equipment is being supplied to 10 vaccine production institutes in endemic areas; consultants have been provided to more than 20 institutes. Research on vaccine production is in progress in the Soviet Union, England, Netherlands and Switzerland. ~~A special meeting of vaccine producers has been called to develop a manual on vaccine production based upon the most current knowledge. Vaccine testing provided by the WHO testing laboratory has increased from 16 tests in 1966 to more than 75 in 1967.~~

2. The technical basis and strategy for the eradication programme is being carefully studied and elaborated. A Scientific Group was convened in Geneva during October; their report is being made available to you at this meeting. A Manual on Smallpox Eradication has been prepared; over 900 copies have been distributed. Surveillance reports to provide an exchange of information between programme directors and investigators and to chart the course of the campaign are now being sent to over 1000 persons concerned with smallpox eradication. The second issue of this report has just been printed; copies are here for you.

3. The WHO has this year developed plans of operations and signed agreements with 24 countries to provide assistance in the form of technical staff, equipment, vaccine and special costs.
4. To prevent extension of the endemic reservoir, a special vaccine reserve and jet injectors have been established in Geneva and provisions made to provide emergency assistance to any of the non-endemic developing countries who experience importations of smallpox. Twice this year, such assistance was provided - staff and vaccine arrived in the afflicted country less than 48 hours after a request for assistance was received.
5. Special studies have been instituted to develop new instruments and techniques for vaccination. Jet injectors have now been used extensively in West Africa and Brazil and have been found to be most effective, capable of vaccinating <sup>as many as</sup> 1,000 persons per hour with successful takes in a higher percentage than is normally achieved by manual methods. These will be demonstrated for you this week. ~~Smaller, less expensive instruments are under test.~~ A forked needle for multiple puncture vaccination has been tested and found effective. This needle permits vaccination with one-fifth the normal amount of vaccine normally required. Five million needles will be delivered in January for use in Pakistan and several countries in Africa.
6. In support of laboratory diagnosis, a manual on diagnostic methods for smallpox is in preparation; necessary reagents for the specified tests are now being produced. This manual and the reagents should be ready for instructional courses late next year. The methods themselves will be demonstrated for you this week.



7. Field studies of smallpox epidemiology, operational techniques and a variety of more technical studies have been initiated, many with WHO support - these studies are already pointing the way to new approaches in eradication programmes. Some of those who have been actively engaged in these studies have been brought to Bangkok to discuss their findings with you.

In brief, I believe I can confidently say that the global programme for smallpox eradication, in this the first of its 10 years, has begun well. Most endemic countries have already indicated that they consider seriously their obligations to their neighbours and have instituted eradication programmes.

This Conference is the first to be conducted under this new programme. I cannot imagine a more pleasant place for it to be held nor more hospitable hosts. It is fitting that it be conducted in a country which suffered from endemic smallpox for centuries but which, this year, celebrates its fifth smallpox-free year.

May I again express our appreciation to the Government of Thailand and to the many who have worked to make the arrangements for this Conference.

It is my hope that 9 years from today we might again meet here to announce formally and finally that the most devastating disease ever known to mankind has been obliterated from the face of this earth.

BANGKOK

8 December 1967

Inter-Regional Seminar  
on Smallpox Eradication  
BANGKOK, 11-16 December 1967

SMALLPOX ERADICATION - BACKGROUND

Global eradication of smallpox is well within the bounds of possibility. This knowledge is based on epidemiological and technical considerations and on the experience of many countries, including Thailand, which have conducted successful programmes.

Although smallpox was once endemic throughout the world, its geographic limits are now constricted. Europe, North and Central America, Australia and the Western Pacific have been freed from smallpox. World's endemic smallpox areas are now found in South-East Asia, Africa and South America.

Persistent high number of cases and a threat of the introduction of smallpox to all countries led the Eleventh World Health Assembly in 1958 to propose that smallpox eradication be undertaken on a global basis.

All endemic countries were asked by the Assembly to initiate programmes; donations of vaccines and other material were solicited from the member governments. Some countries began systematic smallpox eradication programmes. Notable success was achieved in a number of countries including Thailand. However, a number of countries which had carried out systematic programmes of vaccination experienced repeated smallpox introductions from neighbouring endemic countries.

And thus it came to be recognized that no country was safe until worldwide eradication had been achieved. The experience of the first eight years of global eradication programme clearly demonstrated the importance

/of developing

Health Education and Legislation

Admittedly, the key to success for smallpox eradication depends on the people's willingness to be vaccinated. Persuasion and health education are required to overcome the domination of the population by their belief in magic and witchcraft, by superstition and ignorance about health needs and problems. Health education should therefore be an essential part of the vaccination programme. In addition to health education of the public implementation of a smallpox eradication programme usually requires the promulgation of special legislative provisions. Vaccination is more than a personal affair and the community should have a right to take all measures, including compulsory vaccination. Legislation should therefore act as complementary to the health education effort. As health education improves, compulsion can relax.

The role of WHO

According to present estimates 28 countries in three continents experience endemic smallpox; there are however 39 others who by reason of geographic proximity and population movements are constantly threatened by disease introductions and the reestablishment of endemic foci. Of the 28 endemic countries 22 are located in Africa, 5 in Asia and one in South America.

In the first year - this year - of the 10-year WHO-sponsored global smallpox eradication programme 21 out of the 28 countries have already undertaken special intensive programmes of smallpox eradication. A substantial proportion of the 39 countries which border on these endemic zones have also initiated special programmes of vaccination to improve their immunity and intensified programmes of surveillance.

Contrary to the beliefs the disease is not confined to the rural and remote areas. It presently afflicts every major city in at least two major endemic countries in Asia - India and Pakistan - including the capitals themselves.

What are the prospects of eradicating smallpox from the world. An answer to this question was given by the WHO Expert Committee on Smallpox:

"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 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."

## CONCLUDING NARRATIVE SUMMARY

### Inter-Regional Seminar on Smallpox Eradication

Bangkok, December 1967

#### I. Introduction

During the course of the 1st Inter-Regional Seminar on Smallpox Eradication, the presentations and field demonstrations as well as the discussions of successful and unsuccessful smallpox eradication programmes in endemic and non-endemic countries brought to light a number of important points relevant to the conduct of eradication programmes. These are summarized in this presentation.

Of foremost importance has been the recognition that a successful eradication programme is comprised of not one but two important components which must receive equal attention. The first component, systematic mass vaccination, has often been regarded as the only activity of importance. Programmes with this emphasis have failed repeatedly. When successful, the goal of a smallpox-free status has been achieved only with heroic efforts and at considerable expense. It is clear that from the inception of every smallpox eradication programme in every area, emphasis must be placed on the second component - surveillance. This consists of smallpox case detection, reporting, field investigation and the prompt institution of containment measures. Continuing analysis of the data obtained serves to illuminate the principal links in the transmission cycle and to point the way for future planning.

The Scientific Group on Smallpox Eradication summarized these observations in pointing out that systematic vaccination programmes should serve to reduce the reservoir of smallpox virus to the point where transmission can be interrupted by containment measures.

Vaccination coverage of 80% of all segments of the population, including such as migrants and preschool children, should be sufficient to achieve a smallpox free status if there is an effective programme for surveillance of cases and a mechanism to carry out promptly field

investigation and containment measures. Where this second activity is ignored, perhaps 90% or even 95% may require vaccination before smallpox transmission ceases. To contact and vaccinate this additional 10-15% is exceedingly costly and may, in some situations, be impossible logistically. If this basic concept in the strategy of the eradication programme is recognized, success on a national, on a regional, on a global scale is possible. If it is ignored, failure is certain.

## II Important Features of Successful Eradication Programmes

As brought out during the Seminar, successful eradication programmes in their development and execution have been noted to have in common several important features.

1. A full-time programme director and directorate at national, state and district levels with authority and funds to plan and execute the programme. To provide the necessary impetus and organization to mould the uncoordinated vaccination activities into a systematic programme and to develop an effective surveillance scheme, full-time staff are requisite. It was noted in several programmes that the responsible individuals at these various levels need not be physicians. Experienced paramedical staff given sufficient authority and responsibility can be highly effective. Supervision, however, cannot be exercised from behind a desk. Provision must be made for all supervisory staff at all levels to spend at least 25% of their time in the field appraising at first hand the weaknesses and strengths, successes and failures and taking the necessary steps to guide the programme in its day by day, week by week, and month by month execution. The full-time staff and structure must be retained intact until the Maintenance Phase (as defined by the Scientific Group) has been reached. Premature dismemberment of such a staff, described in two instances during the Seminar, resulted quite promptly in a disastrous resurgence of smallpox. However, once the Maintenance stage of the programme has been reached, it is apparent that full integration of vaccination and surveillance



activities within the existing structure of the general health services can be and has proved effective and workable even where the general health services have been comparatively poorly developed.

2. Potent freeze-dried vaccine which is stored at 10°C or less and is distributed efficiently such that the vaccine is used within 30 days after leaving refrigeration. As was described during the Seminar, freeze-dried vaccine is vastly more resistant to heat than liquid vaccine. It is for this reason that the World Health Assembly as well as the Scientific Group on Smallpox Eradication recommend that only freeze-dried vaccine be used in eradication programmes. Even this vaccine, heat resistant as it is, can be destroyed by improper handling and such has occurred in at least one programme. Simple refrigeration prevents this. Needless to say, it must be potent. The World Health Organization is prepared to test, at no charge to the member governments, lots of vaccine submitted.
  
3. Definite plans and goals, with respect to vaccinations to be performed by area, by week, by month and by year. Clearly defined goals and conscientious attention to insure that these are met are requisites for any successful programme. In well-planned and supervised programmes, vaccinators can be expected to perform 75 to 100 vaccinations per day without difficulty. However, as described during the Seminar, poorly supervised vaccinators burdened with elaborate records and excessive equipment frequently perform no more than 5 to 15 vaccinations in an entire day. By giving priority for vaccination to those groups in which most cases are occurring, the achievement of smallpox-free status may be achieved more readily. In most areas, 80-90% of cases occur among persons with no evidence of a vaccination scar. Unvaccinated persons are most frequent among children from 0-14 years of age who do not attend school, among urban slum dwellers and among migrant populations.

4. Continuing assessment of vaccination results. To assure that vaccination technique is good and that the vaccine used is potent, a proportion of primary vaccinees should be checked 7 days or later following vaccination. This is most readily and efficiently done in children less than 5 years of age. More than 95% should exhibit primary takes. To assure that adequate coverage of various areas and population segments is being achieved, a simple check to determine the proportion with scars of primary vaccination can be rapidly and efficiently conducted. Provision should be made for such assessments to be conducted on a continuing basis. Such surveys may be done by supervisory staff at any level and at any time and, if coupled with corrective and disciplinary action, serve to assure better performance on the part of vaccination staff.
  
5. Development, from the inception of the programme, of a system of case detection and reporting and a mechanism to assure prompt institution of containment measures. The importance of this component of the programme was noted as being of at least equal importance to the systematic vaccination effort. For each case, information regarding age, sex and vaccination status at the time of exposure should be collected and forwarded promptly to the national smallpox directorate. Continuing analysis of these data will serve to guide and direct the programme by ensuring that proper emphasis is placed on vaccinating those age groups and population segments in which smallpox is occurring. When the number of cases declines below 200 per year in any country or large state (as those in India), every case should be investigated, confirmed and the source of infection traced. At this frequency of disease, the surveillance-containment programme is, without question, the most important component of the programme. In most programmes, the establishment of "fire-fighting" teams from the beginning of the programme has been found to be of great value. Such teams, moving rapidly and promptly to areas where cases or outbreaks are occurring, carry out the necessary investigations, ensure that patients are

being isolated to the maximum extent possible and vaccinate family contacts as well as residents in the area. Vaccination in this instance should be done rapidly by the collecting point system. An effective team of 3 or 4 persons in one, or at most two days should be able to conduct necessary investigations and institute containment measures including the vaccination of 400 to 600 persons in the vicinity.

6. Enactment of enforceable compulsory vaccination laws. Although every effort should be made to persuade the population of the value and need for vaccination, compulsory vaccination laws which can be enforced have been universally found to be an important adjunct to eradication programmes. As discussed during the Seminar, several provisions have been found to be workable and useful. These include: (1) compulsory vaccination of all infants born in hospitals and maternity homes (of particular value in urban areas); (2) compulsory vaccination of all school children; (3) compulsory vaccination for those employed by government and industrial firms as a condition of employment; (4) compulsory vaccination of all persons admitted to infectious disease hospitals; (5) compulsory vaccination of contacts of cases and those resident in an area declared by the health officer to be threatened by an outbreak.

### III Vaccination Techniques

In many areas, vaccination techniques employed have been elaborate, requiring considerable quantities of equipment and have been less effective than simplified techniques which have now been evaluated and recommended by the Scientific Group on Smallpox Eradication. These methods were discussed and demonstrated during the Seminar.

1. Preparation of the vaccination site - Cleansing of the skin by conventional methods has been found to have no effect in decreasing bacterial complications. On the contrary, many methods employed may decrease vaccine takes and increase the frequency of local

vaccinial complications. Accordingly, no cleansing of the skin is recommended unless it is caked with dirt in which case the dirt may be wiped away with a moist cloth.

2. Contraindications to vaccination - In endemic areas, none are recognized except individuals who are obviously severely ill.
3. Method of vaccination - Comparative studies show that multiple pressure vaccination is consistently more effective than scratch vaccination. The multiple pressure technique has been less frequently employed because of the difficulty in training of vaccinators. The bifurcated needle which was demonstrated during the Seminar permits simple multiple puncture vaccination which can be easily taught. Fifteen strokes with the needle are recommended for both primary vaccination and revaccination. Use of the bifurcated needle will also result in a saving of vaccine since only 0.002 ml of vaccine is used for a vaccination compared to 0.010 ml employing conventional techniques. The "Ped-O-Jet" jet injector has now been employed in routine field use for the past year and has been found to be durable and effective. It is anticipated that all programmes will find the jet injector to be of value in urban areas and for "fire-fighting" teams.
4. Presence of blood at the vaccination site following multiple puncture or scratch vaccination - The presence of a trace of blood in the vaccination site within 15 to 30 seconds after vaccination provides a guarantee that vaccination has been performed with sufficient vigour. It is commonly believed that if blood appears, it will "wash away" the virus. This is not the case. However, if a trace of blood is not seen, it is probable that the scratch or puncture was not sufficiently deep to inject the virus particles to accomplish successful vaccination.

#### IV Assistance to National Programmes

Prior to 1967, WHO had virtually no funds for smallpox eradication. The Nineteenth World Health Assembly made available approximately \$ 2.5 million in the regular budget for "(a) such supplies and equipment as are necessary for the effective implementation of the programmes in individual countries and (b) such services as may be required in individual countries and as cannot be made available by the governments of such countries". This sum of money is not large considering the number of endemic countries and the very great needs. Fortunately, a number of countries, particularly the Soviet Union and the United States of America, have provided substantial additional assistance. As requested by the World Health Assembly, WHO is endeavouring to co-ordinate all of these efforts, international, bilateral and national to effect the goal of smallpox eradication in the shortest possible time. At present, approximately \$ 10 million is available for this programme under all forms of international assistance. Still, this is not a large sum of money. The endemic countries must themselves place a sufficient priority on the programme in order for the job to be accomplished. Special provision must be made to establish full time supervisory staffs and to eliminate administrative barriers; additional funds are normally required. However, it is to be noted that in all countries, vaccination programmes directed at control of smallpox are presently operative. Use of more efficient techniques, improvement of supervision and a "streamlining" of the operation has in many instances permitted an excellent eradication effort for little more than is being spent for a poor control effort. Illustrative of this point is the fact that in one district in one of the countries in Asia, it was found that more than \$ 1.50 was being spent on vaccinator salaries alone for each vaccination performed. In effective programmes, this cost should be no more than a few cents.

As noted above, WHO is prepared to assist in many ways. A few are elaborated below:

1. Supplies and equipment.
2. Technical personnel.

3. Freeze-dried vaccine.
4. Short-term assistance by Regional and Headquarters WHO staff in programme planning and assessment.
5. Consultants and supplies to augment and improve vaccine production.
6. Publications:
  - a) Handbook for Smallpox Eradication, published in July 1967.
  - b) WHO Smallpox Surveillance Reports, published quarterly - Issue No. 2 was printed on 1 December 1967.
  - c) Requirements for Biological Substances (Smallpox Vaccine) - Technical Report Series No. 323, 1966.
  - d) Report of the Scientific Group on Smallpox Eradication - available in March 1968.
  - e) Manual on Vaccine Production - available in late summer, 1968.
  - f) Manual on Laboratory Diagnosis of Smallpox - available in December 1968.
7. Assistance in the Control of Outbreaks in Non-endemic Countries - a vaccine reserve and jet injectors are now stocked in Geneva and, with technical personnel, are available for immediate dispatch to countries requesting assistance.

#### V Reports to WHO

In order to follow the progress of the programme and to co-ordinate the many efforts being made throughout the world, WHO is requesting that regular reports be submitted by the endemic countries regarding progress in the vaccination effort and the occurrence of smallpox cases. The reports do not replace but rather augment reports now made under the provisions of the International Sanitary Regulations. The reports requested are described at the back of the Handbook for Smallpox Eradication. Purposefully, they have been designed to be as simple and brief as possible. Supplementary reports describing outbreaks, interesting investigations, etc. are at all times welcome as contributions to the Surveillance Reports.



## VI Conclusion

During the Seminar, programmes in a number of countries were described which led to a smallpox-free status and the maintenance of this status at a cost in terms of vaccine and personnel, which is far less than that spent on smallpox control in many endemic countries. Countries in many parts of the world have achieved a smallpox-free status with less trained personnel and more problems in transportation and communication than in the presently endemic Asian countries. Further, the task was accomplished and a smallpox-free status maintained with basic health services which were minimal and, in certain instances, virtually non-existent.

Clearly, the necessary tools and better tools than ever before are available. There are no known technical obstacles. If we fail in this task, the failure must rest with us and with us alone. We must all work together on this task for the presence of smallpox anywhere is a threat to all countries. As a national programme cannot be successful unless all parts of the country participate, so a global programme cannot be effective unless all countries fully and actively participate. The World Health Assembly has asked the Director-General to make the programme of smallpox eradication one of the major objectives of the Organization. It is necessary for each individual country to assign the same importance to smallpox eradication in the own national planning.

As expressed by Dr Gunaratne, President of the last World Health Assembly, in May 1967:

"The eradication of smallpox is within our reach. The achievement of this important undertaking now depends exclusively on our will and determination."