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ORGANISATION MONDIALE DE LA SANTÉ

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ORIGINAL: ENGLISH

SMALLPOX ERADICATION PROGRAMME

CORRIGENDUM

Due to a typographical error, Tables 3, 4, 5, 6, 7, and 8 in Document EB41/12 should be replaced by the attached Tables, with the addition of Table 9.

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SMALLPOX ERADICATION PROGRAMME

I. INTRODUCTION

An intensified programme of smallpox eradication, decided upon by the Nineteenth World Health Assembly,[1] commenced in January 1967. Funds were provided in the regular budget of the Organization; endemic countries were urged to take the necessary steps to begin eradication programmes as soon as possible; and multilateral and bilateral agencies were requested to provide adequate material support.

The response on the part of the endemic countries has been gratifying. With assistance from the Organization as well as support from multilateral and bilateral contributions, 16 of the 29 endemic countries commenced eradication programmes during 1967; it is expected that at least 6 additional countries will begin programmes during 1968. Of 38 countries located in endemic regions but who do not themselves experience continuing endemic transmission of smallpox, 21 initiated or continued vaccination and surveillance programmes during 1967; in at least 4 others, such programmes are expected to begin in 1968.

Continued planning, implementation and co-ordination of all efforts directed toward the goal of global smallpox eradication are proceeding actively.

This report, requested in resolution WHA20.15, presents the current status of smallpox and programme plans for 1968 and 1969.

II. STATUS OF SMALLPOX AND PROGRAMME DEVELOPMENT

The annual incidence of smallpox since 1959, according to the most recent information available to the Organization, is presented by continent and WHO Region in Tables 1 and 2. Since 1965, there has been a steady increase in the number of cases of smallpox principally accounted for by increasingly serious epidemics in India and Pakistan. The final total of cases occurring throughout the world in 1967 is expected to exceed 85 000, the highest total in the past four years.

Countries definitely or probably experiencing endemic disease, apart from sporadic introductions, include five in Asia, 23 in Africa and one in South America. At least 38 other countries may be regarded as being at special risk of smallpox

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[1] Resolution WHA19.16, Handbook of Resolutions and Decisions, 9th ed., pp. 41-42.

introductions because of population movements and geographic proximity to endemic areas. Seven of these countries, in fact, experienced outbreaks during 1967. In none of these countries, however, did endemic smallpox become re-established. In five countries distant from the endemic areas smallpox was introduced on six occasions during 1967. The countries affected were Czechoslovakia, Federal Republic of Germany (two introductions), Kuwait, Trucial Oman and United Kingdom of Great Britain and Northern Ireland. In the four European outbreaks the first introduced case (index case) was promptly diagnosed and isolated, and contacts were vaccinated; no spread occurred except for a single case in the United Kingdom of Great Britain and Northern Ireland. In Trucial Oman, 10 cases were recorded and, in Kuwait 41 cases, before the outbreaks were brought under control. All importations into these countries resulted from infections acquired in India or West Pakistan.

1. Africa

1.1 Smallpox incidence

Smallpox continues to be widespread although irregularly distributed throughout Africa south of Sahara. Two countries, Dahomey and Sierra Leone, experienced, during 1967, the highest rates of smallpox recorded anywhere in the world; many countries, on the other hand, record only sporadic cases resulting from disease importations. However, because of extensive migration and travel throughout Africa, all countries are at high risk of smallpox introductions.

In the Western and Central African countries, an increased incidence of smallpox was observed during 1967. Through 7 October, 8811 cases had been recorded, compared to 6366 cases during the comparable period in 1966. This increase can, in part, be attributed to more complete case recording coincident with the development of eradication programmes throughout this part of Africa. In Eastern and South African countries, a slight over-all decline in cases was observed in 1967. No reports from South Africa have been provided to WHO since early 1965 but at that time, smallpox was endemic in that country.

1.2 Programme development

During 1967, 23 countries in Africa commenced smallpox eradication programmes. The bilateral assistance from the United States of America provided the principal material and technical assistance to 19 West and Central African countries. Programmes in six of the 19 countries in this group were also assisted by WHO. With the extensive use of jet injectors in this programme over 15 of the 110 million persons in these 19 countries were vaccinated between January and September. In progress in these countries are a range of studies dealing with operational techniques incorporating jet injectors, assessment methods, workable surveillance procedures and smallpox epidemiology.

Programmes supported by WHO were initiated in mid to late 1967 in the Sudan, Democratic Republic of the Congo, United Republic of Tanzania and Zambia. In the Sudan, during one 20-day working period, over 700 000 persons were vaccinated in Khartoum Province; several million vaccinations had been performed by the end of the year. During 1968, additional programmes are expected to begin in four additional countries, including Rwanda, Burundi, Ethiopia and Somalia. It is anticipated that the programme can be extended to the remaining countries in Africa during 1969.

WHO intercountry advisers are working in both West and East Africa to assist the programmes and to facilitate their effective co-ordination. An Inter-Regional Seminar is planned during 1968 for principal smallpox eradication staff in the East African countries; a similar type of meeting is under consideration for the West African countries.

Several countries were assisted in the development and improvement of vaccine production facilities. Kenya, which received freeze-drying equipment from UNICEF late in 1967 and consultative assistance from WHO, is now producing good quality vaccine in quantities exceeding its own needs. Consultative assistance in vaccine production was also provided by WHO to Ethiopia, and by the United States of America bilateral aid to Nigeria; a virologist from the Pasteur Institute, Senegal, was given specialized training in vaccine production through a fellowship; the laboratory at Kindia, Guinea, received freeze-drying equipment from UNICEF and will begin vaccine production late in 1968 with technical assistance from WHO. These laboratories, together with the laboratory in the Democratic Republic of the Congo, when eventually in full production will have a capacity adequate to supply the needs of all the African countries.

2. Asia

2.1 Smallpox incidence

Through 7 October, the five smallpox-endemic Asian countries had reported a total of 58 082 cases, an increase of 50 per cent. over the number recorded for the same period in 1966. Three-fourths of these cases had been reported from India which experienced widespread epidemics in several northern and north-western provinces. An increased incidence of smallpox was also observed in East and West Pakistan; serious outbreaks occurred in several parts of Indonesia; in Afghanistan, smallpox, though persistent, occurred at a sporadic low level; in Nepal, case reporting is still too incomplete to permit appraisal of the extent of disease. Burma, at the end of three years of well-supervised and executed programme, reported no cases during 1967, its first smallpox-free year in recorded history. In Laos and Cambodia assessment surveys for scars of smallpox confirm that the disease has not been present in these countries for probably a decade or more. From these and other reports, it is most probable that, except in Indonesia, endemic smallpox is no longer present east of the India-Burma border.

2.2 Programme development

In Afghanistan and Nepal, eradication programmes, assisted by WHO advisers, have now been in progress for several years. These programmes were reviewed in detail by WHO staff and consultants during 1967 and new plans of operations developed to provide for accelerated and more effective programmes. Additional material assistance is being given by WHO to support these efforts. In Afghanistan, assessment surveys carried out in many parts of the country reveal that substantial progress towards smallpox eradication has been made. Although inadequate reporting is still a problem, case surveillance is being strengthened; simplified records systems have been introduced; case investigation and containment activities have been instituted; a contingent of female volunteers from the United States of America working with Afghani staff and a WHO nurse adviser have commended a special programme for vaccinating women and young children; vaccine storage facilities have been improved. With continuing support by the Government of Afghanistan and assistance from the USSR in the form of freeze-dried vaccine, it is expected that the remaining limited reservoir of endemic smallpox in Afghanistan can soon be eliminated. Although the programme in Nepal is gradually being strengthened, eradication cannot be anticipated as soon because of difficult transport and communications problems, continuing migration of people between highly-endemic Indian areas and Nepal and a still limited surveillance and reporting system.

A plan of operations for a pilot programme in Indonesia has been developed and should be instituted early in 1968 with WHO technical and material assistance. Additional equipment for vaccine production is being provided by UNICEF and technical assistance as necessary by WHO. Although substantial quantities of vaccine will need to be provided to this programme in 1968 and 1969, Indonesia should be self-sufficient with respect to smallpox vaccine production in 1970.

Special eradication programmes have been developed in both East and West Pakistan which, with WHO assistance, will begin in the early and latter part of 1968, respectively. The vaccine production facility in Dacca is now producing substantial quantities of good quality freeze-dried vaccine but is being provided additional material and consultative support by WHO to enable it to meet the expanded needs of the entire Pakistan programme.

A team composed of Indian and WHO staff assisted by consultants conducted, in late 1967, an intensive 10-week assessment of the Indian eradication programme at national, state, district and block levels. During the three-year mass vaccination programme which concluded this year, 537 million vaccinations had been performed in India, employing freeze-dried vaccine supplied principally by the USSR. The number of recorded vaccinations exceeded, in fact, the total number in the population. However, from the recorded incidence of smallpox this year, the second highest in a decade, the programme clearly had not been a success. The assessment team observed that perhaps of greatest importance was the fact that supervision at all levels of the programme was seriously deficient and that many of the problems had originated from this basic weakness. Many of

the more accessible groups were being revaccinated repeatedly while susceptible pre-school children, migrants and individuals in the floating population were not being vaccinated at all. In some cases, liquid vaccine continued to be used; facilities and mechanisms for storage and shipment of freeze-dried vaccine were inadequate; surveillance, isolation and containment activities needed considerable strengthening; vaccine production facilities were not functioning adequately. The findings and recommendations of the assessment team are currently being studied in the anticipation that a modus operandi can be developed to strengthen this vital programme.

Other countries in South-East Asia are increasing vaccination programmes and surveillance activities to prevent reintroduction of smallpox. A systematic large-scale vaccination programme is being continued in Burma, with assistance in the form of freeze-dried vaccine, provided by the USSR; supplies, including vaccine, are being provided by WHO to Laos to enable it to improve the immunity level in its population; the Philippines has initiated an extensive programme of vaccination in its southern provinces to protect against possible reintroductions from Indonesia; freeze-drying equipment and technical assistance is being given to Ceylon.

3. South America

3.1 Smallpox incidence

Brazil represents the primary, and perhaps only, continuing endemic focus of smallpox in the Americas. Although a few cases were reported in 1967 from Argentina and Colombia, the cases in Argentina are known to have resulted from several separate introductions from Brazil and those in Colombia are probably of a similar origin. Through 7 October, 2376 cases had been reported by Brazil, an increase of 40 per cent. over the number recorded during a comparable period last year. In part, this may be attributed to more complete reporting, coincident with the development of an eradication programme.

Although at least a few cases were recorded in virtually all states of Brazil, over half were reported from the State of São Paulo. The majority of cases have been noted among unvaccinated children less than 15 years of age.

3.2 Programme development

An eradication programme commenced in Brazil early in 1967 with WHO material and technical assistance. Vaccination is being carried out, in large part, by jet injection. Although over five million were vaccinated, during the first nine months, progress in the campaign did not meet expectations. Difficulties were experienced in adapting the vaccination effort to accommodate the considerable daily capacity of the jet injectors. The programme has been replanned and is now progressing more satisfactorily. Surveillance, field investigation and containment of outbreaks have been emphasized from the inception of the

programme; a surveillance bulletin is now published on a weekly basis. Reporting of smallpox is far more rapid and complete than ever before, accounting in part for the apparent increase in cases this year in Brazil.

Virtually all other countries in South America have initiated special programmes to improve population immunity and surveillance for suspect smallpox cases.

With consultative assistance and fellowship training provided by the University of Toronto (Canada), the quality and quantity of vaccine is being steadily improved in the 11 freeze-dried vaccine producing facilities in South America.

III. GENERAL PROGRAMME DEVELOPMENT

1. Central activity

In 1967, the initial year of the global eradication programme, major efforts were directed towards the development of materials setting forth the technical and operational strategy of the programme; in assisting in developing plans of operations and in recruiting WHO technical staff for the various country projects; and in securing an adequate supply of freeze-dried vaccine both through provision of assistance to producing laboratories and through donations. In 1968, in addition to continuing and extending these activities, greater attention will be devoted to the development of laboratory diagnostic methods for smallpox, to the establishment of reference laboratories and to research activities in smallpox.

A 250 page "Handbook for Smallpox Eradication" was printed in July; by November, 900 copies had been distributed and an additional printing was required to satisfy the many requests still being made. A French edition is in preparation.

A smallpox surveillance report for the use of the health administrations participating in the programme, describing the current status of smallpox, progress in the eradication effort and current observations of field and research staff, was first issued in September and a second issue followed in December. It is planned to publish this at least every three months to assist in the co-ordination of programmes and the exchange of information between national, field and research workers concerned with the eradication effort.

During October, a Scientific Group on Smallpox Eradication was convened in Geneva to consider the present status of knowledge regarding smallpox and smallpox eradication and to consider particularly the methodology and strategy for eradication.

A meeting of vaccine producers will be convened during 1968 to review published and unpublished material dealing with vaccine production and to develop a detailed illustrated manual dealing with the production of freeze-dried smallpox vaccine grown on animal skin.

An illustrated manual of recommended procedures for smallpox virus diagnosis will be developed during 1968 and will be employed in courses on this subject to be conducted during 1969 at designated regional reference diagnostic centres. Arrangements were made to obtain sufficient quantities of high titre freeze-dried antigen and antisera to supply the routine needs of diagnostic laboratories.

2. Vaccine supplies

A persistent critical problem is the need for adequate quantities of freeze-dried smallpox vaccine in the endemic countries. As previously noted, emphasis has and is being placed on the development of production facilities in endemic areas, which can efficiently produce vaccine on a year round basis. Studies to date indicate that a laboratory capable of producing 10 million doses annually represents the minimum effective size. It is to be noted that vaccine production equipment has now been provided to all countries demanding this or greater quantities of vaccine. Improvement and expansion of existing vaccine production laboratories is thus being emphasized. In the Americas, the University of Toronto (Canada), under an agreement with WHO, continues to provide consultation and assistance to 11 laboratories in South America. Consultants from various established production centres are assisting in other parts of the world. Special consideration is now being given to the problems of maintenance and repair services, and the provision of necessary spare parts to insure maximum productivity of existing facilities.

Special studies are in progress to evaluate the comparative efficacy and reactogenicity of vaccine strains currently available for use. Studies of the characteristics and comparative yields of these strains in routine production are also in progress.

All countries are being urged to submit vaccine specimens on a frequent, regular basis for testing purposes. In the Americas, these are being tested at the University of Toronto, Canada; vaccines from other parts of the world are being examined at the Rijks Institute, Netherlands. The increased utilization in this service is reflected by the fact that only 12 lots were tested in 1965; 43 in 1966; and over 75 in 1967.

Requirements for freeze-dried vaccine are now substantial and are expected to increase significantly during 1968 and 1969. Thanks to a donation of 75 million doses of vaccine from the USSR for the three-year period 1967-1969 and smaller donations from a number of other countries, the needs in 1967 have been met but, as shown below, a deficit may be expected during 1969.

VACCINE DISTRIBUTED BY WHO (IN THOUSANDS OF DOSES)

1965	1966	1967	1968*	1969*
2 290	3 767	13 008	56 690	60 000

* Projected needs.

It should be observed that in addition to the amounts noted above, more than 150 million doses of vaccine are now being provided annually to endemic countries on a bilateral basis by the USSR and by the United States of America.

3. Development of vaccination devices

Field evaluation of a foot-operated jet injector, currently in use in West Africa and Brazil, indicates that this device is sufficiently sturdy and effective for its uses to be expanded, particularly for vaccination campaigns in densely populated and in outbreak containment activities. Additional injectors have been procured and will be made available during 1968 to countries requesting them following the training of national and local personnel in their use and repair.

A number of studies have been carried out during 1967 employing a lighter, less expensive hand-operated injector produced in France. Although of considerable practical value if effective, studies to date have revealed an unsatisfactory level of vaccine takes following administration of vaccine with this injector. Further studies, however, are being carried out to determine if take rates can be improved by altering the angle of injection and the concentration of vaccine.

Field tests have also been conducted employing for vaccination a forked (bifurcated) needle which permits, in one step, withdrawal of vaccine from the vaccine vial and its application by multiple pressure or multiple puncture technique. Of principal advantage is the fact that with this needle only .002 ml of vaccine is used in performing a vaccination contrasted to .01 ml used with conventional techniques (even more than 0.01 ml when the rotary lancet is employed). Studies have shown that a high proportion of primary and revaccination takes can be obtained with this new needle. The rates are in fact equivalent or better than those obtained with conventional devices. This needle can be sterilized by boiling and reused many times. A simplified production technique has been worked out with the manufacturer which permits the needles to be purchased for little more than the cost of a disposable vaccino-style. The bifurcated needle will be used in some programmes beginning early in 1968.

4. Emergency vaccine reserve and technical assistance

Early in 1967, a small emergency vaccine reserve was established in Geneva to permit the rapid dispatch of vaccine in case of emergencies. Three requests of this type were received within a two-month period after the establishment of the reserve supply. In March, for example, the Trucial States experienced several simultaneous introductions of smallpox from India. Because of the largely unvaccinated status of the population, an urgent request for assistance was sent to WHO. Less than 36 hours after the dispatch of their cabled request, a WHO medical officer with 100 000 doses of vaccine arrived in the principal city, Dubai.

In addition to this vaccine reserve, several jet injectors have now been purchased and stockpiled in Geneva, others will be made available in 1968 to some regional offices; a panel of consultants processed for immediate travel is being constituted; the vaccine stockpile has been augmented to include vaccine suitable for jet injector use.

5. Training courses and seminars

Special courses in laboratory diagnosis of smallpox were conducted in 1967 in South America.

Also an Inter-Regional Seminar for Asian countries on Smallpox Eradication took place in Bangkok in December 1967. A seminar on smallpox eradication is expected to be held in 1969 in East Africa under WHO auspices and in West Africa under bilateral assistance provisions; additional training with regard to methodology of operations, surveillance, assessment, jet injector use and maintenance will be afforded at national level by WHO regional and headquarters staff and consultants.

Plans are being discussed for the development of a six- to eight-week formal course in smallpox eradication for WHO staff and national programme directors which will take place in 1968.

6. Fellowships

The principal need in fellowship training is in the area of vaccine production. Comparatively few production laboratories presently have the space or facilities to provide this important training or, if available, language frequently poses a barrier. This problem is under study in the hope that one or two production laboratories in endemic countries might be adequately strengthened to permit offering this type of training.

7. Research

As previously noted, several studies are in progress relating to cheaper, more effective devices for vaccine administration, either by jet injection, or by multiple pressure or multiple puncture application. Further studies of the epidemiology and patterns of spread of smallpox will be initiated in 1968 and extended in 1969. These studies, designed to determine the precise patterns of spread of smallpox will facilitate programme operations by identifying those groups requiring special attention in the immunization programme. Other studies in progress or to be initiated include those dealing with comparative characteristics of vaccine strains to determine those most suitable for use; appraisals of the safety, efficacy and stability of smallpox vaccines propagated in tissue cultures; assessment of the relative efficacy of vaccination over different time periods and under circumstances of natural challenge; operational studies, including studies of jet injectors, to determine the most efficient and economical means of conducting vaccination programmes. Promising chemoprophylactic and chemotherapeutic agents will be tested and evaluated.

8. Collaboration with other agencies

The League of Red Cross Societies continues to give support to the programme contributing, through national societies, in assisting with health education and publicity and vaccination clinics.

The possible use of food subsidies as additional support for field personnel will be evaluated in several countries during 1968 in co-operation with the World Food Program.

IV. ERADICATION METHODOLOGY

1. General considerations

Technical policies and eradication methodology are continually being subjected to critical evaluation in order to develop the programme on a sound basis. These were reviewed by the Scientific Group on Smallpox Eradication which met in October 1967. The basic concepts, previously presented, continue to be valid.

A more definitive elucidation of the requisite basic strategy for smallpox eradication programmes was worked out by the Scientific Group who observed as follows:

> "The objective of the smallpox eradication programme is achieved by reducing the prevalence of smallpox to the point where transmission of the disease is terminated. Normally, as a first step, this requires systematic mass vaccination with potent freeze-dried vaccine to reduce the prevalence of disease. Simultaneously, however, a case detection and reporting system

should be established or improved to permit prompt application of containment measures, thereby interrupting further transmission. Eradication programmes must focus attention on both of these major components, giving perhaps greater weight to the former activity in highly endemic, poorly vaccinated areas and shifting emphasis as endemic disease declines and a more satisfactory state of herd immunity is achieved.

The detection of every case of smallpox which occurs is nearly impossible when the disease incidence in a country is high. As the incidence is reduced, however, the need to detect and trace the sources of infection in cases becomes of paramount importance. This requires an alert and comprehensive reporting network as well as the epidemiological capacity to investigate all suspect cases and the clinical laboratory capacity to confirm or refute the diagnosis. The reporting of 'no cases' must be as dependable a routine as that for reporting the occurrence of cases.

Theoretically, the interruption of smallpox transmission could be accomplished by the simultaneous immunization of the whole community. Since this is not feasible, mass vaccination is unlikely to result in eradication if it is the only method employed. Mass vaccination serves to reduce the volume of variola virus transmission but other techniques must be employed to eliminate the residuum. When the number of cases occurring in an area is reduced to a relatively few in a year, case detection and containment by vaccination of contacts, isolation of patients and disinfection will be effective in eliminating residual foci of infection.

After a large proportion of the population has been convered by mass vaccination, and while surveillance and outbreak-containment teams are seeking out and eliminating the remaining pockets of infection, an effective immune barrier must be maintained. This is accomplished by systematic primary vaccination of newborns and revaccination of those previously protected.

The programme of smallpox eradication can be considered to progress through a series of phases commencing with the institution of the systematic mass vaccination programme and continuing until continental eradication has been achieved. Three general phases can be broadly defined; Attack Phase (Phase I), Consolidation Phase (Phase II), and Maintenance Phase (Phase III). These terms can be applied to regions of a country or to the country as a whole; in most programmes, progression from phase to phase may be expected to occur in some regions earlier than in others. Only when all regions have progressed to a higher phase can the country as a whole be considered to have entered that phase.

Attack Phase (Phase I)

Endemic areas with an incidence of smallpox of five or more cases per 100 000 population per year and with less than 80 per cent. of all segments of the population showing scars of primary vaccination.

Consolidation Phase (Phase II)

Areas with an incidence of smallpox of less than five cases per 100 000 and in which over 80 per cent. of all segments of the population show scars of primary vaccination.

Maintenance Phase (Phase III)

Areas free of endemic smallpox for more than two years but geographically situated in endemic continental areas, presently Africa, Asia and South America.

The nature and intensity of the component activities of the eradication programme will vary from phase to phase. They are summarized in Table 8."

2. Priorities in vaccination programmes

While vaccination programmes are intended to provide protection to all persons in the population, studies and observations made during the past year clearly indicate that certain groups are of much greater importance than others in maintaining the transmission of disease and thus deserve much greater attention to assure that they are vaccinated.

In all areas in which the vaccination status of smallpox cases has been examined, cases among individuals who have never been vaccinated are found to constitute from 70 to 95 per cent. of the total. This suggests that immunity following vaccination is far more durable than is sometimes thought. Further, carefully conducted studies of smallpox transmission in families in India reveals that transmission of disease occurs three times as frequently when the first (index) case has never previously been vaccinated. That the previously vaccinated individual is less capable of transmitting infection is confirmed by various virological studies. These observations emphasize the need in vaccination programmes to assure maximum coverage of the population by at least primary vaccination.

The importance of assuring complete vaccination among children is reflected by the fact that, in most areas, two-thirds or more of all cases occur among those less than 15 years of age. Additionally, as in most infectious diseases and presumably also in smallpox, children serve as much more efficient vectors of infection than do adults. This group therefore commands particular attention.

Two studies were recently conducted in Asian countries to determine patterns of smallpox transmission over wider geographic areas. In the areas studied moderate levels of immunity had been induced by vaccination. It was found that, in the rural areas, smallpox was introduced repeatedly from major towns but that infection persisted for only two to five generations and ceased. In the urban areas, smallpox was constantly present. These findings emphasize the particular need for thorough vaccination in the more densely crowded urban areas where contacts are maximal and transmission most likely.

Recent outbreaks in Brazil, Africa and Kuwait as well as past experiences in European outbreaks, document the hospital to be a most important site of smallpox transmission. In these outbreaks, smallpox cases, inadequately isolated or undiagnosed, mingled with patients admitted with other diseases at a time when their potential for transmission was high. Frequently, many secondary cases occurred; these individuals experienced a higher than usual case-fatality rate; patients who developed infection subsequent to discharge dispersed over a wide geographic area serving to infect many areas and communities.

From these observations, it is clear that all programmes should make special efforts to assure:

1. Maximum coverage of the population with at least primary vaccination - the vaccination scar serves as a most effective and permanent "vaccination certificate" permitting assessment of coverage at any time.

2. Maximum coverage of those less than 15 years of age. Children are usually most accessible for vaccination. Coverage can be facilitated by insisting upon compulsory vaccination of all schoolchildren, a practice common throughout the world and easily enforced. Vaccination of newborns, a procedure shown to be safe and effective, should be performed whenever possible.

3. Thorough vaccination of more densely crowded areas, particularly lower socio-economic sections, where migrants are common, the vaccination status is poor, and contacts frequent.

4. Vaccination of all admissions to infectious disease hospitals. This is now practised in some areas and has been found to be effective and without significant risk to patients suffering from other infectious diseases.

TABLE 1. SMALLPOX CASES* REPORTED BY CONTINENT 1959-1967

	1959	1960	1961	1962	1963	1964	1965	1966	1967**
AFRICA	16 307	16 823	26 060	24 329	16 863	12 306	16 784	14 127	12 046
AMERICA	5 488	8 021	9 065	9 828	7 202	3 621	3 484	3 565	2 389
ASIA	71 309	39 843	53 958	63 570	98 784	43 537	39 202	50 527	58 082
EUROPE	15	47	24	136	129	-	1	71	5
OCEANIA	-	1	-	-	-	-	-	-	-
World total	93 119	64 735	89 107	97 863	122 978	59 664	59 471	68 290	72 522

* Based on Smallpox Eradication unit data, not including mainland China, North Korea and North Viet-Nam.

** Through 7 October.

TABLE 2. SMALLPOX CASES REPORTED BY WHO REGION 1964-1967

	1964	1965	1966	1967*
AFRICA	12 402	16 662	13 847	11 711
West	3 583	6 236	7 559	8 811
East	8 819	10 426	6 288	2 900
THE AMERICAS	3 621	3 484	3 565	2 389
EASTERN MEDITERRANEAN	1 117	1 723	6 424	9 163
SOUTH-EAST ASIA	42 524	37 601	44 378	49 254
EUROPE	-	1	71	5
WESTERN PACIFIC	-	-	5	-
World total	59 664	59 471	68 290	72 522

* Through 7 October.

TABLE 3. AFRICAN REGION (WEST AND CENTRAL)
STATUS OF SMALLPOX ERADICATION ACTIVITIES IN SMALLPOX ENDEMIC AND NEIGHBOURING COUNTRIES

Country	Estimated* population (in millions)	Smallpox cases reported(A)				Eradication(B) activities	
		1964	1965	1966	1967[a]	1967	1968
Cameroon	5.2	72	-	3	29	X	X
Central African Republic	1.4	-	-	-	-	X	X
Chad	2.9	5	73	-	86	X	X
Congo (Republic of)	0.8	198	89	2	-	X	X
Dahomey	2.4	718	168	530	801	X	X
Equatorial Guinea	0.3	-	-	-	-	XX	XX
Gabon	0.5	49	1	-	-	X	X
Gambia	0.3	6	6	3	-	X	X
Ghana	7.8	9	7	13	84	X	X
Guinea	3.6	320	69	56	384	X	X
Ivory Coast	4.0	11	8	-	2	X	X
Liberia	1.0	258	40	32	5	X	X
Mali	4.8	343	659	281	164	X	X
Mauritania	0.9	-	-	-	-	X	X
Niger	3.4	30	463	1 147	1 069	X	X
Nigeria	58.4	1 430	4 566	4 924	4 486	X	X
Portuguese Guinea	0.5	-	-	-	-	XX	XX
Senegal	3.5	2	-	-	-	X	X
Sierra Leone	2.2	90	60	293	1 446	X	X
Togo	1.6	34	13	199	168	X	X
Upper Volta	4.9	8	14	76	87	X	X
Total	110.4	3 583	6 236	7 559	8 811		

* 1966 (estimated).

(A)a Through 7 October.

(B)X Systematic programmes in operation or to be initiated or intensified with bilateral assistance and/or assistance from WHO.

XX Continuation of present programme of vaccination.

TABLE 4. AFRICAN REGION (EAST AND SOUTH)
STATUS OF SMALLPOX ERADICATION ACTIVITIES IN SMALLPOX ENDEMIC AND NEIGHBOURING COUNTRIES

Country	Estimated* population (in millions)	Smallpox cases reported(A)				Eradication(B) activities	
		1964	1965	1966	1967[a]	1967	1968
Angola	5.3	1	-	3	-	XX	XX
Botswana	0.6	175	-	-	1	XX	XX
Burundi	2.9	-	1 213	363	19	XX	X
Congo (Democratic Republic of)	15.8	2 191	3 783	1 913	1 163	X	X
Kenya	9.5	273	276	159	42	XX	XX
Lesotho	0.8	-	-	-	-	XX	XX
Malawi	3.9	720	228	88	23	XX	XX
Mozambique	7.0	243	115	19	76	XX	XX
Rwanda	3.1	-	5	-	-	XX	X
South Africa	18.1	301	72	+	+	XX	XX
Southern Rhodesia	4.3	200	40	33	13	XX	XX
Swaziland	0.3	517	85	29	1	XX	XX
Uganda	7.6	523	1 338	591	343	XX	XX
United Republic of Tanzania	10.6	1 461	2 743	3 027	1 185	X	X
Zambia	3.8	2 214	528	63	34	X	X
Total	93.6	8 819	10 426	6 288	2 900		

* 1966 (estimated).

(A)a Through 7 October.

\+ Complete data not available.

(B)X Systematic programmes in operation or to be initiated or intensified with bilateral assistance and/or assistance from WHO.

XX Continuation of present programme of vaccination.

TABLE 5. REGION OF THE AMERICAS
STATUS OF SMALLPOX ERADICATION ACTIVITIES IN SMALLPOX ENDEMIC AND NEIGHBOURING COUNTRIES

Country	Estimated* population (in millions)	Smallpox cases reported(A)				Eradication(B) activities	
		1964	1965	1966	1967a	1967	1968
Argentina	22.6	13	15	21	8	X	X
Bolivia	4.4	5	-	-	-	X	X
Brazil	82.5	3 076	3 269	3 518	2 376	X	X
Chile	8.8	-	-	-	-	X	X
Colombia	17.9	21	149	8	5	X	X
Ecuador	5.1	42	-	-	-	X	X
French Guiana	0.04	-	-	-	-	XX	XX
Guyana	0.7	-	-	-	-	XX	XX
Paraguay	2.1	7	32	5	-	X	X
Peru	11.7	454	18	13	-	X	X
Surinam	0.3	-	-	-	-	XX	XX
Uruguay	2.8	3	1	-	-	X	X
Venezuela	8.9	-	-	-	-	X	X
Total	167.84	3 621	3 484	3 565	2 389		

* 1966 (estimated).

(A) a Through 7 October.

(B) X Systematic programmes in operation or to be initiated or intensified with bilateral assistance and/or assistance from WHO.

XX Continuation of present programme of vaccination.

TABLE 5. EASTERN MEDITERRANEAN REGION
STATUS OF SMALLPOX ERADICATION ACTIVITIES IN SMALLPOX ENDEMIC AND NEIGHBOURING COUNTRIES

Country	Estimated* population (in millions)	Smallpox cases reported(A)				Eradication(B) activities	
		1964	1965	1966	1967a	1967	1968
Ethiopia	22.8	104	58	228	352	XX	X
French Territory of the Afars and the Issas	0.08	-	-	52	-	XX	XX
Iran	23.7	1	-	-	-	XX	XX
Iraq	7.2	-	-	1	-	XX	XX
Kuwait	0.5	-	-	-	41	XX	XX
Pakistan East	55.3	72	316	3 207	5 219	XX	X
Pakistan West	48.6	935	1 285	2 935	3 555	XX	X
Saudi Arabia	6.6	-	-	-	-	XX	X
Somalia	2.5	-	-	-	-	XX	X
Sudan	13.7	-	64	-	3	X	X
Trucial Oman	0.1	-	-	-	10	XX	XX
Yemen	5.0	5	-	1	3	XX	X
Total	186.08	1 117	1 723	6 424	9 163		

* 1966 (estimated).

(A) a Through 7 October.

(B) X Systematic programmes in operation or to be initiated or intensified with bilateral assistance and/or assistance from WHO.

XX Continuation of present programme of vaccination.

TABLE 7. SOUTH-EAST ASIA REGION
STATUS OF SMALLPOX ERADICATION ACTIVITIES IN SMALLPOX ENDEMIC AND NEIGHBOURING COUNTRIES

Country	Estimated* population (in millions)	Smallpox cases reported(A)				Eradication(B) activities	
		1964	1965	1966	1967a	1967	1968
Afghanistan	15.9	178	71	75	78	X	X
Burma	25.1	112	53	6	-	X	X
Ceylon	11.4	-	1	-	-	XX	XX
India	488.0	40 265	33 402	32 616	45 560	XX	X
Indonesia	106.4	1 870	3 990	11 296	3 472	XX	X
Nepal	10.1	99	84	385	144	X	X
Thailand	31.1	-	-	-	-	XX	XX
Total	688.0	42 524	37 601	44 378	49 254		

* 1966 (estimated)

(A) a Through 7 October

(B) X Systematic programmes in operation or to be initiated or intensified with bilateral assistance and/or assistance from WHO.

XX Continuation of present programme of vaccination.

TABLE 8. WESTERN PACIFIC REGION
STATUS OF SMALLPOX ERADICATION ACTIVITIES
IN COUNTRIES NEIGHBOURING SMALLPOX ENDEMIC AREAS

Country	Estimated* population (in millions)	Smallpox cases reported(A)				Eradication(B) activities	
		1964	1965	1966	1967[a]	1967	1968
Cambodia	6.3	-	-	-	-	XX	XX
Laos	2.6	-	-	-	-	XX	X
Malaysia	8.3	-	-	5	-	XX	XX
Philippines	33.4	-	-	-	-	XX	XX
Total	50.6	-	-	5	-		

* 1966 (estimated)

(A)a Through 7 October

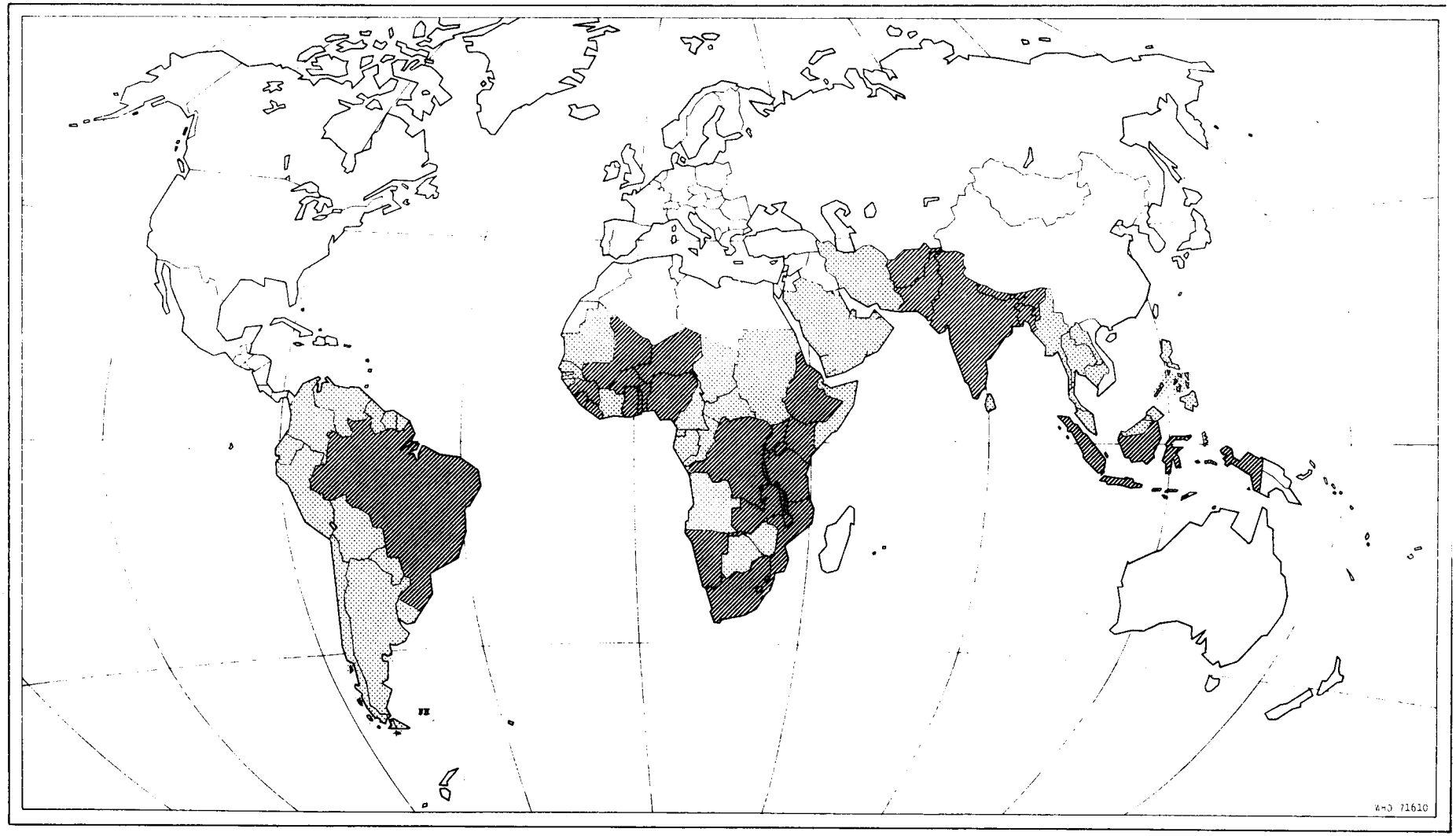
(B)X Systematic programmes in operation or to be initiated or intensified with bilateral assistance and/or assistance from WHO.

XX Continuation of present programme of vaccination.

TABLE 9. PHASES IN THE ERADICATION PROGRAMME

	Attack Phase (Phase 1)	Consolidation Phase (Phase 2)	Maintenance Phase (Phase 3)
Vaccination	Systematic mass vaccination	Continuing maintenance vaccination	Continuing maintenance vaccination
Surveillance	Reporting Establish prompt and regular reporting of smallpox by all existing health facilities. Field Investigation Epidemiological investigation of major outbreaks throughout the country and of all cases in areas where systematic mass vaccination has been done.	Reporting Extension of case detection system to assure that all suspected smallpox cases are reported. Field Investigation Prompt epidemiological investigation of all cases to establish sources of infection and to exclude the possibility of unreported cases.	Reporting Continuation of case detection system to assure that all suspected cases are reported. Field Investigation Each case investigated as an emergency by an epidemiologist.
Laboratory	Establish techniques and methods for the submission and examination of specimens for confirmation of diagnosis	Specimens studied from all isolated cases and representative samples from each outbreak.	Specimens studied from every suspect case.
Containment	Localized, intensive vaccination in communities where cases or outbreaks occur. Isolation of cases if feasible and disinfection.	Vaccination and observation of case contacts. Isolation of cases and appropriate disinfection. Localized, intensive vaccination in community.	Vaccination and observation of case contacts. Isolation of cases and appropriate disinfection. Localized, intensive vaccination in community.

SMALLPOX ENDEMIC COUNTRIES AND COUNTRIES AT SPECIAL RISK



Countries which are definitely or probably experiencing endemic smallpox

Countries at special risk of smallpox introduction