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PART I

RESOLUTIONS AND DECISIONS

ANNEXES

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Annex 16

SMALLPOX ERADICATION PROGRAMME [1]

[A16/P&B/9—18 April 1963]

REPORT BY THE DIRECTOR-GENERAL

CONTENTS

PART I

1. Introduction

This report has been prepared in two parts. In the first part an attempt is made to study the world incidence of smallpox in relation to the endemic areas, as suggested by some members of the Executive Board during the discussion on the smallpox eradication programme at the Board's thirty-first session. The second part gives a summary of the present progress in the programme, as reported by Member States.

The number of reported cases of smallpox in 1962 was 73 913, which is less than the number reported for 1961 (78 325) and 1959 (77 555), but more than for 1960 (59 221) (see Table 1). The eradication programme, therefore, has not yet substantially reduced the incidence of the disease and in the countries of Africa and Asia where it is endemic the rates have declined only slightly.

The persistence of endemic foci in Africa, Asia and, although on a smaller scale, in South America, continues to be an important health problem to countries in which smallpox is present, and a menace to their neighbours and to all those countries throughout the world that are now free from the disease.

In endemic areas, and particularly those that are densely populated, epidemics are known to occur at regular intervals—usually in cycles of between five and seven years—owing to large accumulation of susceptibles. The epidemics of 1951 (489 922 cases) and of 1957-1958 (154 446 and 245 978 cases respectively) are a warning of what may be expected in 1963 and 1964 if eradication campaigns or vaccination control measures are not intensified by immediate effort at both national and international levels.

Effective eradication schemes are based on two fundamental elements, the ability of a public health service to organize—technically and administratively—a mass vaccination programme to cover at least 80 per cent. of a country's population, and the availability of a vaccine which is fully potent at the time of inoculation. A few countries with relatively well-organized health services have been unable to eliminate endemic foci of smallpox after years of apparently intensive vaccination and revaccination, but when all the factors involved in national control measures are considered—vaccination coverage of the various age-groups; potency of the vaccine used (particularly of that used in remote rural areas); vaccination technique; observation and recording of vaccination results—it has been found that one or more of these measures has been incorrectly applied, and that that can account for the failure. In endemic areas not enough emphasis has ever been placed on the importance of evaluating vaccination campaigns and on the efficient recording of vaccination and revaccination results.

A number of problems relating to the epidemiology and virology of smallpox still require elucidation. The Organization (as will be seen later in this report) is closely associated with smallpox research efforts

[1] See resolution WHA16.37.

being undertaken in many places, since the findings have a direct effect on methods of eradication. It is proposed to convene an expert committee on smallpox in 1964 to advise on the problems related to the epidemiology and prevention of smallpox, and also to review the studies which have been carried out.

Since the adoption by the Eleventh World Health Assembly of resolution WHA11.54 on smallpox eradication, the Organization has continued to assist with national eradication campaigns by giving advice on planning and organization and by recommending the use of a thermo-stable freeze-dried vaccine and in some cases supplying it.

The Fifteenth World Health Assembly, in its resolution WHA15.53, recognized that countries in endemic areas are meeting difficulties in organizing country-wide campaigns. The resolution called for further national efforts and additional international assistance to the global eradication programme. The Director-General in his circular letter C.L.32 1962, dated 31 July 1962, invited the attention of Member States to the resolution and called for voluntary contributions in cash or in kind towards the provision of freeze-dried vaccine, transport vehicles, and laboratory and cold-storage equipment for distribution by the Organization to countries which have set up sound eradication programmes and which have requested assistance.

This appeal has so far brought only three offers of additional vaccine supply: Switzerland donated freeze-dried vaccine to the value of Sw. fr. 100 000 (approximately 2 000 000 doses) and two other Member States have offered to donate freeze-dried vaccine—Chile, 500 000 doses; and Italy, 100 000 doses.

In another resolution (WHA15.54) the Fifteenth World Health Assembly expressed the hope that UNICEF would find it possible to give full support to the programme: this appeal has been favourably received.

Fourteen countries in the endemic areas were at the time of reporting conducting eradication programmes or completing their programmes by eliminating residual foci. Others, though wishing to do so, are still encountering difficulties due to insufficient health personnel and to the inadequacy of transport and refrigeration equipment, which has to be purchased from abroad with hard currency.

Lack of money is not the only reason for the slow progress. In some countries the administration finds that the smallpox problem cannot be tackled effectively with the existing inadequate health services.

The Organization, recognizing the dangers of infection spreading across frontiers, has encouraged the co-ordination of eradication programmes in neighbouring countries in areas where smallpox is endemic and the free exchange of information between them so that their efforts can be synchronized. As a result, a large area of West Africa, comprising Ghana, Guinea, Ivory Coast, Liberia, Mali and Upper Volta, is implementing a co-ordinated plan of eradication.

2. World Incidence of Smallpox

Table I shows the world incidence of smallpox in the years 1958 to 1962.[1]

TABLE I. CASES OF SMALLPOX, 1958-1962 [2]

Continent	1958	1959	1960	1961	1962
Africa . . .	14 403	14 155	15 854	24 159	24 119
America . .	4 334	4 899	4 091	1 923	3 029
Asia	227 229	58 487	39 228	52 218	46 629
Europe . .	12	14	47	25	136
Oceania . .	—	—	1	—	—
TOTAL	245 978	77 555	59 221	78 325	73 913

In 1962 the incidence in Africa was 0.7 per cent. and in Asia 11 per cent. lower than in 1961; in America, Brazil had a large number of cases (2759) in 1962.

The countries and territories from which cases were reported in 1960, 1961 and 1962 are listed in Table II.

TABLE II. COUNTRIES AND TERRITORIES REPORTING CASES OF SMALLPOX IN 1960, 1961 AND 1962 [2]

Country or territory	Cases		
	1960	1961	1962
Africa			
Algeria	7	8	1
Angola	—	—	23
Basutoland	—	85	52
Bechuanaland	21	16	4
Cameroon	—	1 345	792
Central African Republic . .	1	—	57
Chad	4	273	749
Congo (Brazzaville)	—	22	1 313
Congo (Leopoldville)	605	2 251	3 785
Dahomey	768	119	90
Ethiopia	293	761	360
Federation of Rhodesia and Nyasaland	—	—	994
Nyasaland	795	1 465	—
Northern Rhodesia	350	233	—
Southern Rhodesia . . .	12	3	—

[1] In Table I as well as in Tables II, III, IV and VI, countries and territories are grouped by continents and not by WHO Regions.

[2] Based on data available at time of reporting.

Country or territory	Cases		
	1960	1961	1962
Africa *(continued)*			
Gabon	—	—	1
Gambia	7	12	4
Ghana	139	70	135
Guinea	176	96	2 948
Ivory Coast	1 634	4 656	1 900
Kenya	151	289	96
Liberia	—	1 119	323
Mali	1 212	1 706	1 427
Mauritania	44	12	40
Mozambique	81	51	67
Niger	2 408	1 740	1 038
Nigeria	4 140	3 538	3 863
Portuguese Guinea	1	7	2
Ruanda Urundi	22		
Burundi		7	26
Rwanda		10	30
Senegal	6	201	231
Sierra Leone	12	6	78
South Africa	65	7	112
Spanish Equatorial Africa	1	—	—
Sudan	135	104	70
Tanganyika	1 584	908	973
Togo	347	281	572
Uganda	707	398	628
Upper Volta	126	2 360	1 335
TOTAL	15 854	24 159	24 119
America			
Argentina	65	4	2
Bolivia	1	—	—
Brazil:			
Rio de Janeiro	650	1 411	1 254
Other	—	—	1 505
Canada	—	—	1
Colombia	171	16	41
Ecuador	3 185	491	205
Uruguay	19	1	10
Venezuela	—	—	11
TOTAL	4 091	1 923	3 029
Asia			
Aden:			
Colony	8	1	—
Protectorate	5	—	—
Afghanistan	111	174	303
Burma	392	88	21
Cambodia	—	1	—
Ceylon	—	34	12
India	31 052	45 195	42 231
Indonesia	5 196	3 777	586
Iran	378	168	28
Korea, Republic of	2	1	—
Malaya, Federation of	15	—	—
Muscat and Oman	—	—	8
Nepal	—	5	—

Country or territory	Cases		
	1960	1961	1962
Asia *(continued)*			
Pakistan:			
East	1 086	420	461
West	780	1 396	1 806
Karachi	139	925	1 153
Saudi Arabia	32	—	1
Thailand	32	33	2
Trucial Oman	—	—	17
TOTAL	39 228	52 218	46 629
Europe			
Belgium	—	1	—
Germany, Federal Republic	—	5	36
Poland	—	—	32
Spain	—	17	—
Switzerland	—	—	1
Union of Soviet Socialist Republics:			
Moscow	46	—	—
Tadzhik SSR	—	1	—
United Kingdom of Great Britain and Northern Ireland:			
England and Wales	1	1	67
TOTAL	47	25	136
Oceania			
Niue	1	—	—

3. Study of Reported Incidence in relation to Endemicity

The information in Table III shows that eighteen countries or territories reported more than 500 cases in 1962 (see page 198).

The rates per 100 000 total population indicate that smallpox is as highly endemic in Africa as in Asia with its much more densely populated endemic areas. In 1962, fourteen countries in Africa reported over 500 cases each. Eight of these showed an incidence rate of 30 or more per 100 000 population. In Asia, however, the highest incidence rate per 100 000 population was in India, which showed 10.

While the incidence rate is approximately 7 per 100 000 population for all the endemic countries in Asia, it is 15 per 100 000 for those in Africa.

Table IV, which shows the number of weeks in which smallpox was reported, indicates that it was present during forty or more weeks in the year in 15 countries in 1960, and in 18 countries in 1961 and 1962. In Africa such reports were received from 11 countries in 1960, and from 14 in 1961 and 1962.

There seems, therefore, to be a clear indication of the persistence of infection in the endemic areas, from which the weekly reports of smallpox incidence have been constant in 1961 and 1962.

It is of interest that while in some countries smallpox cases are reported during a few weeks of the year only, in most countries cases occur almost all the year round.

Though the degree of endemicity of smallpox in a given country cannot be measured by the frequency of the weekly reports of smallpox incidence, the information in Table IV clearly indicates—allowing for unreliable and irregular reporting systems in some countries—the areas of highest endemicity and the constant exposure that neighbouring countries suffer from their contiguity to infected areas.

TABLE III. COUNTRIES AND TERRITORIES REPORTING OVER 500 CASES OF SMALLPOX IN 1962

Country or territory	Approximate rate per 100 000 population
Africa	
Cameroon	20
Chad	35
Congo (Brazzaville)	144
Congo (Leopoldville)	29
Federation of Rhodesia and Nyasaland	12
Guinea	100
Ivory Coast	58
Mali	38
Niger	34
Nigeria	11
Tanganyika	10
Togo	38
Uganda	10
Upper Volta	30
America	
Brazil	4
Asia	
India	10
Indonesia	1
Pakistan	4

TABLE IV. NUMBER OF WEEKS IN WHICH CASES OF SMALLPOX WERE REPORTED, 1960, 1961 AND 1962

Country or territory	Weeks		
	1960	1961	1962
Africa			
Algeria	6	7	1
Basutoland	—	19	15
Bechuanaland	7	9	2
Cameroon	—	48	45
Central African Republic	1	—	7
Chad	4	26	44
Congo (Brazzaville)	—	7	39
Congo (Leopoldville)	47	48	26
Dahomey	39	26	33
Ethiopia	51	45	47
Federation of Rhodesia and Nyasaland:			
Nyasaland	52	52	52
Northern Rhodesia	24	34	38
Southern Rhodesia	8	2	10
Gambia	2	8	4
Ghana	27	28	27
Guinea	10	18	36
Ivory Coast	51	52	51
Kenya	41	47	48
Liberia	—	52	48
Mali	41	50	45
Mauritania	26	7	9
Mozambique	8	18	25
Niger	51	50	47
Nigeria:			
Eastern Region	20	9	32
Northern Region	52	51	52
Western Region	40	30	42
Portuguese Guinea	2	4	8
Ruanda Urundi:			
Burundi	8	4	7
Rwanda	6	4	12
Senegal	4	28	13
Sierra Leone	7	4	22
Somalia (Northern Region)	1	—	—
South Africa	12	4	11
Spanish Guinea	1	—	—
Sudan	23	17	14
Tanganyika	52	52	51
Togo	42	44	51
Uganda	51	50	49
Upper Volta	24	47	50
Asia			
Aden Protectorate	3	—	—
Afghanistan	44	51	52
Burma	30	18	7
Cambodia	—	1	—
Ceylon	—	12	4
India	52	52	52
Indonesia	52	52	52
Iran	26	9	8
Korea, Republic of	2	1	—
Malaya, Federation of	4	—	—
Nepal	—	2	—
Pakistan:			
East Pakistan	52	41	49
West Pakistan	52	48	52
Saudi Arabia	14	5	1
Thailand	1	3	3

4. Epidemiological and other Studies in Progress

Epidemiological Investigations

An understanding of the epidemiology of smallpox is the basis for the sound planning of eradication campaigns. It might be thought that all the necessary information would be available in the literature which extends over a century, but unfortunately on many of the points of particular importance to eradication campaigns information is either entirely absent or incomplete. It is necessary to know more of the behaviour of the disease in densely populated areas as compared with that in the sparsely populated areas; in different age-groups; in persons in whom immunity has partly waned because of long intervals between revaccination or because of the use of vaccines which, though adequate for primary vaccination, are not sufficiently potent for revaccination. It is also necessary to know if partially immune persons constitute a reservoir of infection in the over-crowded parts of the larger cities. If they do, would elimination of the reservoir by adequate vaccination result in a substantial decrease in the general incidence of the disease?

Since definite answers to such questions are not available, inquiries are being made to find suitable areas for pilot studies and investigators to carry them out. If such studies fulfil their promise they will be extended.

Studies are also being made on methods of measuring the level of protection of populations against smallpox. Vaccination and revaccination with a standard vaccine of high potency are being carried out on random samples of population to determine the percentage of susceptibles, by age and by the interval since the last vaccination. This will give information on the optimum intervals for the revaccination of persons of different ages.

Laboratory studies are being developed on the levels of antibodies, in the blood of vaccinated persons, that afford protection against challenge with highly potent vaccines. It is assumed that resistance to challenge by vaccination runs parallel to resistance to natural infection, and knowledge of the serum protection level would permit serological surveys to be carried out to determine the susceptibility of populations to smallpox.

A Better Vaccine

One of the great difficulties in vaccination campaigns, especially those in tropical areas, has always been the rapid deterioration of glycerinated lymph vaccine. Attempts to surmount the difficulty have largely resolved themselves into the production of dried vaccines, but laboratory experiments and field experience have shown that desiccation alone does not make smallpox vaccine stable and heat-resistant. Several campaigns carried out with dried vaccines have failed because the vaccine deteriorated under field conditions. Because of this, WHO organized studies of methods to ensure the regular production of a suitable heat-resistant dried vaccine. Laboratory tests of vaccines produced by different methods in different laboratories were carried out in a comparative study in which laboratories from several countries participated. These tests showed that vaccine production based on desiccation from the frozen state (lyophilization) gave 100 per cent. successful primary vaccination rates after periods of storage of up to 64 weeks at 37° C and 45° C, while other vaccines were less satisfactory. Information about this method of production and about subsequent technical improvements have been distributed to competent production laboratories and assistance has been given to some of them to produce the vaccine.

The importance of producing stable and highly potent vaccines cannot be over-emphasized. It has been established that a certain concentration of virus is necessary in order to obtain a high percentage of " takes ". Based on studies carried out under the sponsorship of WHO on persons previously vaccinated,[1] the Study Group on Requirements for Smallpox Vaccine [2] established potency tests to ensure effectiveness in the field. More recent studies [3] have shown that only vaccines of the highest potency will give satisfactory revaccination " take " rates. With a standard vaccine the percentage of " takes " increases with the lapse of time from the previous vaccination. For example, after two years we may expect a revaccination " take " rate of 33 per cent. After five years the " take " rate will increase to about 70 per cent.

These findings are of obvious importance in relation to eradication campaigns. A vaccine producing a high percentage of " takes " in primary vaccinations but failing partially or completely in revaccinations not only dooms a campaign to failure, but also gives a dangerous false sense of security. Unfortunately practical examples of occurrences of this kind come to the attention of the Organization not infrequently.

Methods of Administration of the Vaccine

The successful utilization of jet injectors for the rapid vaccination of large numbers of persons has been reported.[4] Comparative trials on the percentage

[1] Cockburn, W. C. et al. (1957) *Bull. Wld Hlth Org.* **16**, 63.

[2] *Wld Hlth Org. techn. Rep. Ser.* 1959, **180**, 19.

[3] Hobday, T. L. et al. (1961) *Bull. Wld Hlth Org.* **25**, 69; Mastyukova, Y. N. et al. (1961) *Prob. Virol.* **6**, 207; Espmark, Espmark & Rabo cited by Dostal, V. (1962) *Prog. med. Virol.* **4**, 259.

[4] Elisberg, B. L. et al. (1956) *J. Immunol.* **77**, 340; Barclay, E. N. et al. (1962) *Bull. Acad. Med. Cleveland.*

of " takes " obtained by using jet injectors and by inoculation by the multiple-pressure method are in progress in Liberia. In preliminary trials it has been observed that some persons inoculated with jet injectors respond with induration without vesiculation, and the immunological significance of this response is also being studied.

Passive Protection

The vaccination of contacts is not always successful as a protective measure against smallpox. The chance of failure increases as the interval between exposure and vaccination lengthens. Studies have been carried out, with the support of WHO, on the use of vaccinal hyperimmune gamma-globulin in the prophylaxis of smallpox in contacts.[1] These studies showed the efficacy of gamma-globulin as a preventive agent. Because of the limited supply of this substance, its prophylactic use has to be restricted to those at highest risk. If an animal gamma-globulin could be used for this purpose, larger quantities could be made available. It has been reported that gamma-globulin from hyperimmune animals gives highly effective results in the prevention of experimental vaccinal infection.[2] WHO is supporting studies on the production and testing of animal hyperimmune gamma-globulin with a view to its possible use in prevention and treatment.

Studies on the Infectiousness of Smallpox in the Early Stages of the Disease and on the Dissemination of the Virus by Air

Epidemiological observations suggest that smallpox is not highly infectious in the pre-eruptive period of illness. The clarification of this point is of great practical importance for determining the period during which a patient might be infectious and for purposes of isolation of contacts. Studies on this problem were carried out in Madras with the support of WHO.[3] No virus could be recovered from mouth-washings and garglings from patients in the first two days of the disease. It was, however, frequently found in specimens collected from the sixth and the ninth day of illness. This is further proof that most smallpox patients are not infective in the first days of fever, before the rash appears.

The question of the aerial spread of smallpox has aroused great controversy for many years. It was therefore thought of interest to obtain information on the amount of virus disseminated in the air of a smallpox ward and in the immediate surroundings of smallpox patients at various stages of the disease.[4] Contrary to what was suspected, viruses were very difficult to recover, even when large volumes of air were collected in the proximity of acutely ill patients. In order to explore this matter further, new studies are being carried out, using more sensitive air-sampling methods.

Prevention of Complications

Smallpox vaccination is still unfortunately marred by the rare but serious complications of post-vaccinal encephalitis. Cases of post-vaccinal encephalitis are regularly reported from some countries, but never from others. The reasons for this are not clear. No modification introduced in the manufacture or administration of the vaccine has yet been shown to be effective in preventing the occurrence of post-vaccinal encephalitis. Recently the successful prophylactic effect of anti-vaccinal gamma-globulin administered at the same time as the vaccination was reported.[5] Efforts, so far without great success, are also being made to develop inactivated vaccines. If an effective inactivated vaccine were available its use might permit later vaccination with a live vaccine, and thus provide a satisfactory immunity without the risk of post-vaccinal complications. In addition, it might be possible to combine such a vaccine with other antigens, diminishing in this way the number of inoculations, already quite large, that each child has to receive during the first period of his life.

5. Vaccine: Contributions to WHO

As reported to the Fifteenth World Health Assembly,[6] the Organization continues to supply Member States, on request, with freeze-dried vaccine for use in their eradication programmes. The vaccine is drawn from the amounts donated by a number of Member States.

One obstacle has been largely surmounted in the smallpox eradication programme, namely the development of a potent and thermostable vaccine to meet the requirements of national mass vaccination campaigns. The main problem now is to ensure that vaccines used in mass campaigns are of adequate potency at the time when they are administered in the field, particularly in remote rural areas, where storage and transport facilities are deficient.

Before accepting any donated vaccine, the Organization—as previously reported to the Fifteenth World Health Assembly [6] — carries out tests on a sample of the

[1] Kempe, C. H. et al. (1961) *Bull. Wld Hlth Org.* **25**, 41.

[2] Marennikova, S. S. (1962) *Bull. Wld Hlth Org.* **27**, 325.

[3] Downie, A. W. et al. (1961) *Bull. Wld Hlth Org.* **25**, 49.

[4] Meiklejohn, G. et al. (1961) *Bull. Wld Hlth Org.* **25**, 63.

[5] Nanning, W. (1962) *Bull. Wld Hlth Org.* **27**, 317.

[6] Mimeographed document A15/P&B/18 and A15/P&B/18 (Corrs 1 & 2) May 1962.

vaccine from the lot offered for donation to the Organization. This procedure is in accordance with the decision of the Executive Board (resolution EB22.R12) that all vaccines donated to the Organization for use in the eradication programme should be of an acceptable quality. The tests conform with those laid down in the WHO Study Group on Requirements for Smallpox Vaccine [1] and are made in one of two reference laboratories of world repute. The results are communicated to the donating Member State, and vaccines which pass the test are accepted.

Hitherto, these tests have been made only on the first one or two batches of vaccine donated. Experience has shown, however, that potency variations can occur between batches as produced. In addition, vaccines of high potency, when dispatched from the production laboratory, may, for one or more of a number of reasons, lose part of their potency. To some extent this is guarded against by the recommendation of the Organization that before a fresh batch of vaccine is distributed to the field it should be tested by an experienced vaccinator for the primary vaccination of 50 to 100 children. If in these circumstances the " take " rate is under 90 to 95 per cent. it would be unwise to distribute the batch before its potency is checked in the laboratory. This test, however, does not show when the potency of the vaccine is not sufficient for it to be used for revaccination. The importance of this problem of potency of lymph for revaccination has become more apparent recently. The Organization proposes that in future a sample of each batch donated should be examined as it leaves the production laboratory and, if doubts arise, it should be re-examined after distribution in the field, since it is essential for the success of eradication that vaccines be used only when their potency is at its highest.

Table V shows the position, at the time of reporting, of the donations of vaccine to WHO. It will be noted that, in fact, there will be a shortfall of approximately 1 million doses in the 1963 requirements unless further substantial donations are received by the Organization in the near future.

[1] *Requirements for biological substances, 5: Requirements for smallpox vaccine (Wld Hlth Org. techn. Rep. Ser.* 1959, **180**).

TABLE V. DONATIONS OF VACCINE TO THE SMALLPOX ERADICATION PROGRAMME

Donor and quantity donated	Receiving project or country	Delivered	Called forward—not yet delivered	Estimated requirements for 1963	Doses remaining
Union of Soviet Socialist Republics 25 000 000 doses (packed in 20-dose vials)	Afghanistan (SEARO 30)	1 000 000			
	Yemen 8	30 000			
	Yemen 16	750 000	500 000	750 000	
	Pakistan 41	5 000 000			
	Sudan 28	4 500 000	1 500 000	1 500 000	
	Ivory Coast 14	100 000		320 000	
	Mali 7	500 000	1 000 000		
	Burundi 1	400 000			
	Nepal (SEARO 30)	100 000			
	Saudi Arabia			1 500 000	
	Togo 1		150 000	200 000	
	Ghana			1 500 000	
	Upper Volta			2 000 000	
	Dahomey			1 000 000	
	Guinea			300 000	
	Seychelles			35 000	
	Burma		900 000	900 000	
		12 380 000	4 050 000	10 005 000	(1 435 000)
Jordan 3 000 000 doses (liquid vaccine)	Lebanon (EMRO 16)	2 350 000			
	Yemen	5 000			
	Sudan	100 000			
	Cyprus	200 000			
		2 655 000			345 000
Netherlands 2 000 000 doses (packed in 100-dose vials)	India (SEARO 30)	1 000 000			
	Nepal 9	100 000			
	Ivory Coast 14	530 000			
	Somalia 14	370 000			
		2 000 000			Nil
Red Cross in German Democratic Republic 1 000 000 doses (100-dose vials)	Ivory Coast 14	400 800	599 200		Nil
Mexico 3 000 000 doses (liquid vaccine)	Total gift transferred to the Regional Office for the Americas for disposal.				

PART II

A. PROGRESS TOWARDS SMALLPOX ERADICATION

Table VI shows the status at the time of reporting of countries participating in the global smallpox eradication programme. In all of them, smallpox was endemic in 1958 (when the Eleventh World Health Assembly decided to initiate a world-wide programme of smallpox eradication).

It will be noted that since 1958 five countries—Bolivia and Paraguay in America, and Ceylon (except for small outbreaks as a consequence of imported cases), Iraq and Lebanon in Asia — are now free from smallpox after having completed eradication programmes. Four countries—Liberia in Africa, Colombia in America, and Cambodia and Iran in Asia—have completed eradication campaigns but still report some residual foci. Ten countries (three in Africa, two in America and five in Asia) are at present developing eradication programmes. Twenty-two countries (eighteen in Africa, one in America and three in Asia) have eradication programmes planned and ready. Eight countries (seven in Africa and one in Asia) have as yet not set up plans for eradication.

TABLE VI. STATUS OF SMALLPOX ERADICATION PROGRAMMES IN ENDEMIC COUNTRIES
(April 1963)

1. COUNTRIES WHICH HAVE NOT YET REPORTED PLANS FOR SMALLPOX ERADICATION

Africa		Asia
Angola	Mozambique	Indonesia
Bechuanaland	Portuguese Guinea	
Ethiopia	Togo	
Kenya		

2. COUNTRIES WHICH HAVE A SMALLPOX ERADICATION PROGRAMME READY

Africa		America	Asia
Cameroon	Guinea	Brazil	Afghanistan
Central African Republic	Mauritania		Burma
Chad	Niger		Pakistan (West)
Congo (Brazzaville)	Nigeria		
Congo (Leopoldville)	Senegal		
Dahomey	Sierra Leone		
Federation of Rhodesia and Nyasaland	Tanganyika		
Gambia	Uganda		
Ghana	Upper Volta		

3. COUNTRIES WHERE SMALLPOX ERADICATION PROGRAMMES ARE IN PROGRESS

Africa	America	Asia
Ivory Coast	Argentina	India
Mali	Ecuador	Nepal
Sudan		Pakistan (East)
		Saudi Arabia
		Yemen

4. COUNTRIES WHICH HAVE COMPLETED SMALLPOX ERADICATION CAMPAIGNS BUT WHERE RESIDUAL ISOLATED FOCI ARE STILL REPORTED

Africa	America	Asia
Liberia	Colombia	Cambodia
		Iran

5. COUNTRIES WHICH HAVE SUCCESSFULLY COMPLETED SMALLPOX ERADICATION AND HAVE NOT REPORTED CASES THREE YEARS AFTER THE CAMPAIGN

America		Asia
Bolivia	Ceylon	Lebanon
Paraguay	Iraq	

B. PROGRESS IN THE SMALLPOX ERADICATION PROGRAMME IN THE WHO REGIONS, WITH SOME ESTIMATES OF FINANCIAL NEEDS

African Region

In the African Region where smallpox is endemic in many areas some appreciable progress in national eradication activities is noted in some countries and territories, and vaccination control measures have been intensified in a number of others.

Angola

Population 4 832 677 (1960 census); no case was reported in 1960 or 1961, 23 cases in 1962. A systematic vaccination programme is carried out annually.

Basutoland

Population 697 000 (1961 estimate); 85 cases were

reported in 1961, 52 cases in 1962. Over 80 per cent. of the population is stated to have been successfully vaccinated during the year and efforts are being made to improve the standard of vaccination.

Burundi and Rwanda

Population 4 929 000 (Burundi 2 234 000, Rwanda 2 695 000—1960 estimate); 22 cases were reported in 1960, 7 in Burundi and 10 in Rwanda in 1961, and 26 in Burundi and 30 in Rwanda in 1962. In 1961 and the beginning of 1962 a mass vaccination campaign was carried out in Rwanda.

Cameroon

Population 4 097 000 (1960 estimate); 1345 cases were reported in 1961 (epidemic in North Cameroon), 792 cases in 1962. A vaccination campaign has been planned to cover about 1.5 million inhabitants each year over three consecutive years. The total expenditure necessary for the implementation of a smallpox eradication campaign is estimated at US $163 000. If this were combined with other health activities in the field, the cost would be about US $57 000.

Central African Republic

Population 1 227 000 (1961 estimate); one case was reported in 1960, none in 1961 and 57 cases in 1962. Smallpox vaccination is being carried out by the " Service de Lutte contre les Grandes Endémies " and will cover the total population in three years. The Government has requested assistance in obtaining 1 200 000 doses of vaccine, supplies and equipment, the total cost of which would be approximately US $10 000.

Chad

Population 2 680 000 (1961 estimate); 4 cases were reported in 1960, 273 in 1961 and 749 in 1962. The Government's cost estimate for an eradication programme is US $163 265. In addition, one medical officer, 30 dressers and 60 auxiliaries, 15 vehicles, equipment and supplies, and three million doses of dried vaccine are needed.

Congo (Brazzaville)

Population 900 000 (1960 estimate); 22 cases were reported in 1961, and 1313 in 1962. Smallpox vaccination campaigns are carried out regularly each year by the " Service des Grandes Endémies ". In Brazzaville and Pointe-Noire, the Pasteur Institute and the general health service help in the development of the annual vaccination programme. In 1962 the epidemic which broke out in Brazzaville was brought under control as the Government had vaccine available. For 1963, the Government requested assistance in the provision of 150 000 doses of vaccine it would need for its campaign.

Congo (Leopoldville)

Population 14 450 000 (1961 estimate); 605 cases were reported in 1960, 2251 in 1961, and 3785 in 1962. An epidemic occurred in the early months of 1962 in Leopoldville and was brought under control through a mass vaccination campaign. Sporadic cases of smallpox and local outbreaks of varying severity are frequently reported from provincial areas. A WHO medical officer from headquarters was sent to Leopoldville in February 1962 to advise on the mass vaccination campaign which was implemented in the city and, in November 1962, he paid a second visit to advise on future activities in the control of smallpox and its ultimate eradication from the entire territory. A plan for a pilot eradication scheme in one province was prepared and presented to the Government. The Organization will provide the vaccine needed for mass eradication campaigns. Transport, equipment and supplies will also be needed for the pilot scheme and the mass vaccination campaign which follows.

Dahomey

Population 2 050 000 (1961 estimate); 768 cases were reported in 1960, 119 in 1961, and 90 in 1962. No formal smallpox eradication programme has as yet been planned. At the twelfth session of the Regional Committee in 1962, the delegate of Dahomey expressed the Government's desire to participate in the regional eradication effort and accordingly an eradication campaign will soon be planned with WHO's assistance. Assistance needed would mainly consist of supplies of vaccines—two million doses—and equipment and other supplies.

Federation of Rhodesia and Nyasaland

Population 8 630 000 (1961 estimate); 1157 cases were reported in 1960, 1701 in 1961, and 994 in 1962. The Government considers that, at present, it can cope with its programme, including the purchase of vaccine lymph. The Government would welcome a visit from a WHO consultant to observe work done in the field of smallpox eradication in countries in south-central Africa.

Gambia

Population 284 000 (1960 estimate); 7 cases were reported in 1960, 12 in 1961, and four in 1962. It is planned that a smallpox eradication programme in Gambia would last for three years. The principal needs in this connexion would be a suitable vehicle and a supply of vaccine. The annual cost, estimated by

the Government, would be US $4200, and the total cost of a three-year programme US $12 600.

Ghana

Population 6 943 000 (1961 estimate); 139 cases were reported in 1960, 70 in 1961, and 135 in 1962. In view of the fact that the incidence of smallpox in Ghana is low compared with that in some of the neighbouring countries, the Government has decided to intensify its existing smallpox control measures rather than initiate a country-wide mass vaccination campaign. This new programme will be supported by legislative and administrative measures to enforce vaccination and to give the vaccinators the necessary authority for the effective vaccination of the population, since co-operation from the public may not always be forthcoming. The population of the rural areas will be vaccinated by the medical field units, whose sphere of activity has been enlarged in recent years. They will also be responsible for vaccination at frontier posts on the main highways near the borders. Hospitals, maternal and child health clinics, health centres and dispensaries will all take part in the intensified vaccination programme which, it is hoped, will cover infants, their mothers and the general public. The school population will be vaccinated by school-teachers (600) who have already been trained in vaccination techniques. These volunteers, it is hoped, will maintain an adequate group immunity among school-age children.

Other groups, such as the army, police, factory and other specialized groups of workers, university students, and the large number of people usually encountered at lorry parks, markets, etc., will be vaccinated through this strengthened vaccination programme.

The estimated cost to the Government during the period of this intensified smallpox campaign will be approximately US $548 800 per year. Ghana has requested assistance in the supply of six million doses of freeze-dried vaccine for the four-year period of the intensified programme, and transport and refrigerators would also be needed.

Guinea

Population 3 000 000 (1960 estimate); 176 cases were reported in 1960, 96 cases in 1961, and 2948 in 1962. Wishing to participate in the regional smallpox eradication effort, the Government is preparing a vaccination programme to cover the whole population of the country. A WHO medical officer from headquarters recently visited Guinea and advised on the planning of an eradication campaign. The Government would need assistance in obtaining the necessary quantities of freeze-dried vaccine for the campaign and also transport vehicles for remote rural areas.

The Government has requested WHO's and UNICEF's assistance to develop a freeze-dried vaccine production centre at the Pasteur Institute at Kindia. Once this centre is established it could produce about 20 million doses of freeze-dried vaccine to meet the needs of neighbouring countries, in addition to those for smallpox control measures in Guinea.

Ivory Coast

Population 3 300 000 (1961 estimate); 1634 cases were reported in 1960, 4656 in 1961, and 1900 in 1962. A national smallpox eradication campaign was started in July 1961 and is still in progress. Up to 31 December 1962, a total of 3 109 943 vaccinations had been performed. The campaign, which started along the northern, eastern and western boundaries of the country, is now moving towards the southern areas. It is scheduled to be completed by the end of 1963, when it is expected to have covered the total population.

The Organization has provided freeze-dried vaccine for the campaign and a supply of approximately 600 000 doses has been called forward for 1963.

Kenya

Population 7 287 000 (1961 estimate); 151 cases were reported in 1960, 289 in 1961, and 96 in 1962. No eradication campaign is planned for Kenya which places reliance on a continuing programme to maintain an 80 per cent. current vaccination status.

Liberia

Population 1 290 000 (1960 estimate); 1119 cases were reported in 1961, and 323 in 1962. A WHO-assisted smallpox eradication project was due to start at the end of 1962. An amendment to the project has recently been agreed upon whereby the WHO senior medical officer assigned to the campaign will conduct a study to assess the immunity status of the inhabitants in the light of the mass vaccination campaign which covered a large proportion of the population in 1961 and the first five months of 1962. This assessment campaign, which started in December 1962, is scheduled to last six months.

WHO has provided one senior medical officer and has agreed to provide the total amount of vaccine to carry out a mass vaccination programme, but not the vaccine required for maintenance of vaccination. WHO has also been requested to provide a fellowship for the training of a medical officer.

Mali

Population 4 100 000 (1961 estimate); 1212 cases were reported in 1960, 1706 in 1961, and 1427 in 1962. In 1961 a short-term consultant visited Mali to advise on the smallpox situation there. Following his

report a WHO-assisted plan of operation for smallpox eradication was agreed upon, whereby at least 80 per cent. of the total population will be vaccinated within a three-year period. The Organization is providing the freeze-dried vaccine for the campaign. Some 300 000 inhabitants were vaccinated in early 1962 before the rainy season and the campaign was resumed in December. The Government has requested a WHO medical officer to assist in the implementation of the campaign.

Mauritania

Population 791 000 (1960 estimate); 44 cases were reported in 1960, 12 in 1961, and 40 in 1962. Mauritania's health services have recently established fourteen health divisions. A doctor is in charge of the medical centre of each division and its dispensaries in the rural areas. Forty-eight such dispensaries serve the rural areas and a qualified dresser is responsible for each dispensary. Since 1958, three regional hospitals have been established in the important centres of Atar, Aïon-el-Atrouss and Kaidi. In order to attend the nomadic population, four nomad squads and a special unit have been set up. The National Hospital of Nouakchott, with its school of nursing, will be the training centre for male and female nurses in Mauritania. When completed, it will help pilot schemes for eradication activities in Mauritania.

Mozambique

Population 6 592 994 (1960 census); 81 cases were reported in 1960, 51 in 1961, and 67 in 1962. No eradication scheme is planned for Mozambique. However, a yearly vaccination programme is maintained, whereby thousands of vaccinations are performed with a locally produced vaccine.

Niger

Population 3 112 000 (1962 estimate); 2408 cases were reported in 1960, 1740 in 1961, and 1038 in 1962. In Niger there is a programme for quadrennial vaccination against smallpox and yellow fever. Vaccination is carried out by (*a*) mobile teams for nomads—in west and east Niger; (*b*) mobile units in the district; (*c*) school health services; and (*d*) maternal and child health services. In 1961, 124 000 persons were vaccinated. Coverage, however, is not more than 56 per cent. In order to reach a high proportion of the population and obtain at least an 80 per cent. vaccination and revaccination coverage over a period of two years, five new mobile smallpox vaccination teams would be necessary. The Government has requested assistance as follows: transport (five vehicles), two million doses of vaccine and two refrigerators for the storage of the vaccine at Niamey and Zinder; and also vaccination equipment and supplies. The teams' sole duty would be to vaccinate the population in villages, market places and in scattered dwellings in the rural areas. The Service des Grandes Endémies will direct the programme and it is hoped that with the new group of mobile teams the entire population of the country will have been covered in two years. Special smallpox vaccination cards will be delivered to those vaccinated.

Nigeria

Population 36 473 000 (1962 estimate); 4140 cases were reported in 1960, 3538 in 1961, and 3863 in 1962. The estimated needs, expressed as costs, to implement a smallpox eradication programme in the regions of Nigeria are as follows:

	US $
(*a*) Northern Nigeria — over a three-year period:	
Labour, transport, vaccine equipment and permanent staff	1 680 000
(*b*) Eastern Nigeria:	
Four boats, land transport and travelling, temporary staff, vaccine, equipment, etc. health education, contingencies	1 674 400
(*c*) Western Nigeria:	
Wages, salaries, drivers, drugs and equipment, fuel and maintenance of transport, boats for creek areas	359 800
In addition, 16 million doses of freeze-dried vaccine.	
(*d*) Federal Territory of Lagos:	
Additional staff and equipment for three years	28 000

Rwanda

See Burundi and Rwanda.

Senegal

Population 2 980 000 (1961 estimate); 6 cases were reported in 1960, 201 in 1961, and 231 in 1962. A quadrennial vaccination plan is in progress. Beginning in 1963 the Service des Grandes Endémies is starting vaccination of the whole population of the seven regional areas. The Cape Vert region, however, will be dealt with by the health service. The Government has requested assistance in the form of freeze-dried vaccine (one million doses each year); and has also indicated that it will need additional personnel for the vaccination campaign (US $12 898) and financial help for the operation and maintenance of existing transport (US $8571).

Sierra Leone

Population 2 450 000 (1961 estimate); 12 cases were reported in 1960, 6 in 1961, and 78 in 1962. It is

estimated that four teams will be required for launching a mass vaccination campaign in Sierra Leone. These teams will work simultaneously in each of the four provinces, the western area being regarded as a province, in order to cover the whole country within a period of from nine to twelve months, taking into consideration that very little can be done during the heavy rains. The composition of each team, equipment and estimated cost per province are: one health superintendent or senior health inspector, five vaccinators, and two drivers; two four-wheel-drive vehicles (long wheel-base), one portable refrigerator, two large vacuum flasks, five vaccination kits, one first-aid box with equipment to last nine months, travelling expenses, fuel and oil, overtime fees (drivers), stationery, 14 motor-cycles (350 cc)—US $31 088. The cost for the four provinces is therefore estimated at US $124 352.

South Africa

Population 16 236 000 (1961 estimate); 65 cases were reported in 1960, 7 in 1961, and 112 in 1962. Measures for controlling and eventually eradicating smallpox have been in continuous operation for over forty years. These measures have recently been intensified. Sporadic outbreaks, which are frequently proved to have been caused through infected persons from other territories entering the Republic, still occur. Such outbreaks are, however, quickly brought under control and localized, thus preventing the spread of the disease to other areas. Adequately equipped to deal with the situation in its territory, the Government consequently does not require financial or other assistance for the implementation of its smallpox campaign.

Tanganyika

Population 9 560 000 (1962 estimate); 1584 cases were reported in 1960, 908 in 1961, and 973 in 1962. The Government has prepared a smallpox eradication scheme, the basis of which is the vaccinating unit, consisting of a vaccinator and a recorder whose duties are interchangeable. Each such unit is expected to vaccinate an average of 150 persons per day for 300 days a year. These units will be organized in teams of three units, with one supervisor and one driver, travelling in a four-wheel-drive vehicle, and having ultra light-weight motor-cycles to enable them to reach small pockets of population groups inaccessible to four-wheel transport. Ten vaccinating teams will be supervised by a sanitarian, travelling in a four-wheel-drive vehicle and accompanied by a clerk-interpreter. The whole scheme will be supervised by a medical officer, who will travel by four-wheel-drive vehicle, and have a clerk-interpreter. The Government has indicated that it will require considerable assistance, as follows: 1 medical officer; 3 sanitarians; 10 000 000 doses of freeze-dried vaccine and insulated lymph containers; 34 four-wheel-drive vehicles; 60 ultra light-weight collapsible motor-cycles; 248 light-weight camp beds; 596 blankets; 38 sets of camp equipment; 34 pressure lamps; 100 hurricane lamps.

Togo

Population 1 500 000 (1962 estimate); 347 cases were reported in 1960, 281 in 1961, and 572 in 1962. A smallpox vaccination programme, to be integrated with a WHO-assisted yaws campaign, is being finalized. The Organization will provide the freeze-dried vaccine.

Uganda

Population 6 845 000 (1961 estimate); 707 cases were reported in 1960, 398 in 1961, and 628 in 1962. The average vaccination rate in Uganda over the past five years is one million vaccinations per year. To carry out a mass vaccination campaign would present little difficulty from the point of view of staff. The Government's requirements have been indicated as follows:

(*a*) *Vaccine:* depending on whether or not dried vaccine is to be used, financial provision is required for the purchase of suitable insulated containers for the transport and storage of lymph in rural areas. Estimated cost US $1400. The estimated cost of lymph is US $70 000.

(*b*) *Transport:* vehicles. Estimated cost US $2800.

Upper Volta

Population 4 400 000 (1961 estimate); 126 cases were reported in 1960, 2360 in 1961, and 1335 in 1962. The Government is eager to carry out a smallpox eradication programme. During the visit of a medical officer from WHO headquarters in October 1962, a scheme was discussed with the health authorities and it was agreed that a formal eradication plan should be sent to the Regional Office for Africa. The Government will need assistance in the form of supplies of vaccine necessary for the mass campaign, vehicles and portable refrigerators. The mobile units of the Service des Grandes Endémies will be supported during the vaccination campaign by a large number of vaccination centres to be established in dispensaries, health centres, etc.

Region of the Americas

The smallpox eradication programme in the southern hemisphere is progressing satisfactorily. Of the 1923 cases of smallpox reported in 1961, 1411 occurred in Rio de Janeiro, Brazil, 491 in Ecuador, 16 in Colombia, 4 in Argentina and one (imported) in Uruguay. In 1962 a total of 3029 cases was reported, of which 2759 occurred in Brazil, 205 in Ecuador, 41 in Colombia,

11 in Venezuela and 10 in Uruguay. The highest incidence of smallpox is still in Brazil and Ecuador.

The smallpox eradication campaign in Colombia is a good example of proper planning, organization and operation. The Organization collaborated with the Government of Colombia in the conduct of this programme by furnishing a full-time consultant and a consultant specialized in dried-vaccine production, and by providing fellowships.

The Pan American Sanitary Bureau/Regional Office for the Americas signed an agreement with Bolivia in February 1963 for a nation-wide campaign to vaccinate three million Bolivians against smallpox. The figure represents 86 per cent. of the nation's total population of 3.5 million. Following the vaccination of almost 80 per cent. of the population in 1958, the reported number of smallpox cases dropped from the yearly average of 604 between 1946 and 1957, to 7 in 1959. One case was reported in 1960; none in 1961 and 1962.

The nation-wide campaign will be the country's first since 1958. Its aim is to maintain in the population a high level of immunity against smallpox.

Brazil

Population 75 271 000 (1962 estimate); 650 cases were reported in 1960, 1411 in 1961, and 2759 in 1962. The Government has recognized the need to eradicate the disease and has decided to initiate a programme experimentally in some areas of Rio de Janeiro and of the state of Sergipe, and subsequently to extend it to the state of Alagoas. Once the most suitable working methods have been established, the vaccination campaign will be extended to cover the entire country, until 80 per cent. of the population has been covered. The Organization has provided the equipment for producing freeze-dried vaccine; in addition a fellowship has been awarded to enable a medical officer to visit various centres producing dried vaccine on a large scale.

Colombia

Population 14 443 000 (1961 estimate); 171 cases were reported in 1960, 16 in 1961, and 41 in 1962. The smallpox vaccination programme was initiated in October 1955 and completed in April 1962. In all 11 273 085 persons were vaccinated, of whom about 4 484 000 were primary vaccinees.

Ecuador

Population 4 579 000 (1962 estimate); 3185 cases were reported in 1960, 491 in 1961 and 205 in 1962. The aim of the smallpox eradication programme in Ecuador, which was initiated in 1958, is to vaccinate 80 per cent. of the population within a period of five years. Over 1.5 million persons, who live in remote areas in the mountains and on the coast, still have to be vaccinated. The Government request for material assistance for vehicles for the transport of personnel, laboratory equipment to increase the production of dried smallpox vaccine, field equipment, as well as sanitary inspectors to co-operate with local personnel in the organization, development and supervision of field activities, amounting to approximately US $57 000 has been met.

South-East Asia Region

Encountering many demographic, financial and, to some extent, technical difficulties, this densely populated and highly endemic region is, at the present, particularly active in the global eradication effort. The Indian national eradication programme, planning and implementation are being watched with great interest and hope.

Afghanistan

Population 13 800 000 (1960 estimate); 111 cases were reported in 1960, 174 in 1961, and 303 in 1962. In 1959 the Government adopted a country-wide pre-eradication control programme, making vaccination compulsory. Up to March 1962, four million people had been vaccinated in Kabul and the provinces. WHO has provided a medical officer to advise on the organization of the eradication programme. Assistance needed by the Government consists of transport, refrigerators, thermos flasks and 3 750 000 doses of freeze-dried vaccine to be supplied in instalments through 1962, 1963, 1964 and 1965. One million doses of vaccine have already been supplied.

Burma

Population 22 342 000 (1962 estimate); 392 cases were reported in 1960, 88 in 1961 and 21 in 1962. In recent years progress in reducing the incidence of smallpox has been achieved by a vaccination programme carried out by the network of rural health centres. In December 1961 a plan for a smallpox eradication programme was prepared by the department of health and is being considered by the Government. Under this plan it is recommended that pilot areas representative of the prevailing conditions in the country should be selected in order to study the most practical approach and the requirements for a subsequent nation-wide mass vaccination campaign. The pilot eradication programme is expected to be started in May 1963. WHO assistance to the pilot projects would consist of supplies of freeze-dried vaccine.

India

Population 441 631 000 (1961 estimate); 31 052 cases were reported in 1960, 45 195 in 1961, and

42 231 in 1962. After the conclusion on 31 March 1961 of the pilot projects which were carried out in all 16 states, and after much useful experience had been gained in the planning of an economical, practical and effective eradication campaign, the Government reported on 25 April 1962 that the national eradication programme had already been launched. By January 1963 the smallpox eradication programme was completed in 23 districts and is now in progress in 125 others. 53.65 million vaccinations were performed. A committee was constituted to assess and evaluate the smallpox eradication programme in the Union Territory of Delhi in its attack phase. The assessment work started on 13 March 1963, and the results, when completed, could serve as a prototype for assessment of the programmes elsewhere in India.

The Government of the USSR, under a bilateral assistance agreement, has undertaken to supply 250 million doses of freeze-dried vaccine free of charge to India in eight equal quarterly instalments, commencing in January 1962, to meet the additional requirements of smallpox vaccine for the national smallpox eradication programme. The Government of India requires for its vaccine-producing institutes equipment such as deep-freeze cabinets for storing the vaccine. In addition, it has considered the possibility of starting to manufacture freeze-dried vaccine at Belgaum (Mysore) and Namkum (Bihar) to supplement the existing WHO- and UNICEF-assisted producing centres at Guindy (Madras) and Patwadangar (Uttar Pradesh). The Government also found it necessary to plan a health education campaign as an essential part of the eradication programme.

The estimated cost of assistance needed from international sources is US $2 549 412. The total cost estimate for the national programme is approximately 16 million dollars.

Indonesia

Population 96 750 000 (1961 estimate); 5196 cases were reported in 1960, 3777 in 1961, and 586 in 1962. No formal smallpox eradication programme for the country has as yet been planned. A WHO epidemiologist in Indonesia is helping the health authorities to establish a network of provincial epidemiological services. Epidemiological sections have now been established in Djakarta, Semarang and Surabaya, and in the near future similar sections will be established in Medan (North Sumatra), Makassar (South Sulawesi) and in Palembang (South Sumatra). With this strengthening of the country's epidemiological organization a country-wide programme for smallpox eradication would be developed. Outbreaks have been reported in 1962 from Serang and some regencies in Bandung (West Java) and the local health authorities organized vaccination campaigns. Cases of smallpox were also reported from some areas in South Sumatra. In September and October 1962 an outbreak occurred in Bandung and an intensified vaccination programme was immediately set up to control the epidemic. In November 1962 a smallpox epidemic occurred in Bekasi (about 50 kilometres east of Djakarta) and a mass vaccination campaign has been started by the epidemiological unit and the local health authorities. UNICEF has provided five jeeps. The UNICEF/WHO-assisted freeze-dried vaccine manufacture unit in Bandung was, at the time of reporting, in the experimental phase of production.

Nepal

Population 9 388 000 (1961 census); no cases were reported in 1960, five in 1961, and no cases in 1962. The WHO-assisted smallpox control pilot project which started in February 1962 is in progress. Planned to cover a population group of approximately 450 000 people in Kathmandu, the pilot project's short-term objectives are:

(*a*) to train national health personnel in vaccination techniques, care of vaccine, record-keeping, and generally in the organization and conduct of the vaccination programme, including health education aspects of the scheme;

(*b*) to build up a nucleus of smallpox vaccination activities in a limited area in the first instance.

The long-term objectives of the pilot project are gradually to expand the smallpox control programme as and when the situation permits, in order to build up the group immunity of the population to a level at which smallpox is no longer a public health problem. The Organization's assistance consists of one public health nurse, and equipment and supplies which include transport (one jeep station-wagon) and freeze-dried vaccine for the campaign. An estimate of international assistance which may be required for an eradication campaign in Nepal will only be possible some time in 1964, after the results of the pilot project over a period of two years have been assessed.

Thailand

Population 27 181 000 (1961 estimate); 32 cases in 1960, 33 in 1961, and two in 1962. For the last few years, smallpox has not been a major problem in Thailand. The smallpox eradication programme which was launched by the Government in 1961 is in progress. The objective of this programme is to vaccinate yearly one-third, or about eight million people, of the estimated total population of 25 million. A total of 7 261 141 vaccinations was performed in 1961. International assistance requested consists of six vehicles

for supervisors of field work, and supplies of vaccine in 1962 and 1963 respectively. The UNICEF/WHO-assisted freeze-dried vaccine production unit in Bangkok started production in 1960 and the output is expected to increase in 1963 with additional equipment.

Eastern Mediterranean Region

In the Eastern Mediterranean Region almost all the remaining endemic countries and territories are now actively implementing eradication programmes. Pilot control projects, eradication campaigns and intensified vaccination control measures have shown substantial progress in 1962.

Ethiopia

Population 20 000 000 (1960 estimate); 293 cases were reported in 1960, 761 in 1961, and 360 in 1962. The Government is finding it difficult to undertake a mass campaign against special diseases because of the very inadequate basic public health services. At present, all efforts are being concentrated on the gradual development of these services, and the smallpox campaign is to be integrated with the over-all services of the health centres and health stations. Since 1961 a department has been established in the central reference laboratory (at the Pasteur Institute) with the assistance of the Organization, for the production of lyophilized vaccine, the quality of which has been found to meet the recommended standards. This is a good step towards eventual undertaking of mass vaccination in remote areas, using the local health facilities. A combined mass vaccination campaign against smallpox and yellow fever was carried out in the south-western provinces of Ethiopia early in 1961. About 800 000 persons were vaccinated and vaccination campaigns are being continued and systematically expanded to cover large areas and more of the population.

Pakistan

Population 93 720 613 (1961 census); 2005 cases were reported in 1960, 2741 in 1961, and 3420 in 1962.

East Pakistan. Population 50 840 235.

Following the visit of a WHO consultant in 1960, East Pakistan has planned a scheme aiming at the eradication of smallpox in that province. After a pilot phase, which was carried out in the districts of Tipperah (population of approximately 4.4 millions) and Faridpur (population of approximately 3.2 millions) from January to November 1961, a mass vaccination campaign covering the whole province was started in November 1961. The vaccination of the total population of East Pakistan will be achieved in three phases from November 1961 through December 1967. The first phase will be terminating at the end of 1963 and the two subsequent follow-up phases will be conducted from 1964 through 1965, and from 1966 through 1967. This programme has been made the direct responsibility of an assistant director of health services under the control of the director of health services. In the 17 districts the chief medical officer of health or the district health officer is in charge of the implementation of the scheme. At the sub-divisional level, the health officers are responsible for the detailed planning, operation and supervision of the vaccination campaign.

Vaccine. Since the middle of 1961 the Institute of Public Health in Dacca has produced freeze-dried smallpox vaccine of satisfactory quality. The present output is about 1.2 million doses a week which can easily be raised to 2 million doses and which largely covers the requirements for the planned province-wide mass campaign. The Organization supplied the Government of East Pakistan with 5 million doses of vaccine from the USSR donation, and that vaccine was used in the pilot phases. Further requirements for the campaign are indicated as transport and equipment and supplies for freeze-dried vaccine production at an estimated cost of US $619 727.

West Pakistan. Population 42 880 378.

The Government has decided to integrate a smallpox vaccination campaign with the BCG campaign over a period of five years. Assistance required for the smallpox eradication programme has been indicated as 50 jeeps, 200 refrigerators and 4000 thermos flasks. In addition, equipment will be required for the increased production of dried smallpox vaccine. The estimated total cost of these requirements is US $330 743.

Saudi Arabia

Population 6 036 000 (1956 estimate); 32 cases were reported in 1960, but none in 1961, and one only in 1962. The Government, being aware of the endemicity of smallpox, its periodic outbreaks in certain parts of the peninsula and the potential danger to the country of international traffic, has planned an eradication programme with the assistance of the Organization. The objective of the agreement is the eradication of smallpox through the vaccination of the entire population within three years. The Organization will provide assistance in the form of *ad hoc* short-term consultants as may be required in 1963, 1964 and 1965, 4.5 million doses of freeze-dried vaccine to be supplied by instalments, and transport.

Sudan

Population 12 650 000 (1962 estimate); 135 cases were reported in 1960, 104 in 1961, and 70 in 1962. A plan of operation for a WHO-assisted smallpox control and eradication project in Sudan was agreed to in July 1962. The project aims at eradicating smallpox by vaccinating the entire population in four years. To this end the country would be divided into four divisions, each to be covered in one full year of operations. In the first year a pilot scheme will cover, in the western zone of the country, the Kordofan and Darfur provinces with a total population of 3 417 000 inhabitants. The Organization's assistance for the pilot scheme is one short-term consultant/epidemiologist for a month in 1961, and a month in 1962; three million doses of freeze-dried vaccine to be supplied in instalments of one million doses, transport, sterilizers, refrigerators and thermos flasks.

Yemen

Population 5 000 000 (1960 estimate); no reports are available on the incidence of cases. A plan of operation for a WHO-assisted smallpox control and eradication project in Yemen was agreed to in December 1961. The aim of the project is to eradicate smallpox by vaccinating the entire population within three years. The Organization has agreed to provide one short-term consultant for three months in 1962 and three months in 1963, three million doses of freeze-dried vaccine to be provided in instalments, transport and all medical supplies needed for the campaign. A decree for compulsory and free vaccination of all the inhabitants of Yemen, including the newly-born, was issued on 2 July 1962. On 10 September 1962 the whole population of the city of Sanaa, the capital, was vaccinated.

Western Pacific Region

Countries in the Western Pacific Region are at the present time free from endemic smallpox. Vaccination control measures and intensified vaccination programmes are, however, being undertaken by most countries in order to maintain a level of immunity by which serious outbreaks could be avoided when and where the disease is introduced.