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STATUS OF THE SMALLPOX ERADICATION IN THE AMERICAS

Recognizing the extent of the problem of smallpox in the Americas, the XIII Pan American Sanitary Conference (Ciudad Trujillo, 1950) recommended to the countries the development of systematic programs of smallpox vaccination and revaccination with a view to eradicating the disease and that these programs be carried out under the auspices of the Organization in agreement with the interested countries.

In a series of resolutions, twelve in all, adopted in successive years, the Directing Bodies of the Organization expressed their concern about smallpox in the Americas, and their desire to see the disease eradicated in the Western Hemisphere.

In 1958, noting that "smallpox still remained a very widespread and dangerous, infectious disease, and that in many regions of the world there existed endemic foci constituting a permanent threat of its propagation and menacing life and health" the Eleventh World Health Assembly (Resolution WHA11.54) requested the Director-General to carry out an investigation of the means of ensuring world-wide eradication of the disease. In 1959, the Twelfth World Health Assembly (Resolution WHA12.54) requested the Director-General to "collect from the countries concerned information on the organization and progress of their respective eradication programs and to report to the Thirteenth World Health Assembly". A similar request was made by the Thirteenth and Fourteenth World Health Assemblies. The Fourteenth World Health Assembly (paragraph 2 of WHA14.40) urged the more economically advanced countries to make voluntary contributions in cash or kind to the funds of the WHO Smallpox Eradication Special Account.

The above-mentioned resolutions reaffirm the priority that the Governing Bodies of PAHO and WHO give to the problem of smallpox. Since all these resolutions were approved unanimously, the Governments of both Organizations are pledged to eradicate the disease.

In accordance with the successive resolutions of the Directing Bodies, the Organization in concert with many countries, has, since 1950, actively engaged in a hemisphere-wide program for the eradication of this disease.

The Organization has continued to assist the Governments in planning smallpox eradication programs based on vaccination campaigns which can, in due course, be incorporated into the general public health services of the countries. This assistance has included technical advisory services for the production of smallpox vaccine and the provision of equipment for the preparation of freeze-dried vaccine. In other cases the provision of vaccine ready for use was facilitated, the services of consultants specialized in organizing and implementing vaccination campaigns were provided, and fellowships were awarded for training national personnel. The services of an accredited laboratory, where the purity and potency of smallpox vaccine prepared by the national laboratories can be tested, has also been made available to the Governments.

From 1948 to 1964 the Organization has assigned to the different smallpox eradication programs in the Americas the amount of US\$599,277. Its distribution, per country, is contained in Table IV.

Substantial progress towards the eradication of smallpox has been made since 1950. The progress varies greatly from country to country, so that although an important group of countries has achieved the objective of eliminating the disease and others are close to the goal, there are still countries in which smallpox is present and where eradication campaigns must begin without delay. It is also necessary for countries where eradication programs have become indefinitely prolonged and which have a very high incidence of smallpox, to give ample and decided attention to this type of activity.

Full international participation in the eradication effort has not yet been attained. The foci of smallpox remaining in the Continent not only constitute a problem for the countries in which they occur, but also a continuous threat and cause of concern to other countries which, thanks to their spirit of perseverance and continental solidarity, are already free from the disease. The persistence of these foci forces those countries to continue their efforts to maintain the immunity of the population at a high level. The reintroduction or the threat of reintroduction of smallpox has already forced individual countries already free of the disease to repeat mass national vaccination campaigns.

The efforts made by the Governments and the Organization to provide adequate amounts of a stable freeze-dried vaccine have been successful. With the assistance provided by the Organization, several countries are now producing enough vaccine not only to satisfy their needs, but also to supply the non-producing countries. The countries, in general, are not making adequate use of the facilities offered for the testing of the vaccine, and a few are experiencing difficulties in the preparation of their vaccine since some lots do not meet the minimum standards of potency, safety, and stability set by WHO. It will be necessary to have the vaccines tested routinely if their high quality is to be maintained. The Organization is ready to provide assistance to ensure the effective functioning of vaccine production laboratories and again reiterates its offer of the testing facilities, which should be used more frequently by the countries.

The eleven laboratories for production of smallpox vaccine, which have received assistance from PAHO/WHO, produced in 1964, 32,300,823 doses of freeze-dried smallpox vaccine and 32,660,791 of glycerinated vaccine. Table I shows the production of freeze-dried and glycerinated vaccines according to the reports received.

TABLE I

Reported Production of Smallpox Vaccine
in the Americas - 1964

Country	Glycerinated	Freeze-dried	Total
Argentina	7,190,000		7,190,000
Bolivia	---	864,200	864,200
Brazil	500,000	22,014,500	22,514,500
Chile	3,825,000	717,500	4,542,500
Colombia	---	3,069,500	3,069,500
Cuba	1,280,650	---	1,280,650
Ecuador	---	864,360	864,360
Guatemala	1,417,165	---	1,417,165
Mexico	10,754,400	---	10,754,400
Peru	2,944,000(a)	3,553,700(a)	6,497,700(a)
Uruguay	2,493,000	---	2,493,000
Venezuela	2,256,576	1,217,063	3,473,639
Totals:	32,660,791	32,300,823	64,961,614

(a) January-August

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Brazil, Colombia, Guatemala, Mexico, Peru, and Venezuela continued to donate freeze-dried or glycerinated vaccine to the programs being carried out in several countries of Middle and South America. The Organization has acted as a coordinating agency on behalf of both the countries requesting vaccine and those producing it.

However, the smallpox eradication campaign in the Americas is progressing more slowly than anticipated. In spite of the excellent results obtained by various countries that have completed eradication or reduced the incidence of smallpox to a low level, the disease is still an important public health problem in the Americas. The achievement of eradication throughout the Hemisphere requires the concentrated efforts of the countries concerned, both for the protection of their own populations and for the safety of other countries that have already taken the necessary steps to eradicate the disease.

Priority considerations and political, financial, or administrative reasons, operating singly or in association, were responsible for the failure to move faster. Governments should ensure the necessary provisions in the national budgets for the prosecution of the eradication activities.

Experience shows that wherever smallpox exists, whether in an epidemic or endemic form, and the Governments are firmly decided to initiate eradication programs and provide the necessary funds with which to carry them out, the disease disappears very quickly.

It is therefore clear that the continued existence of smallpox is due not to lack of experience or of technical knowledge about how to eliminate the disease but to the lack of will to do so and a failure to provide the funds necessary for such an undertaking.

Smallpox vaccination programs should be either initiated or stepped up. There is an equally pressing need to vaccinate the population of countries where level of protection is low and which are near other countries where the disease exists.

The levels of vaccination among populations in areas or countries in which national vaccination programs have been completed is being maintained below the rates and ratios recommended (see Table III). At the same time, the reporting of suspected cases of smallpox in areas in which the population had already been vaccinated is defective, and the investigation (clinical and epidemiological) and the laboratory diagnosis are being carried out on a restricted scale and cover only a small proportion of the cases reported. This points to the need for the organization of epidemiological surveillance services in countries where smallpox eradication programs have been completed or are in progress.

With the establishment of posts of epidemiologists for all Zone Offices, the Organization will be in a better position to cooperate with the countries in the establishment of those surveillance services. Preparation for the organization of two courses on the laboratory diagnosis of smallpox, to be held in 1966, are advanced. It is hoped that training in this field will substantially contribute to improve the diagnosis and reporting of cases of smallpox.

It is difficult to know the actual incidence of smallpox in the Hemisphere because of the incompleteness and lateness of reporting. In 1964 only Brazil, Colombia and Peru recorded significant disease foci. Brazil continues to report the great majority of cases (2,502) and although a vaccination program was begun in 1962 the disease remains widely prevalent. Peru, having eradicated the disease in 1954, experienced a resurgence in 1963 in areas bordering Brazil and reported 454 cases last year. Colombia, Uruguay and Argentina reported 21, 3, and 12 cases respectively. In 1965, up to 31 August, Brazil has reported 448 cases; Argentina, 11; Colombia, 146; and Paraguay, 10.

The reduction in the incidence of smallpox in the Americas since 1947 (see Table II) parallels the progress made by the eradication programs that the countries are conducting. Of course, all these figures should be interpreted with caution owing to the incompleteness of reporting, but they give an idea of the trend of the disease. The efforts made by the countries to improve systems for the reporting, registration and diagnosis of smallpox are gradually leading to an improvement in our knowledge of the disease.

The following is a summary of the progress made in smallpox campaigns in several countries of the Hemisphere.

El Salvador, Guatemala, and Honduras, where the percentage of the population immunized against smallpox was small, are making good progress in their vaccination programs, which are being carried out as part of the routine activities of the regular health services.

In Argentina, the national vaccination campaign, which began in 1961, made little progress in 1964, owing to economic and administrative difficulties. In 1964, 284,239 persons were vaccinated. Twelve cases occurred in 1964 and at the present there is an outbreak with eleven cases in the Province of Corrientes, near the border with Paraguay. Argentina does not produce freeze-dried smallpox vaccine. The Organization is providing the equipment for the production of this type of vaccine. The reestablishment of the campaign in Argentina will be an important step in the eradication of smallpox from the Americas.

The campaign in Bolivia, which is being carried out with the cooperation of PAHO and TA/WHO, has met with numerous obstacles to its normal course. The Organization is providing the services of a health inspector who is cooperating with the national health authorities in the organization and conduct of field activities. Political, economic and administrative factors have considerably delayed the development of the campaign. In 1964, 535,049 persons were vaccinated, or 66.4 per cent of the original target figures of 739,200.

Brazil continued its smallpox eradication program under which it is proposed to vaccinate 64,000,000 persons in six years. During 1964 the vaccination of 8,016,713 persons brought the total number of those vaccinated since the start of the program to 15,901,304 (June 1962). The Brazilian health authorities understand the need to step up the campaign if eradication is to be achieved. At the present rate, it would take at least ten years to vaccinate 64,000,000 persons. At that time, the population of the country would be 30 per cent larger and a great majority of the vaccinated population would have lost their immunity. Taking these facts into consideration, the national health authorities are at present engaged in a revision of their plans to intensify the campaigns, based on a more flexible administration and on the use of better means of transport and of modern equipment for vaccination. For this purpose, additional support in the form of personnel and equipment will be needed.

The Recife and Porto Alegre laboratories, as well as the Oswaldo Cruz Institute in Rio de Janeiro, to all of which the Organization supplied the equipment necessary to prepare freeze-dried vaccine, are producing good quality vaccine, and their joint production is sufficient to meet the present demands of the country.

Of the 2,496 cases reported in the Americas in 1964, the great majority (2,502 or 83.5 per cent) continued to occur in Brazil. There is no doubt that the incidence of the disease in that country is much larger than indicated by the number of cases reported, since reporting is incomplete and late. In 1964, only ten states reported cases; no information was obtained from the rest of the country, although it is known that the disease is widespread, both in the urban and rural populations.

Brazil is the key to eradication of smallpox in the Americas and once the attack is effectively mounted there and coordinated with programs in the neighboring countries, it will be possible to eliminate the disease from the Americas. It is evident, however, that the resources of the country are insufficient for a task of such magnitude and external help will be necessary.

In Colombia, after a well organized campaign, which ended in 1961 and covered 93 per cent of the total population of the country, cases have been occurring: 16 in 1961; 41 in 1962; four in 1963; and 155 in 1965 (up to 16 August). At the beginning, the cases were restricted to a few areas, but lately the occurrence has been widespread. According to the plans established by the campaign, the general health services of the country would be responsible, after the termination of the campaign for the maintenance of a level of immunity of the population, through the annual immunization of 80 per cent of newborns and of 20 per cent of the population. For several reasons, the objective could not be attained and the population of newborns vaccinated every year is around 30 per cent and the proportion of the general population vaccinated is ten per cent.

In view of the increasing number of cases reported, the Government is considering a new program of vaccination which would cover at least 80 per cent of the population in three years. For this purpose, external assistance will be necessary.

Peru, which eradicated the disease in 1954, experienced a resurgence in 1963, when 863 cases were reported. In 1964, 454 cases of smallpox were notified, most of them in the Department of Loreto, in the northeastern region of the country. In this area, the percentage of the population vaccinated against smallpox during the eradication campaign was low. The outbreak was limited to this area, and the disease did not spread to the rest of the country. The Government initiated a smallpox vaccination program which, by September 1964, had succeeded in vaccinating 3,165,404 persons. A surveillance service was established to investigate any suspected cases that might arise after the completion of the intensive vaccination program.

The objective of the smallpox vaccination program in Haiti, which began in July 1962, is to vaccinate 80 per cent of the population in a period of five years. Between that date and 15 October 1964, 847,109 persons were vaccinated; 293,441 of these vaccinations were made in the first nine months of 1964. Only 58 per cent of the target figures for 1964 was attained. The program has been beset by financial and administrative difficulties.

The smallpox eradication campaign in Ecuador, which started in 1958, was completed in May 1964. During this period, 3,531,489 persons or 85 per cent of the population of the country, were vaccinated. No cases of smallpox were reported in 1964 or 1965 (up to the present). In 1960, 2,185 cases were notified, 496 in 1961, 204 in 1962, and 45 in 1963. It will be necessary to strengthen the measures to keep the immunity of the population at a high level, as well as to improve the machinery for vigilance and case-notification, diagnosis, and epidemiological investigation of such new cases as may occur in the future.

Conclusions

As the only reservoir is man and as vaccination provides effective protection for a number of years, eradication of smallpox in endemic areas is well within the compass of modern preventive medicine.

However, although the means for prevention of smallpox have been known since the end of the eighteenth century, the disease is still endemic in many countries of this Hemisphere. Properly organized and systematic campaigns to administer smallpox vaccine to the population, are measures sufficient to achieve the eradication of the disease.

Failure to achieve it hitherto has been due to a variety of factors, the most important being the incomplete coverage of the population because of inadequate health services, lack of priority, economic and administrative difficulties.

Expenditure for the completion of an eradication program, although considerable, is small compared with the cost in money and, especially, in human lives and sufferings caused by the continuous presence of the disease. The eradication of smallpox is of extreme importance to all countries, both to protect their own population and to safeguard other countries already free from the disease. It is therefore important to urge all countries where the disease is still present, to make all efforts necessary to surmount the financial and administrative difficulties that may have delayed the anti-smallpox activities and to attribute to the smallpox eradication program the priority it deserves from the standpoint of national and international health.

It is clear that eradication of smallpox is a national responsibility and can only be achieved by national effort. However, it should also be emphasized that the eradication of smallpox is a matter of concern not only to the infected countries but to all countries, as those now free constantly run the risk of the introduction of the infection from endemic areas.

There is no doubt that substantially increased effort and support, both on the national and on the international scale, must be given to the smallpox eradication program if it is to achieve success within the foreseeable future.

Even if increased national resources are allocated to smallpox programs, the endemic countries will not be able to eradicate the disease without substantial help from the international organizations and from the countries which are no longer endemic.

The endemic countries could rapidly bring the disease under control and ultimately eliminate it, if they decided to take energetic action and received help from countries already free from the disease and provided they also enacted and adopted the necessary legislation and took budgetary action to comply with the international obligation all the Governments assumed when they approved the Resolutions of the Directing Bodies of PAHO and WHO.

TABLE II
Reported Cases of Smallpox in the Americas, 1948-1964*

	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 ^h	1964 ⁱ
Argentina	166	1,176	4,462	1,404	982	309	256	55	86	335	27	36	65	6	2a	-	12j
Bolivia	831	805	644	728	432	429	624	372	499	1,310	183	7	1	-	-	-	-
Brazil(b)	1,288	670	706	1,190	1,668	923	1,035	2,580	2,385	1,411	1,232	2,629	2,644	7,656	7,589	6,211g	2,502g
Brit. Guiana	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-
Brit. Hond.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canada	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chile	5	4	3,564	47	15	9	-	-	-	-	-	-	-	-	1f	-	-
Colombia	7,356	3,040	4,818	3,844	3,235	5,526	7,203	3,404	2,572	2,145	2,009	950	209	16	41	4	21
Costa Rica	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
Cuba	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dom. Rep.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ecuador	3,856	657	241	174	665	708	2,516	1,831	669	913	863	1,140	2,815	496	204	45	-
El Salvador	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guatemala	6	4	10	3	1	1	-	-	-	-	-	-	-	-	-	-	-
Haiti	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Honduras	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Martinique	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Mexico	1,541	1,060	762	27	-	-	-	-	-	-	-	-	-	-	-	-	-
Neth. Ant.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Nicaragua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Panama	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraguay	1,451	175	135	282	797	770	207	57	132	103	21	-	35	-	-	-	-
Peru	7,105	6,305	3,753	1,218	1,360	172	115	-	-	-	-	-	-	-	-	-	-
Trinidad Tob.	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	865	454
United States of America	57	49	39	11	21	4	9d	2d	-	1d	-	-	-	-	-	-	-
Uruguay	-	9	3	1	16	7	1	45	42	2	-	-	19e	1f	10e	1k	3k
Venezuela	6,358	3,951	2,181	280	109	72	13	2	4c	-	-	-	-	-	11	-	-
Total...	30,034	17,910	21,318	9,221	9,301	8,930	11,979	8,348	6,389	6,220	4,343	4,763	5,158	8,175	7,858	7,126	2,996

a Includes 1 imported case.
b State capitals only, 1948-1964
c Includes 4 imported cases
d Clinical diagnosis only

(e) Includes 2 imported cases
f Imported case
g Information incomplete: covers 19 States and 1 territory

h Latest figures received
i Up to 30 June 1965
j Includes ten imported cases
k Imported
-- None

* Revised figures according to latest reports from the Governments (for 1961-1963)

TABLE III

Reported Number of Smallpox Vaccinations in the Americas 1960-1964

Country	1960	1961	1962	1963	1964
Argentina	1,990,467	4,407,020	1,344,401	638,502	284,239
Bolivia	42,603	34,215a	164,449	280,427(4)	1,040,797(5)
Brazil	4,910,091	...	2,061,179b	6,955,330	8,016,713
Canada	1,332,000	...	...	...	...
Chile	285,314	382,946	703,297	946,000	1,481,820
Colombia	3,195,355	1,250,685	191,083c	1,936,676	1,702,972
Costa Rica	14,657	79,553	106,252d	39,224(1)	220,518
Cuba	38,635a	129,647	135,319e	50,755(1)	63,173
Dom. Republic	26,057	10,000	35,135	20,492(1)	66,552(6)
Ecuador	783,338	535,668	685,595	653,517(1)	652,571
El Salvador	33,373	24,554a	143,835	200,091(2)	435,839
Guatemala	123,590f	129,590a	127,004	109,249(1)	555,724
Haiti	441f	3,135	180,719	350,156()	293,441(7)
Honduras	17,843	9,509	127,144d	51,069(1)	91,105
Jamaica	79,973	70,129	131,652	47,333	70,958
Mexico	3,637,334	2,588,149	5,226,096g	3,143,916(4)	5,524,600
Nicaragua	8,803	19,385	3,335c	19,280(1)	94,752
Panama	24,835	31,596	11,547a	12,591(1)	39,716
Paraguay	122,897	110,142	28,283c	88,350(1)	135,223
Peru	1,049,740	969,808	593,336	277,298(3)	3,165,404(7)
Trinidad-Tob.	3,839	11,438	1,271h	40,730(1)	44,901
Uruguay	214,360	188,674	81,754c	55,364(1)	188,702
Venezuela	1,104,389	1,140,842	1,147,574g	1,150,324	953,868
Antigua	1,603	1,186	446c	3,552(1)	1,558
Bahamas	...	17,941	3,196	7,653(1)	3,213
Barbados	10,564i	14,070	86,507	4,591(1)	10,490
Bermuda	783i	579	...	...	1,154
British Guiana	3,165	...	6,982	4,087(1)	7,447
British Honduras	3,939	4,900	10,617	4,953(1)	...
Cayman Islands	...	...	...	...	9,000
Dominica	...	1,351a	2,315c	1,470(1)	1,585
Falkland Islands	128	...	...	...	...
French Guiana	2,204a	1,120a	1,122g	1,922(3)	1,590
Grenada	3,402	2,695	1,031	1,445(3)	2,477
Guadeloupe	13,567f	5,000a	750c	...	13,076(8)
Martinique	18,817	7,650a	10,685	11,641(3)	9,779
Montserrat	1,204	903	927	873(1)	458
Neth. Antilles	3,665f	...	2,400c	...	...
Panama Can. Zone	9,528f	...	...	...	...
Puerto Rico	...	...	...	...	...
St. Kitts Nev. Angu.	3,300	2,979	...	...	...
St. Lucia	...	...	3,200	1,500(3)	...
St. Pierre & Miq.	224	...	...	...	...
St. Vincent	...	...	2,405	1,512(1)	1,820
Surinam	6,375	8,400	5,286	6,237(1)	6,250
Turks & Caicos I.	...	...	...	58(3)	65(7)
Virgin Isl. U.K.	44	...	...	73(1)	104

...No data available f= Primo-vaccinations (1) January-October 1963
a= Incomplete data g= Provisional (2) January-September 1963
b= São Paulo State h= January-March (3) January-August 1963
c= January-April i= Excludes vaccinations given (4) January-November 1963
d= January-November by general practitioners. (5) January 1964-May 1965
e= January-September Source of data: Government (6) January 1964-April 1965
reports. (7) January-September 1964
(8) January 1964-June 1965

TABLE IV
PAHO/WHO and UNICEF Funds Alloted to Smallpox
Eradication Projects 1948-1964

(In U.S. Dollars)

Projects	PAHO/WHO	UNICEF	Total
AMRO-0300	130,426	--	130,426
Argentina-2	9,736	--	9,736
Bolivia-0300	51,544	--	51,544
Brazil-0300	48,414	--	48,414
Chile-0300	12,172	--	12,172
Colombia-17	103,789	15,000	118,789
Cuba-8	30,741	--	30,741
Ecuador-0300	179,368	--	179,368
Haiti-0300	3,848	--	3,848
Mexico-31	5,307	--	5,307
Paraguay-15	10,164	--	10,164
Peru-51	1,148	--	1,148
Uruguay-12	6,870	--	6,870
Venezuela-12	5,750	--	5,750
TOTAL.....	599,277	15,000	614,277