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SMALLPOX ERADICATION

Report by the Director-General

In conformity with the request made by the Seventeenth World Health Assembly in its resolution WHA17.43, paragraph 3 (1) and (3),[1] the Director-General has the honour to present to the Eighteenth World Health Assembly a further report on the progress of the smallpox eradication programme.[2]

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[1] Off. Rec. Wld Hlth Org., 135, 19.

[2] Attached.

SUMMARY OF A REPORT ON A VISIT TO COUNTRY A BY A TEAM OF CONSULTANTS ON THE WHO SMALLPOX ERADICATION PROGRAMME

17-31 December 1964

INTRODUCTION

Country A is a mountainous country with an estimated population of 13.7 million including approximately two million nomads and semi-nomads. It has 18 provinces, recently split into 29 provinces and many remote villages; communications are difficult, especially in winter and spring.

The climate varies from hot desert areas with temperatures 40-50°C to cold conditions with long and severe winters with temperatures of minus 15 to minus 25°C and deep snow that practically cuts off the traffic from the main centres.

Religious beliefs and cultural traditions offer real impediments to the vaccination of the female by male vaccinators.

Literacy is low and occupation is mostly agricultural.

Variolation is still practised in almost all parts of the country and is often the starting point for epidemics of smallpox. Notification and reporting systems are most inadequate.

Smallpox is still endemic in every province and is one of the major health problems of the country.

Epedemiology of Smallpox

In the absence of data other than that contained in the weekly returns from hospitals, only a rough picture of the endemicity of smallpox in three major zones of the country can be given.

Zone 1

The areas are mountainous (60 per cent. of the land is situated over 9000 feet) and most of them are relatively closely connected with the capital city by several main roads and mountainous paths.

Zone II

Most of the area is desert and a scattered population inhabits the river valleys.

Zone III

This zone is isolated from the other two zones especially in winter because of the high mountains. Some of the area is desert.

Information on the annual incidence over the past 13 years is given in Figure I for each of the three zones. In Zone I there has been a downward trend since 1952, but this was halted about 1957. From 1957 until 1962, 50 to 100 cases were reported yearly and in 1963 there was an increase and 150 cases were reported. In Zone II, 50 to 150 cases have been reported every year except in 1959 when 250 cases were reported. In Zone III, 500 cases were reported in 1955 but since 1957 only 50 to 150 cases have been reported every year.

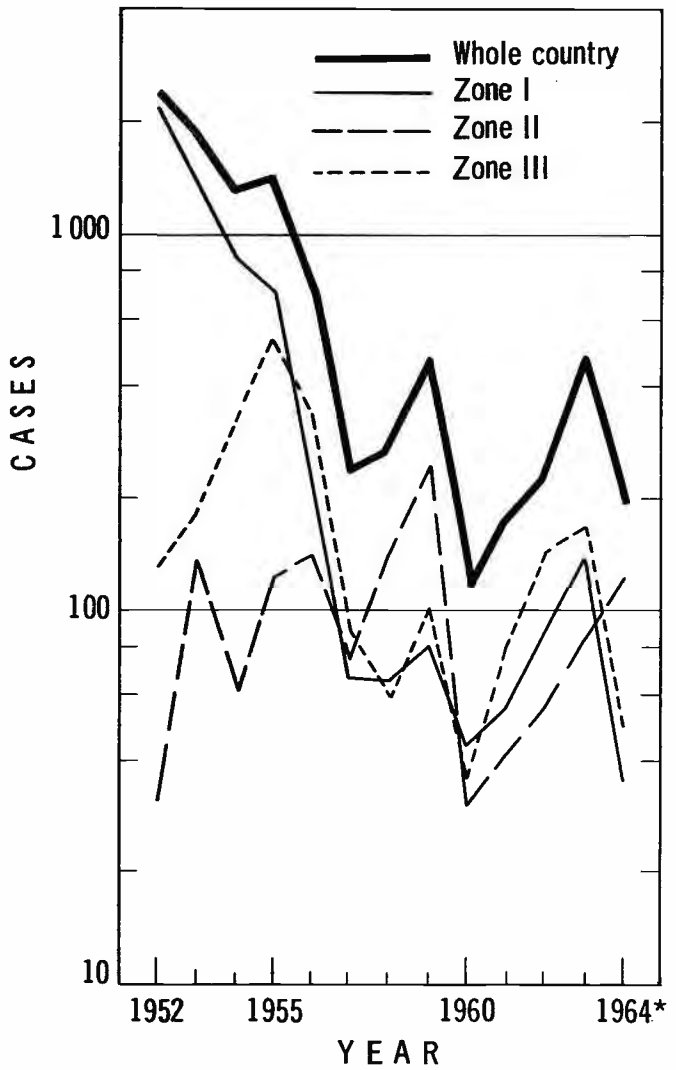
The trend of smallpox in the country, as a whole, is also depicted in Figure I. The curve in Figure I reflects the downward trend in Zone I. A peak in 1955 is indicative of reporting of large numbers of cases from Zone III and similarly the next peak in 1959 reflects reporting of large numbers of cases from Zone II. The peak in 1963 is observed in every zone. If we review the peaks in 1955, 1959 and 1963, we get an interval of four years between peaks. Details of figures are given in Table I.

TABLE I. SMALLPOX CASES REPORTED BY WEEKLY REPORTS (1952-1964)

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Zone I	2142	1499	847	713	197	66	62	84	44	58	88	144	33
Zone II	31	142	58	132	144	78	149	256	30	39	55	170	110
Zone III	126	186	337	503	300	82	57	102	35	81	145	165	38
Zones I, II & III (whole country)	2299	1827	1242	1348	641	226	268	442	109	178	288	479	181

FIG. 1

SMALLPOX CASES REPORTED IN COUNTRY A
DURING 1952-1964

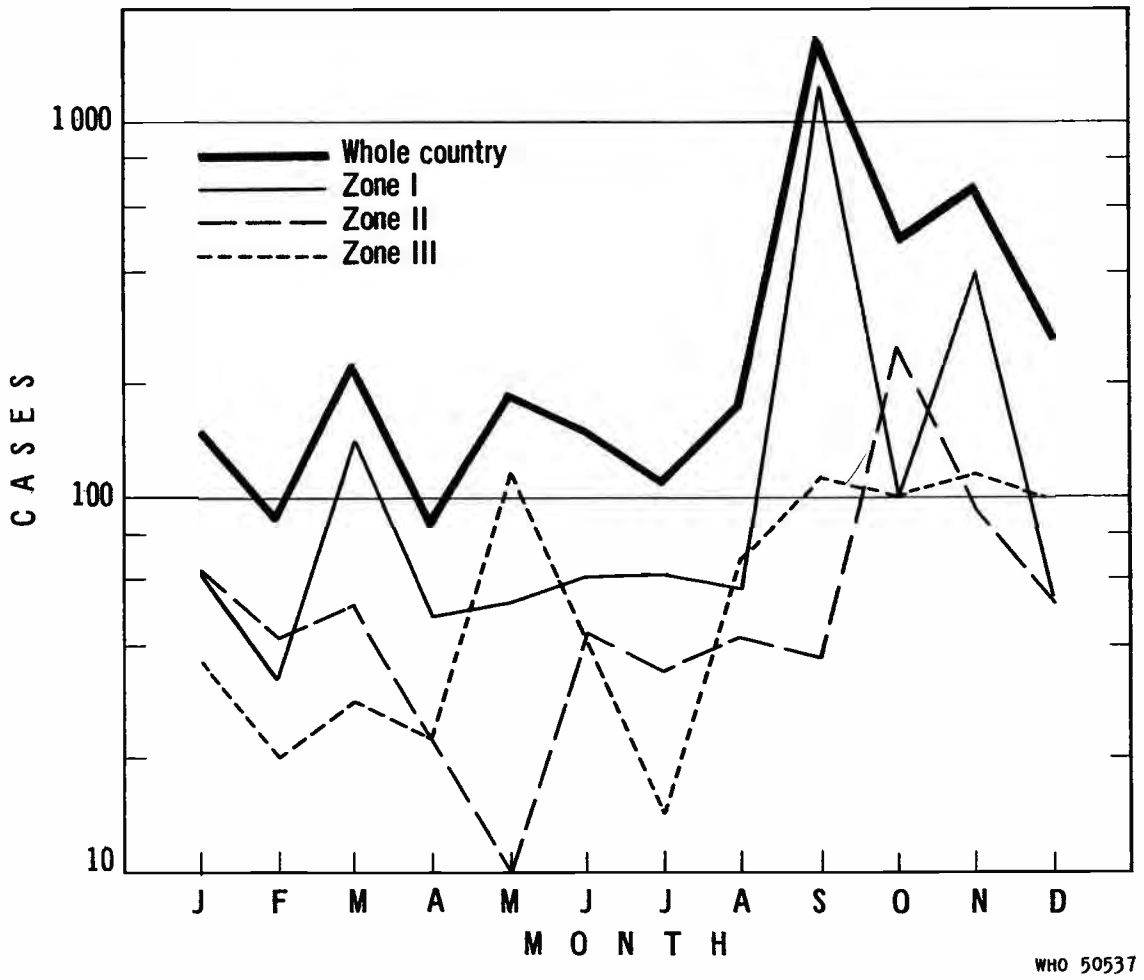


*provisional figure

WHO 50536

FIG. 2

SEASONAL DISTRIBUTION OF SMALLPOX CASES REPORTED
IN COUNTRY A DURING 1961 - 1963



The seasonal distribution of reported cases in each zone and in the country as a whole is shown in Figure II. Zones I and II have a somewhat similar pattern: the highest number of cases being reported during the months of September to November. In Zone III two peaks are discernible, one in May and the other in September to November.

For the country as a whole, the number of reported cases is highest between September and November.

The age distribution of the reported cases for the period 1961 to 1963 was also obtained from the monthly hospital report

Children 0-14 years of age constituted the largest group of cases in each zone - in Zone I, 66 per cent. of the cases, in Zone II, 88 per cent. of the cases and in Zone III, 97 per cent. of the cases, and for the country as a whole 77 per cent.

A study of schoolchildren from several provinces in 1963-64 showed that 2.5 per cent. to 13.4 per cent. had pock marks.

The above data, though very limited, broadly reflect the trends in incidence, the seasonal variations, the age distribution, and the periodicity of smallpox in each zone and in the country as a whole.

Smallpox control in the past

A WHO-assisted smallpox eradication project was started after the arrival of a WHO medical officer in October 1962. From November 1962 to May 1964, 139 male vaccinators, seven female vaccinators and auxiliary midwives, who also carry out vaccinations, were trained and refresher courses were also organized. Recognizing the need for the training of female vaccinators in each province, training courses for female vaccinators recruited locally were started in three provinces in May 1964.

The linear scratch method of vaccination was used and in the case of freeze-dried vaccine one insertion was given for primary vaccination and two insertions for revaccination.

Under the supervision of a WHO medical officer and his national counterpart, a pilot project was started in March 1963 in the capital city. Up to October 1963 a total number of 392 026 vaccinations was performed. Both freeze-dried and liquid lymph vaccines were used and 89 per cent. of the population was vaccinated, taking the estimated population of the city to be 400 000.

In addition to the WHO-assisted project in the capital city, a vaccination programme was carried out in nine provinces and about 1.6 million vaccinations were carried out between October 1962 and June 1964.

In the light of the experience gained during the implementation of the pilot project, a new plan of operation was prepared and signed by the Government and WHO in September 1964. This plan was intended to cover, province by province, the entire population with two mobile teams, each of 70-75 vaccinators, trained in the pilot project. The project was expected to last five years, starting in 1964.

Present state of the project

At the time of the team's visit on 17 December 1964 the new plan of operation had not been implemented, because all vaccinators who were trained and were working as members of mobile teams had been transferred to provinces, leaving only a nucleus of a central team in the capital city to fight epidemics wherever they might occur.

Conclusions by the team following their visit to hospitals and health centres

The team visited several hospitals and health centres both in the capital and in the provinces and came to the conclusion that:

(1) the vaccinators were working without supervision by the Medical Officers. No check of their records or results was being made;

(2) liquid lymph vaccine is issued unlabelled and often the vaccinators continue to vaccinate with it until it is used up - without any regard to the possibility of deterioration;

(3) the technique of vaccination requires to be improved and the vaccinators require more training in reading results and in record keeping. The training could be done in refresher courses;

(4) family registers were not being used;

(5) areas are not being covered systematically.

Special difficulties in the implementation of the project and the steps necessary to achieve control and ultimate eradication of smallpox in Country A

1. The structure of basic health services is just beginning to develop and is at best in its formative stage. Nineteen rural health centres existing at present can cover only a limited population around the health centres (total of about one million).

2. There are only 60 hospitals spread out in the old 18 provinces (reorganized recently to 29 provinces) under the supervision of chief medical officers who are responsible for both curative and preventive services. The chief medical officers, as well as medical officers attached to hospitals and in private clinical work after hospital hours have neither public health background nor orientation in community approach and have, therefore, no interest or confidence to supervise vaccination work. The total number of doctors with a public health background is only four or five.

3. The country is vast with difficult mountainous terrain and hot desert areas. Communications are poor; in winter months many areas are inaccessible.

4. The level of literacy is very low and to add to these existing difficulties there is the problem of two million nomads.

5. Female vaccinators only can vaccinate the female population in rural areas.

Under the above-mentioned circumstances the entire population cannot be vaccinated by posting vaccinators to existing hospitals and the only realistic approach is to reorganize the vaccination programme on the lines indicated in the plan of operations and to take the following steps:

Administrative

1. All the vaccinators sent to the provinces in June and July 1964, along with the permanent vaccinators attached to hospitals, should be summoned together and given a two weeks' refresher course by the Director, CD Control, and the WHO Medical Officer and then mobilized into four teams of 75 vaccinators, each to carry out the attack phase of the programme. To achieve this target new vaccinators may also have to be recruited and trained.

2. Each mobile team of 75 vaccinators should be headed by a senior sanitarian and each team of five or six vaccinators by a senior vaccinator supervisor and, if possible, there should be one sanitary inspector over six supervisors.

3. Simultaneously, an adequate number of female vaccinators should be recruited and trained locally in every province by two public health nurses, for which a request was made by the Director, CD Control, and is supported by the team.

4. A standard report form giving the number of primary vaccinations and the number of vaccinations carried out by age-groups - below 1, 1-4, 5-14 and 15 and over - should be maintained and submitted fortnightly to the Director, CD Control, who will be directly responsible along with the WHO Medical Officer for the organization and execution of the campaign. Each primary vaccination should be observed by the supervisor after 6-8 days and if unsuccessful it should be repeated immediately. Similarly at least 20 per cent. of the revaccinated persons should be checked after 6-8 days. The total number of primary vaccinations observed and total number positive and the total number of revaccinations observed and total number positive should be recorded on the standard form.

5. The Director, CD Control, should have in his unit a full-time medical officer for the smallpox eradication programme, who will also act as the national counterpart to the WHO Medical Officer and will exercise control over the vaccination programme and help in the training of vaccinators. The Statistical Unit of the Ministry of Health should be closely linked with the Director, CD Control, so that all data available from the field are pooled and are available at a minute's notice.

6. Chief Medical Officers of provinces should be given orientation in public health by the WHO Medical Officer, with particular reference to the smallpox eradication programme and how to exercise general supervision during the implementation of the attack and maintenance phases. These orientation courses could conveniently be held in two batches. Administration and supervision of the vaccinators in the respective provinces where the attack phase is under operation should be the joint responsibility of the Chief Medical Officer and the doctor in charge of the project.

7. For the success of the programme it is essential that the vaccinators carrying out the attack phase of the programme are contented. This will only be possible when their prospects of permanency in service or merger with the expanding basic health service is assured. The duties of a vaccinator are of an arduous nature and without the prospects of permanency he will always be looking out for an alternative job, depleting the cadre of vaccinators.

8. Co-operation with vaccination teams should be assured from the highest officials, i.e. the governor of a province, to the lowest administrative link, i.e. a Malik, and from the highest religious head, i.e. a judge, to the local Mullah, and this will only be possible when the Government attaches a high priority to the programme and sends special instructions to governors of provinces.

9. A fully equipped mobile team of 15 to 20 vaccinators and supervisors should be organized with the special purpose of carrying out at short notice control measures in any province whenever an outbreak occurs. In non-epidemic periods this group, jointly with available female vaccinators from the capital, will work initially in the capital province and afterwards vaccinate travellers and nomads at strategic centres on the main roads to the capital city or other principal cities, or at any other resting stage. Freeze-dried vaccine should be used.

Vaccine

1. Facilities should be provided for the proper storage of freeze-dried vaccine at headquarters at refrigeration temperature and records of proper distribution should be kept. The amounts of freeze-dried vaccine required for the next three years should be estimated.

2. Liquid lymph vaccine is not recommended for the campaign. If it has to be issued to the provinces near the vaccine institute, there must be a clear label with each ampoule giving the date of issue and date of expiry. For distant places with difficult communications freeze-dried vaccine only should be used, even for normal vaccination work carried out by health centres and hospitals. Factual records of primary vaccinations and revaccinations should be maintained on the standard form.

3. Each batch of vaccine should be tested initially in the field by carrying out a specific number of primary vaccinations and revaccinations before issue.

Transport

1. Transport should not be much of an immediate problem. There are three vehicles with the WHO Medical Officer, including a USSR jeep.

2. There are four trucks in the pool of the Ministry of Health, which can be utilized for the campaign.

3. Ten motor cycles supplied by WHO are available for sanitarians and supervisors. The government responsibility will be in connexion with the running expenses and maintenance of the vehicles.

Phasing of the project

It is desirable that the attack phase of the campaign be completed in a three-year period and this will be possible only when four mobile teams, each consisting of 75 vaccinators inclusive of female vaccinators, are organized and trained. For logistical, practical and economic reasons (transport, etc.) the available strength of vaccinators will be concentrated in three to four adjoining provinces. They will have the responsibility of carrying out mass vaccination until a satisfactory coverage of over 80-90 per cent. of the population in all age-groups is obtained.

Simultaneously, with the implementation of the attack phase, there should be provision and planning for adequate mopping-up operations after mobile teams move out and for the observance of the obligations of a maintenance phase on a long-term basis. The Government, with the assistance of WHO, will prepare plans for co-ordinating and integrating, within the general health service of the Ministry of Health and Rural Development Department, the vaccination of the newborn, immigrants and the floating population, as well as the periodic revaccination of the population - particularly of children at 5, 10 and 15 years of age. The health services of these departments will be reinforced with personnel from the mass campaign, according to the specific needs of an area.

Notification of cases

The notification of cases and the reporting system are confined to hospital records only at present and are most inadequate and urgently need improvement. All the methods of reporting and notification through all possible channels should, therefore, be explored. The mass vaccination of intimate and remote contacts to localize the epidemic would depend on quick notification and reporting of cases.

Health education

The value of health education as an integral part of all phases of smallpox eradication programmes cannot be over-emphasized. There should be pooling of all available resources, including international and foreign agencies and arrangements made for the display of films to convince people about the advantages of vaccination. Besides health education by the display of films, talks on the radio, group discussions, and all audio-visual aids available should be harnessed and the educative role of teachers and religious heads fully utilized.

Legislation

The existing practice of variolation should be made illegal and punishable.

SUMMARY OF A REPORT ON A VISIT TO COUNTRY B
BY A TEAM OF CONSULTANTS ON
THE WHO SMALLPOX ERADICATION PROGRAMME

December 1964/January 1965

INTRODUCTION

Country B has a strong central government and is divided into 50 administrative units including the capital city. The total population is about 22 million. There are three mountain ranges which run north to south. Three important rivers flow north to south down the valleys between the ranges. The most thickly populated are the central plains and the delta region in the south. The northern and eastern areas are hilly and population is sparse. The coastal regions are long narrow strips crossed by rivers and creeks. Roads, railways, and internal airlines connect the capital with the most important towns.

The total allotment for health (including the capital expenditure) for 1964-65 is about 2.4 per cent of the national budget.

Organization of health services

The health services have recently been re-organized and now consist of three administrative levels - central, divisional and township.

At the central level, there are four deputy directors under the Director of Health Services. The Deputy Director of Communicable Diseases has four assistant directors. One is in charge of leprosy, one of malaria and one of tuberculosis. The fourth, the Assistant Director of Epidemics, is in charge of trachoma, filariasis, venereal diseases and smallpox. There is, therefore, no separate officer with the sole responsibility of supervising and implementing the smallpox programme.

At divisional level, the smallpox campaign will be the responsibility of a medical officer who will at the same time be responsible for the technical supervision of trachoma, filariasis and venereal diseases, whereas malaria, tuberculosis and leprosy will have special campaign officers.

At the township level, the smallpox programme will be the responsibility of township medical officers, along with other multifarious duties.

At the peripheral level, there is a number of rural health centres. The population covered by each centre is approximately 20 000 - one for every 15-16 villages.

Comments

1. The Assistant Director (Epidemics) at the central level has other responsibilities besides smallpox and cannot exercise the supervision and control necessary for an efficient smallpox campaign, nor does he have a full-time health officer to whom could be delegated the work of supervising the campaign, checking the results and ensuring the programme is developed satisfactorily.

2. The shortage of health officers at the divisional and township levels means that at these levels also there is insufficient supervision and guidance.

3. As a result, the co-ordination of the programme and the enforcement of the regulations and technical standards are poor. The quality of the work in each area visited by the team depended on the personal skill and interest of the local worker(s) and was not the result of central direction of a well-planned and organized programme.

4. The Health Assistant at the Rural Health Centre has no transport and as he is responsible for several other activities, he has no time to supervise and check the vaccinators, as the team observed on visiting one RHC where the vaccinator was using the rotary lancet although instructions to abandon it had been issued.

5. The vaccinators work by themselves for a full month in the field, walking from one place to another, carrying sufficient freeze-dried vaccine for the whole period. Though they perform their duties conscientiously, they cannot be expected to maintain the necessary level of efficiency without frequent supervision and advice.

EPIDEMIOLOGY OF SMALLPOX

Notification - reporting system

A scheme for the registration of all persons over 12 years of age is being put into effect throughout the country. Each person registered has an identification card and each family has a family record which has to be kept up to date under the supervision of the headman of the village. Births and deaths are registered only

in the major cities. The headman of the village is responsible for reporting cases of smallpox to the rural health units, and from these a report is sent to the medical officer of the district. It appears that the notification of smallpox cases is relatively well carried out.

Annual numbers of cases and deaths

In Table 1 is shown the yearly number of cases and deaths reported for the period 1946 to 1964.

TABLE 1. NUMBER OF SMALLPOX CASES AND DEATHS 1946-64 AND REPORTED DEATHS AS A PERCENTAGE OF REPORTED CASES

	Cases	Deaths	Percentage
1946	4 372	1 450	33
1947	3 940	1 468	37
1948	5 849	1 642	28
1949	3 466	1 032	30
1950	10 225	3 854	38
1951	2 750	752	27
1952	2 411	989	39
1953	164	18	11
1954	216	34	16
1955	1 667	319	19
1956	4 223	1 496	35
1957	2 739	758	28
1958	1 897	381	20
1959	1 601	345	21
1960	391	53	14
1961	91	5	6
1962	32	1	3
1963	193	21	11
1964*	111	12	11

* Provisional figures.

There were two epidemic periods, one from 1946 to 1952 when 3500 to 10 000 cases were reported yearly and the other from 1955 to 1959 when 1500 to 4000 cases were reported yearly. In the second epidemic period fewer cases occurred than in the first. The highest annual numbers were 10 000 cases in 1950 and 4000 in 1956. In spite of these peaks the general tendency in the period 1946-64 has been for the annual number of cases to decrease.

In order to observe the behaviour of smallpox in more detail the country was divided into six zones according to the geographical features and communications as follows:

Zones I, II and III

This is mostly a plain, densely populated and located in the centre of the country. Almost 80 per cent. of the population live here. It includes the present and old capital cities and their surrounding districts and a peninsular area.

Zone IV

This area is mountainous and isolated from the country proper.

Zone V

The area is mostly mountainous but is relatively closely connected with the upper part of the country by large valleys.

Zone VI

This area is mountainous. It has less easy communication with the country proper.

Geographical distribution

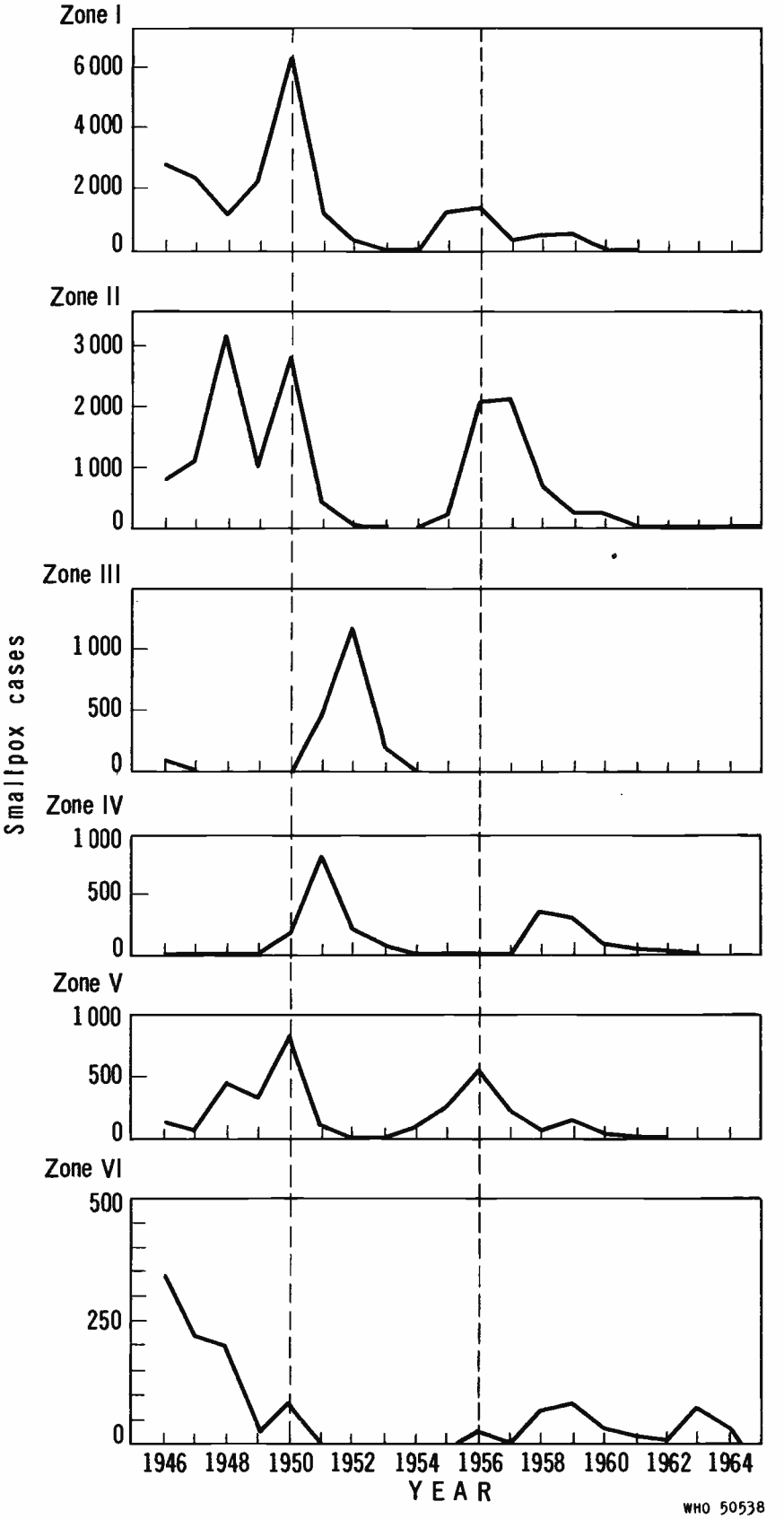
The epidemic years in these six zones are shown in Fig. 1.

During the first epidemic period (1946-52) epidemics occurred almost simultaneously in Zones I and II, and in Zone V. The epidemics in Zone III and Zone IV occurred later.

During the second epidemic period (1955-59) an epidemic occurred first in Zone I, and later successively in Zones II, V, VI and IV.

FIG. 1

SMALLPOX EPIDEMIC YEAR IN SIX ZONES OF COUNTRY B (1946-1964)



Taking into consideration the geographical situation of each zone mentioned above, there is a tendency for epidemics to occur first in the densely populated and then in the peripheral areas.

Death rates

If deaths during each year 1946 to 1964 are related to the reported cases in the same years, the percentages range from 10 to 40. The highest proportion of recorded deaths to recorded cases was observed in the epidemic years.

3835 cases were admitted to the Infectious Diseases Hospital of the capital during the period 1948-63 and 787 were fatal - a fatality rate of 20 per cent.

Seasonal distribution

In each year of the period 1958-63 more than 70 per cent. of the cases were reported between December and April. There is usually no distinct peak of reported cases in any particular month in this period.

Age distribution

The age distribution of cases reported in 1964 was reviewed, as shown in Table 2. 50 per cent. of the cases were in children under 15 years of age.

TABLE 2. AGE DISTRIBUTION OF SMALLPOX CASES REPORTED IN 1964

Age	No. of cases	Per cent.
0-5	20	24
6-15	22	27
16-	40	49
Total	82	100

VACCINE

Vaccine supplies

The Pharmaceutical Institute at the capital city produces liquid vaccine at present which is issued in brown-coloured capillary tubes containing 5 doses in each, well-labelled with an expiry date and clear instructions about storage. At present, liquid vaccine is used only for routine vaccination in the maintenance phase in urban areas.

Two members of the staff of the Pharmaceutical Institute were trained in the production of freeze-dried vaccine at the Lister Institute. Freeze-drying equipment and two air-conditioning plants provided by UNICEF are expected to arrive in April 1965. Local production will probably start by the end of 1965 and after the initial trial batches have been produced and found satisfactory, production will gradually be raised to 7 million doses annually - enough for the attack phase, and more than will be necessary for the maintenance phase.

Freeze-dried vaccine from the USSR has been used in the mass campaign since August 1963 and during 1964 6 million doses of this vaccine were received partly through bilateral arrangements and partly through WHO. 6-7 million doses of vaccine will be required annually until local production is adequate.

Distribution of vaccine

Both lymph and freeze-dried vaccine are stored under good conditions in the cold room of the Pharmaceutical Institute. Vaccine is distributed, usually at the end of every calendar month, to district health offices where it is stored in refrigerators for a few days only before it is distributed to rural health centres. At the rural health centres there are no cold storage facilities and the vaccine is stored at room temperature under water containers. Instructions are issued with the USSR vaccine that it requires storage at a temperature below +10°C.

National smallpox eradication programme and its planning

The basic principle of the national smallpox eradication programme in Country B is to divide the country into operational units and carry out mass vaccination by house-to-house visits in one-third of each operational unit each year. At the same time primary vaccination of new entrants is to be carried out in the remaining

two-thirds of each unit. Thus by rotation the whole area of each unit is to be covered by the mass campaign every three years. The area of each operational unit is that covered by a rural health centre (RHC), or an average population of 20 000, so that each year 6000 to 7000 persons have to be vaccinated in each unit area. The actual number varies from area to area and may be as low as 3000 or as high as 9000. In each operational unit one vaccinator under supervision of the Health Assistant of the RHC is expected to conduct the mass vaccination campaign in one-third of the unit and primary vaccinations in the other two-thirds. This is called Method I, the Method of self-maintenance. There is also Method II, the Method of mobilization, when a mass vaccination campaign is to be carried out as a "crash-type" campaign for a short period by means of mobilizing all available personnel in an area and vaccinating the population at collecting points. Method II is meant to be used in selected urban areas and remote border areas where communications are difficult.

Personnel

There are 893 vaccinators, 525 in rural health centres and 368 hitherto employed by municipalities and district councils. Every rural health centre operational unit has one vaccinator and the number in a town depends on the population.

Supervisory staff

At the operational unit level there are health assistants and local authority health inspectors. At the divisional level the Health Officer will exercise general supervision over the vaccination campaign, and at the township level the Township Health Officer will perform these duties. At the central level, there is the Deputy Director, Communicable Diseases Control and the Assistant Director (Epidemics) who are responsible for the smallpox campaign along with other control programmes.

Equipment

All the necessary equipment for vaccinators is issued from the Directorate of Health Services through the Central Medical Stores. Each vaccinator has a vaccinator's kit with a number of needles, cotton-wool, soap and vaccine.

Transport

In the rural operational units vaccinators and health assistants have no transport. They move from village to village on foot, and sometimes use public transport where available. In the towns also the vaccinators and health inspectors are not provided with bicycles.

Technique of vaccination

All vaccinators and supervisors are trained in the use of two insertions each by one scratch 1/4" in length at the insertion of the deltoid muscle for primary vaccinations and on the forearm for revaccinations.

Numbers so far vaccinated

Campaigns were carried out in nine pilot areas during 1963. Methods I and II were used. Altogether 2.6 million vaccinations were performed in these pilot areas during 1963. In the main campaign which began in 1964 5.5 million vaccinations have been carried out. The success rate of primary and revaccinations in one area is given in Table 3.

TABLE 3. SUCCESS RATES FROM JANUARY TO DECEMBER 1963 AND JANUARY TO DECEMBER 1964 IN ONE AREA

	No. of vaccinations	No. verified	No. of successes	Success rate
	(from January to December 1963)			
Primary	17 676	14 497	9 703	67%
Revaccination	26 883	14 954	3 659	25%
Total	44 559	-	-	-
	(from January to December 1964)			
Primary	26 248	22 005	17 897	81%
Revaccination	79 380	56 525	16 881	30%
Total	105 628	-	-	-

As seen in this table the success rates in 1963 were 67 per cent. in primary and 25 per cent. in revaccination. The rates in 1964 were 81 per cent. in primary and 30 per cent. in revaccination. The low success rates in primary vaccination should be noticed. At least 80 per cent. of primary and 50-70 per cent. of revaccinations were verified.

The team visited the capital city, the headquarters of three districts and several rural health units, hospitals and villages, in order to observe the progress and execution of the smallpox eradication programme.

The proportions of the population vaccinated have been calculated on the 1961 census figures, except in the old capital city and a township. Though a good national registration system and system of family registers is available, this was not used to estimate the total population in most of the places visited (nor presumably in most parts of the country).

The vaccinators have worked diligently as can be seen from the number of vaccinations performed. The team found the family registers prepared by the vaccinators neatly written and in one of the villages their correctness was verified by the team. However, there was a lack of close supervision. The vaccination method varied from unit to unit and in one town time-expired vaccine was used.

The preparation of the monthly, quarterly, and annual reports was satisfactory, but the amount of time required to complete all the records and deal with them at the different administrative levels is very great. It was found that in fact the data provided were not being used to give a current evaluation of the programme.

UNICEF provides transport for rural health development and, as a result, the district hospital health office and municipal health office have their own transport, either jeep or Volkswagen minibus. No transport was, however, available for the vaccinators stationed at the rural health centres and this substantially reduced the number of vaccinations they could perform.

Vaccine is being stored in the cold storage of the Pharmaceutical Institute. At district level the vaccine is stored in the refrigerators below 10°C. Supplies are issued at monthly intervals from the district officers to the rural health units. In these the vaccine is kept at room temperature - a procedure not in accordance with the printed instructions issued with the USSR freeze-dried vaccine.

Comments

1. Planning

The plan of operations containing Method I and Method II is satisfactory, but Method II should be modified and house-by-house vaccination should be carried out as was done in the old capital city. Though it is a "crash-type" mass campaign it is essential that accurate estimates of the coverage and success rates should be made and recorded.

The 1961 census figures may be useful for the planning stages, but for execution the national registration data should be used.

The number of vaccinators is adequate.

The record system is sufficiently comprehensive to provide the necessary information for assessing the progress and effectiveness of the campaign

2. Organization

The great disadvantage is the absence of medical officers engaged full-time on smallpox control at any level. The success of the campaign depends upon the skill and interest of the vaccinators who are the only full-time workers in the programme and who work without technical guidance or supervision.

Another effect of the absence of full-time campaign officers is the failure to utilize the data in the monthly, quarterly and yearly reports. These the team found to have been very carefully and accurately compiled and very valuable when the operation was being assessed.

Though the administrative system is in transition at present, this should not hamper the progress of the programme because the Government has stated that it will retain the present operation areas (with about 20 000 population in each) as the basis of their eradication programme by them.

3. Training of health personnel

The health officers whom the team met lack full understanding of the importance of the programme and of the need to assess progress accurately at frequent intervals. Refresher courses for medical officers and for health assistants should be instituted.

4. Execution

The work of the vaccinators is satisfactory. Stage I of the campaign has been completed as planned. The recording system is also generally satisfactory though sometimes discrepancies were found in the various tables prepared.

As has already been mentioned, the absence of supervision, the shortage of trained medical officers, and lack of full-time campaign officers may well jeopardize the ultimate success of this campaign.

A summary of the observations made by the team is given in the following table:

TABLE 5. RESULTS OF STAGE I OF THE CAMPAIGN OBSERVED BY THE TEAM

Name of area	Coverage	Success rate	
		Primary	Revaccination
Capital city	85%	Not available	Not available
District I	79% (over-estimated)	93%-100%	17%-19%
District II	95% (over-estimated)	79%	17%
Old capital city	85%	99%	25%
District III	93% (over-estimated)	67%-81%	25%-30%
One township headquarters	98%	77%	Not available

The old capital city was probably well immunized, but one cannot be certain that herd immunity in the other areas is adequate. In future the work in each area will have to be concurrently assessed by trained full-time campaign officers before there can be any assurance that the results of the programme are satisfactory.

Checking of success rates in primary vaccination and revaccination has been carried out satisfactorily - in most areas over 80 per cent. of primary vaccinations and over 50 per cent. of revaccinations have been examined and the success rates recorded.

Absence of transport for vaccinators and health assistants is hampering the rapid progress of the campaign.

The storage of the USSR vaccine at room temperature for one month in rural health units is against the instructions issued with the vaccine and careful checks on the potency of the vaccine must be made at intervals during this period of storage - especially during the later stages of the storage of each consignment.

There have been two major epidemic periods since 1946 in the country as a whole. The interval between the periods varied from one to six years in different areas. The present low case incidence cannot yet be ascribed with certainty to the effectiveness of the smallpox vaccination campaign.

RECOMMENDATIONS

1. Full-time campaign officer at the Centre

(a) For the efficient execution of the smallpox eradication campaign it is essential that a full-time Assistant Director should be appointed to take charge of the campaign under the general guidance of the Deputy Director, Communicable Diseases Control. The smallpox eradication programme, if vigorously implemented, will yield rich dividends in the short period of three years if well supervised and diligently and enthusiastically pursued at all levels.

(b) At the divisional level in the new administrative structure it is strongly recommended that special full-time campaign officers should be appointed under the Divisional Health Officer. Where this cannot yet be done, full responsibility for supervision of the programme should rest directly on the Divisional Health Officer; at township level full responsibility should rest on the Township Health Officer. In the rural health centres closer supervision must be exercised by health assistants than at present.

2. Utilization of the present assessment scheme

Township health officers should check coverage rates by operation areas, investigate the success rates in both primary vaccinations and revaccinations and take appropriate steps to deal immediately with any shortcomings which he finds.

3. Independent assessment team

A central evaluation team, headed by a senior health officer, should be set up to make periodic assessments of the programme in operation areas sampled at random in every dividion. The findings should be communicated to all divisional health officers, township health officers, and health assistants responsible for the implementation of the programme.

4. Method II

The method by which all available resources are mobilized to conduct a mass vaccination programme in a short period should be confined to selected difficult areas, where it is not possible to implement Method I. Method I with freeze-dried vaccine should be the method of choice in all areas in 1965 and 1966.

5. Transport

The vaccinators and health assistants have to be made mobile for better and quicker execution and supervision of the programme and for this the provision of bicycles is essential.

6. Simplification of recording

Ten record forms are too many. The number should be reduced and the information demanded simplified to lighten the clerical work of the vaccinator. Vaccination figures for primary vaccination and revaccination should be returned in three specific age-groups - 0-4, 5-14, and 15 and over. The number of vaccinations observed and the number successful should also be given in these three age-groups.

7. Use of national registration

Family registers prepared during the operation of the smallpox eradication campaign should be utilized for concurrent assessment of coverage and reliance should not be placed on the 1961 census figures alone. Mopping-up operations should be carried out where adequate coverage has not been obtained.

8. Uniformity of vaccination technique

The number of insertions by the linear scratch technique needs to be made uniform all over the country.[1] The age for primary vaccination should be reduced from six months to three months.

9. Training

Assistant health officers need orientation courses in the execution, supervision and assessment of the smallpox eradication programme. Short refresher courses of a week's duration should be organized for vaccinators and health assistants to give them greater grounding and achieve uniformity in the execution of the programme.

10. Vaccine

In view of the absence of refrigerators at township and rural health central level and the prevalence of high atmospheric temperatures, it is recommended that supplies be made to rural health centres every two weeks instead of every four weeks, as at present. Steps should be taken to ensure that time-expired vaccine is destroyed so that it will not continue to be used, as sometimes happens at present.

11. Assistance needed from outside sources

Supply of an annual amount of freeze-dried vaccine equivalent to 7 million doses should be assured until the local institutes become self-sufficient in the production of freeze-dried vaccine.

CONCLUSIONS

The smallpox eradication programme has been well planned in Country B and has been fairly well executed in 1963 and 1964.

If the recommendations made above are implemented it can be confidently expected that initial control and ultimate eradication of smallpox is well within the realm of possibility.

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[1] Wld Hlth Org. techn. Rep. Ser., 1964, 283, Report of the WHO Expert Committee on Smallpox.

SUMMARY OF A REPORT ON A VISIT TO COUNTRY C BY A TEAM OF CONSULTANTS ON THE WHO SMALLPOX ERADICATION PROGRAMME

4-15 February 1965

INTRODUCTION

Country C - total area 330 000 square miles - is divided into four regions and the Federal Territory.

There are four main physical and climatic zones. The coastal belt with sandy sea shore, lagoons, swamps and the river delta; the tropical rain forest varying in width from 40 to 100 miles; open woodland and grass savannah about 100 miles wide.

The climate is tropical. The dry season extends from November to March and only brief showers occur in early morning. Rainfall decreases and daily temperature variations increase from south to north.

In the 1963 census the total population was recorded as 55 620 268, distributed as follows:

Region I	- 29 758 875	(105 persons per square mile)
Region II	- 12 394 462	(420 " " " ")
Region III	- 10 265 846	(341 " " " ")
Region IV	- 2 536 839	(167 " " " ")
Federal Territory	- 665 246	(29 638 " " " ")

In Region III, 40 per cent. of the population lives in towns of 100 000 or more compared with seven per cent. in Region II and four per cent. in Region I. About 80 per cent. of the population is agricultural.

Seasonal migration within the country is common among nomads in Region I who move regularly to find better pasture for their animals. There is also migration within the country at harvest season.

There are about 250 tribal groups.

Region I is predominantly Moslem whilst Regions II and IV are predominantly Christian. Region III is about equally divided between Christians and Moslems.

There are reasonably good road and rail communications, sometimes affected by the seasonal rains. There are also local coastal shipping services, river and lake steamers and an airways network which serves the main cities.

HEALTH SERVICES STRUCTURE

The country is a Federal Parliamentary Republic with the public administration at federal, regional and provincial levels.

The Federal Government deals with international quarantine, the medical register, control of pharmaceutical products, epidemiological reporting, sanitary control of ports and international airports, and the country's relationship with WHO, UNICEF, and other international bodies. To co-ordinate the health activities at national level, there is a National Council on Health, which consists of the regional ministers of health with their chief executive officers and chief professional advisers. The Chairman is the Federal Minister of Health. A technical committee of this Council examines all technical and professional matters and submits proposals to the National Council of Health for approval.

At federal level, under the Minister of Health, the Chief Medical Adviser is the executive head of services, and has under his control five divisions: (1) the health services division, (2) the hospital services division, (3) the statistical division, (4) the radiology division, and (5) the chemistry division.

The organization of the Ministry of Health in each region has more or less a similar pattern.

Within the province of each region there are local administrations (local authorities). The general health of the population in rural areas is mainly the responsibility of this local authority in all four regions.

The staff of peripheral services in dispensaries and maternity and child health centres are paid by the local authority.

Region I

The curative services division and the preventive services division are responsible for the main activities of health services, under the over-all guidance of the permanent secretary of the regional Ministry of Health.

The provinces have medical areas within their jurisdiction, with a hospital as base. The medical areas have decentralized executive health services for the provinces, under the Ministry of Health.

Every medical area is supposed to have a senior medical officer for hospitals and a senior medical officer for health to supervise curative and preventive services within it. Actually there are 35 medical areas within Region I, but only six of them have senior medical officers for health, the other 29 coming solely under the general guidance of the senior medical officer for hospitals, for all health activities.

The local authorities' contribution to rural health is provided by:

(a) dispensaries, staffed mainly by dispensary attendants;

(b) maternity and/or child welfare units with a maximum of five beds staffed by grade II midwives;

(c) health staff, usually based at a dispensary, comprised of: (1) health inspectors, (2) health assistants, (3) vaccinators;

(d) leprosy clinics for out-patient treatment.

The health staff of local authorities are responsible for carrying out smallpox vaccination under the supervision of the governmental medical area staff and are also responsible for environmental sanitation, food hygiene, etc.

There are 70 local authorities, but only 62 have their independent treasuries. Total health units run by local authorities and supervised by governmental staff from medical areas are 571, which works out to one unit for 50 000 people spread out in 500 square miles.

Region II

The region is divided into 12 provinces, 27 divisions and 107 local authorities.

Every rural area is accessible. Facilities of communication and transportation are good except in two districts.

At the local authorities level, there are 73 health centres, 150 maternity centres (four to eight beds) and 269 independent dispensaries. Each health centre has one dispensary attendant, one midwife (grade II), one community nurse, one overseer and one health centre supervisor. The maternity centre with eight beds has a community

nurse and a midwife and the maternity centre with four beds has only one midwife. Every centre is supposed to be visited by the medical officer once a month, but this is not possible since there are only four medical officers of health and three rural medical officers in the region.

Region III

The curative services division and preventive services division, each under a principal medical officer, are responsible for all the health activities.

The medical division has under its guidance hospitals, nursing homes and permanent medical institutions.

Under the health division come the health activities performed by static and mobile units.

The region is divided for purposes of preventive health services into divisions under the supervision of health superintendents. Several health superintendents are posted in large towns as 40 per cent. of the population of Region III is town-dwelling. The number of local authority maternity centres is 265 and the number of local authority dispensaries is 363.

Region IV

This region was created in 1963 by separating it from Region III.

Health facilities in rural areas in this region are provided by (1) three health centres (each with four beds, one doctor and 12 nurses on its staff), (2) 181 dispensaries, and (3) 119 maternity centres.

EPIDEMIOLOGY

In Fig. 1 are shown the reported cases of smallpox in Country C from 1941 to 1964. There was an upward trend from 1941 to 1950 when the highest number of cases (20 000) was reported. Since the year 1950, the trend has been downward. In this downward trend, there have been three distinct epidemic peaks, the first in 1948 when 6000 cases were reported, the second in 1957 when 10 000 cases were reported and the last in 1960 when 4000 cases were reported. The interval between these peaks is two to three years. During the past four years about 1500 to 3500 cases have been reported annually. The figures on which the graph is based are given in Table I.

FIG. 1

YEARLY TREND OF REPORTED SMALLPOX CASES IN COUNTRY C 1941-1964

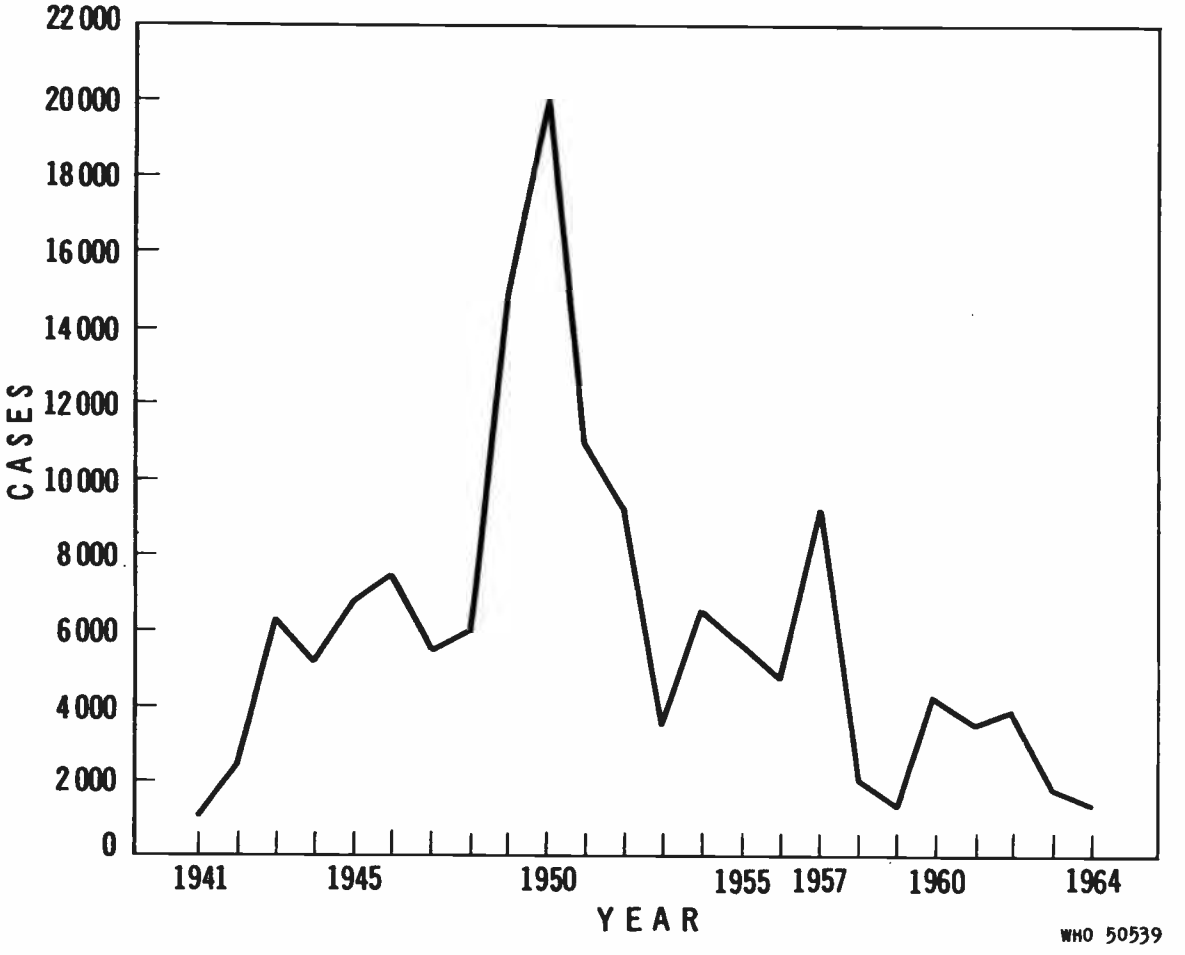


TABLE I. NOTIFICATION OF CASES AND DEATHS FROM SMALLPOX IN COUNTRY C, 1941-64

Year	Cases	Deaths	Year	Cases	Deaths
1941	1 097	210	1953	3 258	425
1942	2 514	502	1954	6 362	733
1943	6 360	1 234	1955	5 780	732
1944	5 164	816	1956	4 798	593
1945	6 720	1 117	1957	9 733	1 350
1946	7 620	1 015	1958	1 808	193
1947	5 425	954	1959	1 562	212
1948	5 744	830	1960	4 078	377
1949	14 863	2 246	1961	3 611	349
1950	20 940	3 379	1962	3 864	439
1951	11 879	2 276	1963	1 778	164
1952	9 260	1 626	1964	1 472	129

The morbidity in Regions I, II, and III* was examined using the population figures of the 1963 census. The population ratio of Regions I, II and III* is approximately 2.5:1:1. In Table II are shown the adjusted figures of the yearly average number of cases during the past five years.

TABLE II. FIVE-YEAR AVERAGE OF SMALLPOX CASES AMENDED BY POPULATION RATIO, 1960-64

	Region I	Region II	Region III*
Population ratio	2.5	1	1
Five years' average smallpox cases	2 581	135	221
Adjusted figures	1 032	135	221

* Inclusive of Region IV and Federal Territory.

Since notification is incomplete, it is difficult to know accurately the fatality rate from smallpox. An attempt has been made by reviewing yearly the number of deaths in relation to the number of reported cases during the past 24 years in the country as a whole, and the results are shown in Table III.

TABLE III. REPORTED DEATHS AS A PERCENTAGE OF REPORTED CASES IN COUNTRY C, 1941-64

Percentages	No. of years
Less than nine	3
10-14	12
15-19	7
20 and over	2

Years with percentages between 10 and 14 occur most frequently. Years with less than nine per cent. or over 20 per cent. occur least often.

Information on the age distribution of smallpox cases is limited.

In 1957, 572 cases were reported from the capital city. As shown in Table IV, 47 per cent. of cases were in the over-15-years age-group.

TABLE IV. AGE DISTRIBUTION OF SMALLPOX CASES REPORTED FROM THE CAPITAL CITY IN 1957

Age	Number of cases	Percentage
0- 4	126	22
5-14	178	31
15 and over	268	47
All ages	572	100

The findings suggest there are still many adults susceptible to smallpox in the capital city.

VACCINE

The team visited the smallpox vaccine laboratory. Two types of smallpox vaccine are being produced - lanolinated lymph vaccine in collapsible tubes of 20 doses and freeze-dried vaccine in 25-dose and 100-dose ampoules.

The vaccines are stored at minus 15°C. The present stock of vaccine is:

1. 411 834 x 20-dose tubes of lanolinated vaccine (about 8 million doses).
2. 5.5 million doses of freeze-dried vaccine which is inclusive of 1.2 million produced in January 1965.

Sheep are used for the production of vaccine. The rabbit-skin scarification test is being used for testing the potency of lanolinated vaccine and the inoculation of CAM of developing chick embryo method for the potency test of freeze-dried vaccine. Sterility tests for both vaccines are being carried out. No heat stability test for freeze-dried vaccine has been carried out so far and no information was available as to the conditions necessary for storage or about its expiry date. Each batch of both final products is being tested in the field by vaccinating infants in the Maternal and Child Health Centre. No label is attached to the final containers of the lanolinated vaccine.

There are difficulties concerning maintenance of freeze-drying equipment and this results in breakdowns for long periods; there is a shortage of trained laboratory workers.

Comments

1. If Country C launches a smallpox eradication campaign, it will require 20 million doses of freeze-dried vaccine yearly, the population of Country C being 55 million according to the 1963 census.

2. The vaccine laboratory is not yet ready to achieve this target production. The potency, heat-stability, bacterial counts, etc., of the present freeze-dried vaccine should be checked by an independent assay laboratory.

A WHO consultant on the production of freeze-dried vaccine should be provided initially for a period of six months, to sort out and resolve the difficulties which are being experienced at present and raise the yearly production to 20 million doses.

THE VACCINATION PROGRAMME

Smallpox vaccination programme in the Federal Territory with a population of 675 000

Since 1878 primary vaccination has been compulsory and the practice is to vaccinate children when they are five months old. Vaccination is by multiple pressure. The total number of vaccinators is 80 to 90 and every year a mass vaccination programme without systematic coverage is carried out for one month at 20 to 25 collection centres in the city. Besides this, there are five centres for child welfare where facilities for routine vaccination are available.

It was planned to launch a more organized vaccination programme with freeze-dried vaccine from 1 March 1965. Urban health centres (three at present, one under construction) will be entrusted with the responsibility of vaccinating the entire population, house-to-house in their ward.

The population of the Federal Territory is expanding rapidly and in view of rapid movement of the population, it is difficult to cover the whole population unless a country-wide campaign is launched.

Smallpox vaccination in Region I

The Ministry of Health drew up a plan in 1962 for 36 vaccination teams (each consisting of 10 vaccinators, five recorders and one supervisor), with adequate transport and freeze-dried vaccine, to cover the entire population of the region within three years. The personnel was to be provided by the regional authorities and transport and vaccine by the federal authorities. As vaccine and transport had not yet been made available the plan had not been implemented.

A local vaccination programme is being carried out by the health personnel (dispensary attendants, health assistants, etc.) of the local authority and is supervised partly by supervisory staff of the Provincial Government. Vaccination is by multiple pressure with lanolinated vaccine of which the expiry date is unknown because of the lack of labelling. In 1963, about two million vaccinations were recorded. No breakdown of primary and revaccination was available. No coverage rate in operation areas was available. Supervision of vaccination work is very difficult because there is an extreme shortage of supervisory personnel at provincial

government level. In addition, questions often arise over allocation of duties and responsibilities between the government supervisory staff and local authorities staff. At present in the region there are at least 383 native authority employees designated as vaccinators.

Conclusion

Female vaccinators are essential for the success of any campaign in Region I where Muslim tradition and beliefs prevent male vaccinators from entering the women's section of the compound to deal with women, infants and children. Opposition to vaccination is reported to be still very strong in rural areas and intensive health education will have to come first in the areas of mass vaccination campaigns.

The Permanent Secretary of the Ministry of Health said that smallpox was one of the major problems of the region, but implementation of the over-all systematic vaccination programme depended upon the decision of the Federal Government, which would supply the freeze-dried vaccine, funds and transport.

Smallpox vaccination in Region II

Routine vaccination is being carried out mainly by midwives and health overseers who are assigned to the health centres belonging to local authorities. However, it is not possible for the provincial supervisory staff to exercise careful supervision over the work of the local authorities staff. The team visited one health centre where a dispensary attendant, health overseer and a community nurse and midwives were interviewed. It was mentioned by the Medical Officer from the Ministry of Health that there are personnel available for the vaccination campaign once it starts. However, they cannot be employed as full-time campaign vaccinators as they have other duties such as maternal and child health work and food inspection and sanitation.

Smallpox vaccination in Region III

Routine vaccination is being performed by dispensaries, maternity and child health centres' staff of the local body and supervised by staff of the regional government. The team visited one dispensary and maternity and child health centre of the local body in the rural area. There was no permanent vaccinator, but the midwives grade II and health assistants were carrying out routine vaccination in the health centres and adjoining villages. Vaccination is by multiple pressure. A form for vaccination

includes name, sex, age, residence, date and result. However, there was no verification. These records were not being used for checking the situation of routine vaccination. There was no refrigerator. The unlabelled lanolinated vaccine was kept at room temperature for one week.

The team met the Senior Health Officer of the Ministry of Health of Region III. He referred to the discussions held earlier at the National Health Council level, at the meeting of health officers of all the regions and at federal level on a nation-wide smallpox eradication programme, as a result of which plans were drawn up. Due to lack of freeze-dried vaccine these have not yet been implemented. During discussions the following points emerged:

1. The existing basic health services with field medical units (see smallpox vaccination by yaws teams below) would be sufficient to cover the entire population with effective vaccination within three years. The town-dwelling population - 40-50 per cent. of the entire population - would be covered mainly by the urban static health units and the rest of the population in the rural areas both by mobile teams and static local authorities' health units.

2. Health superintendents (40) belonging to the regional government and assistant health superintendents (14) on the staff of local councils, would be available as supervisory staff.

3. A statistical unit is being set up in the Ministry of Health with the assistance of a WHO medical officer assigned as Public Health Adviser to the Ministry. This would help careful and correct recording and reporting systems for the campaign. A special statistics unit should also be set up at federal level to co-ordinate the simultaneous implementation of the programme in each region.

Smallpox vaccination by yaws teams

The yaws project assisted by WHO started in 1954, was confined in each region to rural areas where endemic foci existed, and entered the surveillance stage about 1961 as by that time incidence of infectious yaws had shown a marked decline. The integration of smallpox vaccination and leprosy control with the yaws project worked as a stimulus to the health scouts because it gave added purpose to the tedious task of searching for residual cases of yaws village to village. It also provided

a strong argument for their retention by local authorities who were usually not prepared to foot the bill for their service for the sake of searching out a few yaws cases.

At present there are altogether: 10 medical field units, 10 health supervisors, 152 inspector assistants and 552 health scouts all over the country, and their distribution is shown in Table V.

TABLE V. DISTRIBUTION OF FIELD YAWS TEAMS IN COUNTRY C

Region	No. of field units	Health inspectors	Inspector assistants	Health scouts	Total No. of personnel
Region I	3	3	45	126	174
Region II	4	4	57	232	293
Region III	2	2	31	103	136
Region IV	1	1	19	91	111
Whole country	10	10	152	552	714

The activity of health scouts is, however, confined to only those rural areas where yaws projects are operating; for instance, in Region III only 3-4 million out of a total population of 10 million are being covered. The health supervisors are being paid by the regional government and the rest of the personnel by the local authorities.

In 1964, 544 000, 440,400, 460 000 and 157 000 vaccinations were carried out by these field medical units in Regions I, II, III and IV respectively.

In Region III the success rates of primary and revaccination were reported to be 78 and 66 per cent. respectively. The success rate of primary vaccination is apparently low and the data are difficult to interpret because it is unusual to find that a vaccine which gives a success rate of 66 per cent. on revaccination gives only 78 per cent. in primary vaccination.

The team observed the work of one of these field medical units which was working in the bush (rural area) in Region II. There were one supervisor and two scouts who had been working for the yaws project since 1954. Vaccination was by multiple pressure, giving about 10 pressures in primary vaccinations and about 20 in revaccinations. The technique was satisfactory. Lanolinated vaccine was being used but it was not carried in thermos flasks in the field. The unit was making house-to-house visits and examining the people for leprosy and yaws and simultaneously vaccinating them if they had not previously been vaccinated. This was the second visit - the first was made in 1962 and records of this visit have been well kept and were being utilized for the second visit. On the record form the reactions are classified into primary vaccinia, accelerated reaction, and immediate reaction, together with no reaction and there is no column for the number verified. Although the unit was observing about 50-60 per cent. of reactions, it was difficult to find out the correct success rate in primary and revaccination with this form. Recently this form was revised by the WHO Medical Officer.

SUMMARY

Under the National Health plan, linked with the National Development plan for 1962-68, the proposed expansion of the curative and preventive services has been mentioned both in the Federal Territory and separately in each region but there is no specific mention of a smallpox eradication programme as such. There is, however, mention of the enlargement of a smallpox vaccine laboratory under federal government plans.

During initial discussions at the Federal Ministry of Health with the Chief Medical Adviser of the Federal Government, the team was informed that the National Council of Health has accepted in principle the launching of the smallpox eradication programme in all the regions and that the programme was to have started from October 1964 but due to the lack of a sufficient quantity of freeze-dried vaccine there has been a delay.

The team visited the capital towns of Regions I, II, and III, and held discussions with the First Secretary to the Government in Regions I and II and with the Principal Health Officers in all three regions. The team was informed that each regional government had already submitted its detailed proposals to the Federal

Government and is anxious to launch the programme on an assurance from the Federal Government that (1) a continuous supply of freeze-dried vaccine will be made available during the three years of the attack phase and subsequently during the maintenance phase, (2) the Federal Government should take a decision on the financial assistance that each region will receive to meet the extra expenditure incurred on the programme in the way of transport, equipment and pay of extra staff, both basic and supervisory.

It has already been stated under "Vaccine" that the present stock of freeze-dried vaccine stands at 5.5 million doses and that the vaccine laboratory is not in a position to assure a continuous supply of 20 million doses per year. The first essential step is to get one or two batches tested at the independent assay laboratory both for their potency and heat stability and then to send a WHO consultant to find out what assistance the vaccine laboratory needs to produce 20 million doses per year.

Assuming that the difficulties connected with the yearly production of 20 million doses of freeze-dried vaccine are overcome with WHO assistance, and financial assistance to each region is assured by the Federal Government of Country C, the team considered whether with the pooling of existing basic health personnel in each region, the programme could be started simultaneously in all regions. The following health personnel, if pooled, are available for carrying out mass vaccination programmes:

	Health scouts	Health personnel at static health posts (health overseers, midwives, etc.)
Region I	126	383
Region II	232	283
Region III	103	400
Region IV	91	-

Health scouts, as stated earlier, are the field personnel of the so-called medical field units who are now engaged in the detection of residual cases of yaws, leprosy control and carrying out mass vaccination against smallpox in their limited area.

Health personnel at various static health posts usually consists of a health overseer and a midwife; the latter cannot be engaged on the full-time vaccination programme because her main duties are connected with conducting confinement cases in dispensaries and the health overseer has also to perform duties connected with food hygiene and environmental sanitation.

Health scouts, health overseers, health assistants and midwives receive their salary from the budget of local authorities - hence the local authorities' concurrence will have to be obtained in each region before launching the programme. Supervisory staff in the way of health superintendents and health inspectors, paid by regional governments, will also have to be pooled, as without adequate supervision, work can be very patchy and the objectives of the programme will not be achieved. It is also necessary to solve the existing problem of relationship between the local body and regional government supervisory staff, especially in Region I. The team came to the conclusion that in Regions II, III and IV, if a special campaign is launched with full financial support, adequate transport and a continuous supply of vaccine, the attack phase could be completed in three years, whereas in Region I additional staff would have to be recruited and trained before launching a campaign.

RECOMMENDATIONS

It is essential that at federal level there should be a special officer in charge of this carpaign to guide and co-ordinate the implementation of the campaign in different regions. At the regional level also a special campaign officer would have to be appointed to be in charge of the regional campaign.

The Technical Committee of the National Council of Health would be wise to appoint a sub-committee on smallpox eradication, and the special campaign officers at federal and regional level would have to be appointed to the sub-committee which would have to meet frequently to co-ordinate, assess and guide the national campaign.

It may be necessary to set up pilot areas in each region to gain experience about personnel, equipment, transport and coverage of the population before the final plans can be drawn. Funds and vaccine must be assured before launching a country-wide eradication campaign. The staff engaged at present in routine vaccination programmes in each region may have to be given short refresher courses in the reconstitution of freeze-dried vaccine, vaccination techniques and reading and recording of results.

It would be helpful if WHO could provide consultants to organize the programme from its initial stages to ensure that all difficulties are sorted out before launching the campaign.

A special statistical unit at federal level would be necessary to co-ordinate the statistical data of all regions.

An independent assessment team at federal level to carry out concurrent assessment of the programme in each region would be very beneficial, as its reports will bring out the lacunae in the execution of the programme and provide an opportunity for removing the difficulties in good time.

Before leaving Country C, final discussions were held with the Chief Medical Adviser of the Federal Ministry of Health and from the trend of the discussion it emerged clearly that the Federal Government had not so far considered the question of giving financial assistance to regional governments for the launching of the programme. The Federal Government was only planning to meet the needs of the regions with their requirements of freeze-dried vaccine. During the discussions, the Senior Medical Adviser was informed by the Secretary of the Technical Committee of the National Health Council that the subject of smallpox eradication was discussed in the Technical Committee only a few days earlier and professional advisers from each region had stated that without financial support from the Federal Government, regional governments are not in a position to launch the programme.

The Chief Medical Adviser inquired whether WHO could supply them with the required amount of freeze-dried vaccine and it was explained that WHO would be prepared to offer assistance in the local production of freeze-dried vaccine but may not be in a position to meet the entire gap between the local production and yearly requirements. The Government was advised to strengthen the staff of the local vaccine laboratory with technical personnel on adequate salary and that their laboratory should ultimately meet not only the needs of Country C but also should be in a position to meet the needs of adjoining countries.

During this final meeting a question was raised about the synchronization of eradication programmes in countries bordering Country C and it was stated that even if Country C launches a programme and the adjoining countries do not start

simultaneous eradication programmes, Country C would be facing the problem of importation of cases resulting in secondary cases. The team said that all countries are being asked to take up eradication programmes and that this problem should not deter them from implementing the programme.

CONCLUSION

In conclusion it can be stated that Country C at present is not in a position to launch even a control programme in the country as a whole.

The difficulties about the annual local production of 20 million doses of freeze-dried vaccine have to be overcome or a continuous supply of an equal amount has to be assured for them from outside sources until they become self-sufficient.

The Federal Government has to signify to each regional government the pattern of financial assistance to meet the cost of the campaign.

Special campaign officers, both at federal level and regional level, have to be appointed and then plans drawn out for a realistic three-year programme to be launched simultaneously in all the four regions.

Assistance by WHO

WHO should provide a medical officer to assist the Federal and regional governments in the planning, organization and execution of the campaign besides giving assistance in vaccine production mentioned earlier.

SUMMARY OF A REPORT ON A VISIT TO COUNTRY D BY A TEAM OF CONSULTANTS ON THE WHO SMALLPOX ERADICATION PROGRAMME

February 1965

INTRODUCTION

The country stretches for about 1 200 000 km^2 and has a population of 4 500 000, with an average of 3.7 per km^2 and is divided into three natural regions:

Region I covers approximately half the country, has an average rainfall of about 400 mm and is located in the centre and south of the country and is mainly devoted to agriculture.

Region II is the stock-raising zone with rainfall from 100 to 400 mm.

Region III is mostly desert with almost no plant or animal life.

The population is mainly rural. The birth rate is high - 4.5 to 5 per cent. - and more than 43 per cent. of the population is under 15 years of age. Only 5 per cent. is over 60 years of age.

The capital town has a population of 110 000. Three other important towns have populations varying from 13 000 to 21 000. Ninety per cent. of the population are Muslims.

TRANSPORT

There are 426 km of railroads. The road network includes main roads, local roads and tracks. Communications are disrupted during rains. Local airlines connect principal cities.

ECONOMIC BACKGROUND

A five-year plan for economic and social development began in 1961 and has now been extended until June 1966. The plan concentrates on the vitally important agriculture sectors and provides for a policy of price stabilization for agricultural commodities.

The five-year plan provides US$ 7.7 million for health, social affairs and pharmacy, with emphasis on five aspects:

(1) medical care, by modernization of hospitals;

(2) mass preventive medicine;

(3) sanitary education;

(4) training of personnel;

(5) research.

A number of countries are giving financial and technical assistance to Country D.

Health budget

The health budget in 1950 represented 10 per cent. of the country's total budget. For 1960 the percentage was about 5.

Health structure

One Director-General of Health under the Minister of Health heads the public health activities and he is assisted by technical advisers and an Assistant Director-General.

The actual planning, execution and supervision of public health activities are being carried out by the Chiefs of Divisions. The Chief of the Division of Hygiene, Epidemiology and Endemic Diseases is responsible for the smallpox programme of the whole country.

The country is divided into six sanitary regions. The regions are divided into "cercles" and every "cercle" into "arrondissements".

In the headquarters of every region there is one regional hospital and at the headquarters of the more important cercles, there is a secondary hospital.

At the headquarters of each cercle there is one medical centre under the direction of one physician, who is responsible for both medical care and public health and has several auxiliaries on the staff of the hospital. The medical centre has beds for maternity, medical care, surgery and endemic diseases.

In rural areas, there are in some of the principal villages rural dispensaries (dispensaires de la brousse) for providing medical care for the population of 10 to 12 small villages. There are 230 rural dispensaries altogether. The staff of a rural dispensary consists of the following: one male nurse, one male auxiliary nurse, one bush midwife and one auxiliary nurse, for leprosy, making a total of four.

TABLE 1. HEALTH PERSONNEL IN COUNTRY D, 1964

Physicians[a]	100
Medical assistants (Infirmier d'Etat)	11
Dentists[b]	3
Fully-qualified midwives	71
Fully-qualified nurses (male and female)	44
Assistant nurses (certificate)	918
Auxiliary nurses	51
Auxiliary social assistants	61
Pharmacists[c]	14
X-ray technicians	1

[a] 3 in private practice

[b] 1 in private practice

[c] 5 in private practice

TABLE 2. HOSPITALS, CLINICS AND DISPENSARIES, 1963

Unit	1963
Large hospitals	2
Secondary hospitals	6
Medical centres	36
Dispensaries	246
Medical units	12
Maternity units	43
MCH - primary	18
MCH - secondary	21
Dispensaries - endemic diseases	7
Dispensaries - mission	30

ORGANIZATION OF THE MAJOR ENDEMIC DISEASES DIVISION

The Major Endemic Diseases Division (Division des Grandes Endémies), which is responsible for the execution and supervision of the smallpox eradication programme, is divided into 11 sectors and the staff of the Division, besides the Director, is as follows:

Medical officers	2
Technical health assistants (ATS)	10
Nurses (first degree)	103
Auxiliary nurses	153
Clerks	6
Personnel on a daily wage	75
TOTAL	349

Qualifications of Health Personnel in Country D

MD (full medical doctors)	Physicians graduated in Europe
African physicians	Physicians graduated at Dakar - four years course
Technical Health Assistant (ATS)	State Nurse with ten years' practice and having to pass one examination
Nurses (first degree) (Infirmier d'Etat)	Graduated in France as State Nurse or graduated at the School of Nursing, in Country D
Specialized nurse	Qualified nurse with special training
Auxiliary nurse	No qualification - only nomination and practical training
Midwives	Primary school required plus 3 years school of nursing
Matrone (rural midwife)	Six months' training at a medical centre
Dispensary attendant (Aide soignant)	No qualification - just nomination
Vaccinators	Primary school required plus three to four weeks' course

EPIDEMIOLOGY

In Table 3 are shown smallpox cases and deaths reported during the past ten years; 1000 to 3000 cases have been reported yearly except in 1964, when only 300 cases were reported.

Region I, located in the southern part of the country, where the capital city is situated, is densely populated as compared with the other two Regions and has a population of about 2.1 million - 50 per cent. of the entire population. Communications are better here than in the other two Regions. The rainy season is longer and the climate is more humid.

TABLE 3. SMALLPOX CASES AND DEATHS REPORTED DURING 1955-64

	Cases	Deaths
1955	726	104
1956	947	94
1957	2 982	276
1958	703	44
1959	772	27
1960	1 212	47
1961	1 706	92
1962	1 521	172
1963	1 096	80
1964	343	18

In the rainy season the main river is flooded which prevents communication between the three Regions.

The incidence of smallpox in the three Regions is shown in Table 4.

TABLE 4. SMALLPOX CASES REPORTED FROM THE THREE REGIONS DURING 1958-63

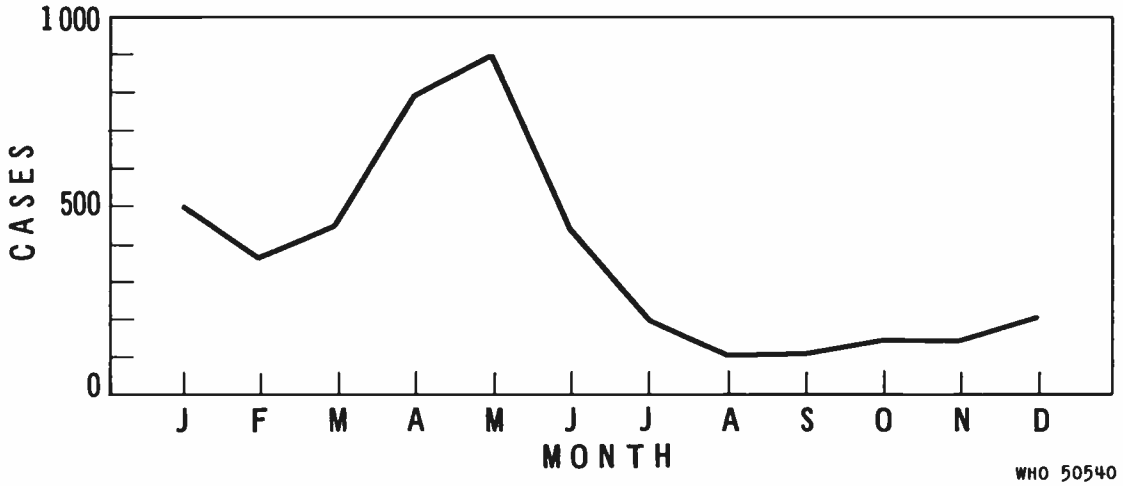
Region	1958	1959	1960	1961	1962	1963
Region I	605	333	970	979	570	289
Region II	98	429	221	535	527	507
Region III	-	10	21	192	424	300
Whole country	703	772	1 212	1 706	1 521	1 096

In Region I between 300 and 1000 cases and in Region II between 100 to 500 cases have been reported yearly; no distinct downward trend is discernible in either Region. In Region III the number of reported cases has increased. Whether this is due to the actual endemic situation or improvements in the notification system is not known.

In order to compare the grade of endemicity in each Region, the number of cases per 100 000 population has been calculated using the population figures for 1962. The results are shown in Table 5.

FIG. 1

MONTHLY DISTRIBUTION OF SMALLPOX CASES REPORTED DURING 1961-63



	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1961	12	35	158	479	399	137	105	51	34	29	68	199
1962	271	168	184	248	249	122	47	20	50	70	28	65
1963	178	174	109	107	220	181	71	16	6	16	14	4
TOTAL	461	377	451	834	868	440	223	87	90	115	110	268

TABLE 5. SMALLPOX MORBIDITY RATE PER 100 000 POPULATION IN THE THREE REGIONS DURING 1958 to 1963

Region	1958	1959	1960	1961	1962	1963	Population
Region I	29	16	47	47	27	14	2.1 million
Region II	8	36	18	45	44	42	1.2 "
Region III	-	1	3	24	53	38	0.8 "
Whole country	17	19	30	42	37	27	

In Region I the morbidity varied from 15 to 50 per 100 000 population; in Region II from 10 to 45 and in Region III from 1 to 50. It is clear that the country as a whole is an endemic country.

The seasonal distribution of smallpox cases has been determined by combining the reported cases for 1961, 1962 and 1963. The highest incidence was observed in April and May when the dry season is ending and the rainy season beginning. The lowest incidence was in August and September when communications are difficult due to heavy rains and the flooding of the main river. Details are given in Fig. 1. With the limited data available it is difficult to state the fatality rate. However, if we compare the number of reported cases with the number of reported deaths, it may be assumed that the fatality rate is low in this country.

SMALLPOX PROJECT IN COUNTRY D

The Plan of Operations for a smallpox eradication project assisted by WHO was prepared after the visit of a WHO consultant in 1962 and was signed by the Government and by WHO in April and May 1964. According to this plan, it was intended to cover the entire population of Country D (then estimated to be 3.8 million) within three years using mobile teams. WHO's commitments were to supply freeze-dried vaccine and one medical officer and the commitments of the Government were to appoint a full-time physician for directing the campaign, and five teams of ten vaccinators, each with the necessary means of transport.

The team was informed by the Director, Major Endemic Diseases Division, that a mass vaccination programme with 30 vaccinators (divided into two teams of 15), four male nurse inspectors, two part-time medical officers, four lorries and one jeep was started in December 1962 in the southern part of the country. Towards the end of 1964, 850 000 vaccinations had been carried out (300 000 in 1963 and 550 000 in 1964).

USSR freeze-dried smallpox vaccine was used. One hundred doses of USSR vaccine was mixed with one hundred doses of yellow fever vaccine (Dakar strain) in gum arabic diluent and simultaneous protection was given against smallpox and yellow fever. The practice of combining both the vaccines is also in operation in adjoining countries.

The technique of vaccination was by a linear scratch. Two insertions were made in the case of primary and three in the case of revaccination but each linear scratch was more or less adjacent to the other and not 2.5 cm apart. There was slight oozing at the site of vaccination but dabbing of vaccine was not being carried out. Ninety per cent. alcohol was being used for cleaning the skin before vaccination. The vaccinator's form for the recording of this vaccination programme during 1963 and 1964 was in accordance with the form mentioned in WHO/Smallpox/10.[1] It includes the family name, number of primary vaccinations and revaccinations, age-group (-1, 1-9, 10+) and negative and positive reactions in primary vaccination. Vaccinations verified were reported to be 10 per cent. by random sampling but examination of the vaccination records revealed that verification was not being carried out as stated. In some areas primary vaccinations were verified (the proportion of these was often greater than 10 per cent.) but revaccinations were not verified; in one area primary and revaccination verifications were given together and the success rates were so high (between 88 and 93 per cent.) that it is doubtful if the recordings were accurate.

Vaccination against smallpox by mobile teams was in abeyance at the time of the team's visit as the staff of 30 vaccinators and supervisors were carrying out a vaccination campaign with USAID against measles, using jet injectors in four major cities. The team was informed that the vaccination campaign against measles was more important because the death rate was much higher, as much as 50 per cent. in hospitalized cases as compared to less than 10 per cent. in smallpox.

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[1] WHO/Smallpox/10, 7 July 1959.

VACCINE

During 1962 and 1963, 2 000 000 doses of USSR freeze-dried vaccine were received in different instalments and the balance at the time of the team's visit was nearly 300 000 doses. The date of expiry of this vaccine was May 1964 but it was still in use. The entire stock of freeze-dried vaccine had remained stored in the office of the Major Endemic Disease Division, at room temperature, although the instructions are for storage at a temperature of below +10°C. Recently, 35 children had been vaccinated with this vaccine and 25 gave positive takes. 225 000 doses of Swiss vaccine were received from WHO just before the team arrived and on the advice of the team this was stored in the cold room of the pharmacy department and the use of the expired USSR vaccine was given up.

It was stated by the Director, Major Endemic Disease Division, that the progress of the vaccination programme had been much slower than was projected in the Plan of Operations. He summarized the main difficulties as follows:

(a) They can vaccinate for only six months in a calendar year (from December to May) due to inaccessibility of areas following heavy rains.

(b) Because 90 per cent. of the rural population are engaged in agricultural activities far away from their villages, it is often impossible to contact them.

(c) There is a shortage of transport. One of their transport lorries was damaged and could not be replaced due to lack of funds. (Because of the poor communications, the usual life of a vehicle is only two years).

(d) There is a shortage of refrigerators: only six were available.

(e) They have been waiting for the past two years for a WHO Medical Officer to be appointed to the project.

(f) They are already spending in the neighbourhood of US$ 82 304 each year on the programme and are not able to spend more.

(g) There is a general shortage of doctors and trained personnel and often there is only one doctor and one nurse for a population of 100 000. They have therefore to assign three or four separate duties to one doctor. It is not possible to allocate one officer to a single programme.

VISIT TO A CERCLE

The team visited a medical centre located at the headquarters of a Cercle, which has seven arrondissements with a total population of about 140 000. The medical centre has the following staff: 1 physician, 3 technical health assistants (ATS), 2 midwives, 17 male nurses, 3 female nurses and 1 special nurse for laboratory services, making a total of 27.

The number of beds is 78: 18 for medical care, 15 for surgery, 19 for maternity, 20 for endemic diseases, 3 for tuberculosis and 3 for paying maternity cases.

There are 11 rural dispensaries in the district attached to the medical centre. Each has a staff of one male nurse, one auxiliary nurse and one midwife.

A mass vaccination campaign against smallpox was carried out in 1963-64 in this Cercle by a mobile team of 30 vaccinators and an over-all coverage of 72 per cent. of the population was achieved.

It was stated by the Director, Major Endemic Diseases Division that:

(1) ten per cent. of the total cases in Country D used to be reported from this area but no cases had been reported after July 1964 and that similar results have also been obtained by conducting mass vaccination campaigns in contiguous Cercles;

(2) a team of 15 vaccinators can vaccinate 50 000 persons a month and as there is a total of only 30 vaccinators at present, they would require 10-12 years to cover the whole country working six months each year;

(3) there was synchronization of the programme with two adjoining countries but not with the third.

The team made inquiries about the maintenance phase of the programme in this Cercle with special reference to the staff for endemic diseases located in medical centres and rural dispensaries and was informed that:

(a) no vaccination had been carried out after the mobile teams left in July 1964;

(b) the records of vaccination of this area were taken to the capital and the staff of the medical centre had no knowledge about the coverage in different villages, nor about the list of unprotected children. However, persons vaccinated had vaccination certificates;

(c) vaccine was not supplied to the medical centre as vaccination teams consisting of 30 vaccinators are a separate organization centralized at present at the capital. Motor cycles are needed for going into the bush. The teams carrying out the measles campaign are at present using motor cycles;

(d) they had planned to vaccinate new-born babies in the area covered during 1963-64 but were handicapped by the lack of transport facilities.

The team did not have an opportunity to visit field areas in other parts of the country.

PHASING OF THE SMALLPOX PROJECT

It is proposed to vaccinate 500 000 in a pilot area; this was scheduled to begin on 1 March 1965. It is also proposed to evaluate the coverage of 850 000 population vaccinated during 1963-64. In four subsequent years, i.e. by the end of 1969, the whole population is expected to be covered at the rate of one million each year.

Before the team left Country D two meetings were held with the Director General, Health Services, at which the Director, Major Endemic Diseases Division, and the Adviser, Public Health, were also present. At the first meeting, the progress of the programme, details of the pilot zone, future phasing of the programme and observations by the team were discussed. Immediate posting of a WHO Medical Officer was stressed by the Director General, who further stated that it is not possible for them to post a full-time medical officer as national counterpart but that they will post a suitable technical assistant. Future supplies of freeze-dried vaccine should be made quarterly to enable them to store it in the cold room attached to the pharmacy department. Immediately after these discussions, the team met the Health Minister along with the Adviser, Public Health and acquainted him with the impressions of the team about the programme and gist of the technical discussions held in the Director General's room.

Following the discussions at the first meeting a tentative addendum to the plan of operations for smallpox eradication in Country D was drawn up by the Director, Major Endemic Diseases Division, which formed the basis of discussions at the final meeting.

In the addendum to the plan, WHO's commitments besides provision of a medical officer and freeze-dried vaccine, were stated to be one 2.5 ton truck, six Kerosene oil operated refrigerators, 60 thermos flasks, the total cost of which should be provided by WHO. The Government's commitments are to provide a national counterpart, a vehicle, an office and a secretary for the WHO medical officer. Verification of 20 per cent. of vaccinations both primary and revaccinations, coverage of 500 000 population during the year 1965 in the pilot zone, subsequent coverage of one million population each year and completion of the programme by the end of 1969, is envisaged.

COMMENTS

1. The progress of the mass vaccination programme during two years - 1963 and 1964 - with mobile teams of only 30 vaccinators (against 50 mentioned in the plan of operations) resulted in the vaccination of 850 000 persons. At this rate no hope can be held out of covering the entire population of 4.5 million in under 8-10 years, all the more so because the vaccination season is restricted to only six months and the major part of the country is very sparsely populated - density of the population per square kilometre ranges from 0.7 to 11.6 (3.7 for the country as a whole).

2. Smallpox does not appear to have in general the same priority and economical implications as sleeping sickness, onchocerciasis, bilharziasis and measles, amongst the public health programmes in the country.

3. Extreme shortage of medical and paramedical personnel, combined with non-availability of a WHO medical officer, has been largely responsible for the lack of leadership resulting in practically no guidance and day to day supervision in the field. The Director, Major Endemic Diseases Division, who is responsible for planning and executing the smallpox eradication programme, has his hands full with other public health activities and cannot be expected to supervise the field work.

4. Storage of USSR freeze-dried vaccine at atmospheric temperature, rising sometimes to 50°C, against instructions for storage below 10°C and its use months after the expiry date have to some extent vitiated the results of the campaign.

5. Failure to organize a maintenance phase after the attack phase has been completed in an area, will lead to failure of the programme and a recrudescence of smallpox.

6. The proposed target of 4150 vaccinations per month by one vaccinator, on the basis of 140 vaccinations per vaccinator per day mentioned in the addendum to the plan of operations does not appear to be realistic and capable of achievement, keeping in view the fact that the major part of the country is sparsely populated and the vaccination season is confined to only six months. Unless the number of vaccinators is increased to 50 it is not expected that the attack phase of the programme will be completed by the end of 1969, as projected in the addendum to the plan of operations.

COST OF THE CAMPAIGN

An attempt has been made to work out the cost of the campaign from the information available. Every vaccinator is paid on a basis of US$ 30 per month. The total yearly expenditure on the smallpox campaign exclusive of cost of personnel, transport and equipment, works out to about US$ 39 000. If about US$ 14 400 to cover expenditure on the salary of four nurse inspectors, 30 vaccinators and five drivers, is added to this, the cost of the campaign without taking into consideration the expenditure on vaccine and equipment comes to US$ 53 500 per year. Thus the cost per vaccination works out to US$ 0.15 without equipment and supplies. If the expenditure on supplies and vaccine is also taken into consideration and the cost is calculated at US$ 0.20 per vaccination, the total expenditure per year will be approximately US$ 220 000.

RECOMMENDATIONS

To make the programme realistic and control effective it is essential that:

(1) WHO should appoint a suitable officer as soon as possible, who will provide the necessary guidance not only in the different stages of the execution of the programme in the areas with a population of 500 000 planned to be covered in 1965, but will also provide the necessary assistance in the maintenance of proper records and family registers.

(2) The posting of a male nurse or sanitarian in addition to the medical officer mentioned above should be considered favourably to enable greater supervision to be exercised in day to day execution of the programme by vaccination teams.

(3) WHO should arrange for a supply of 250 000 doses of freeze-dried vaccine in instalments during the current year in addition to the recently supplied stocks.

(4) The existing male nurses, auxiliary nurses and midwives in the Cercle hospitals and rural dispensaries should be trained in the technique of vaccination so that they can carry out at least primary vaccinations in their areas. Freeze-dried vaccine should be kept in the Cercle hospitals and be available for the staff of dispensaries in the bush after they have been trained in its reconstitution and use.

(5) In the absence of a full-time medical officer for the campaign, a full-time senior experienced technical health assistant should be provided by the Government to guide and supervise the work of vaccinators along with the WHO personnel.

(6) It is essential that the World Health Organization should provide transport and refrigeration facilities to tide over these difficulties.

(7) WHO should also explore the possibility of synchronization of the programme with the adjacent countries where mass vaccination programmes are not being implemented.

WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

EIGHTEENTH WORLD HEALTH ASSEMBLY

Provisional agenda item 2.5

A18/P&B/10 Corr.1
29 April 1965

ORIGINAL: ENGLISH

SMALLPOX ERADICATION

Report by the Director-General

Corrigendum

Page 18, paragraph 4, line 1, "Sanitarian" should read "Smallpox control officer".

Page 26, paragraph 1, last sentence, should read "In Indonesia, where mainly emergency programmes are being conducted, eradication in the immediate future is not probable."

Page 26, paragraph 5, last sentence, should read "Although vaccine supplies for the attack phase of the programme are adequate in Indonesia, such a programme has not yet been implemented."

Page 27, paragraph 2, should read "If substantial support is provided promptly to assist the programmes in Asia, smallpox could conceivably be eliminated from all areas from which we have information about the existence of the disease by 1970."