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Dear Newton:

Enclosed is a copy of Dr. Gauthier's final report on this programme. It was written a long time ago but had to be translated from French at the WHO Manila office - a time consuming job.

We think the report a good one, indicating that even Cambodia with its severe shortage of medical staff can do a good job with leadership. The leadership fortunately was available in the person of an excellent young health officer.

The prospects for successful continuance of the campaign are reasonably good. We should have more on this when we get the final report of the WHO nurse who left Cambodia at the end of 1956.

Yours sincerely,

Brian Jones

Mr. N.R. Bowles
UNICEF
New York
TO : Dr. I.C. Pang  
Regional Director  
WHO/WPRO
FROM : M.P. Gauthier  
Team Leader - Cambodia 6
SUBJECT : FINAL REPORT ON THE WHO/UNICEF-ASSISTED BCG CAMPAIGN IN CAMBODIA
Ref. : Cambodia 6-E

Introduction

Cambodia, bordering Vietnam on the east and south, Laos and Thailand on the north and the Gulf of Siam on the west, is an independent kingdom covering some 180,000 square kilometres and whose population might be estimated at some 4,500,000 inhabitants.

The country is mainly agricultural, and floods lasting for approximately six months a year make it ideal for the culture of rice.

Due to the very high relative humidity (often 90%), the tropical climate is particularly difficult.

The main diseases are malaria and parasitoses. Tuberculosis, although prevalent, does not appear as common as in Vietnam. This is mainly due to dispersion of the inhabitants, to the not highly developed means of communication and also to a very low level of industrialization.

Nevertheless, as soon as the Royal Government of Cambodia requested the World Health Organization, after having been admitted as a Member State in 1950, to assist in various health projects, the BCG vaccination programme was one of the first to be proposed.

This report will mention the various activities undertaken during the first 18 months of the campaign, which is being continued with the assistance of WHO and UNICEF.

Population

Apart from the city of Phnom-Penh, whose population is estimated at some 500,000 inhabitants, Cambodia includes 14 provinces, hereafter listed according to their estimated number of inhabitants.
their total amounted to 67 and they were all distributed in the hospitals, dispensaries and military units.

It was in 1953 only that the Ecole des Officiers de Santé was transformed into the Royal School of Medicine where new curricula had to be adapted to those used by medical schools in other countries. The courses enabling students to become medical doctors started in 1955 only. In order to train a medical corps for the country, new modern premises have been built and inaugurated very recently.

It goes without saying that a sufficient number of medical officers cannot be trained for several years, but according to the new regulations, the officiers de santé can already take certain examinations enabling them to become medical doctors. Thus sufficient numbers of medical doctors will be trained by little little to enable the medical services to develop.

As concerns the nursing staff, only the figures of the 1952 census are available and their number amounted at that time to 539 for both sexes. It is most likely that this figure is much higher now.

There are still very few hospitals and for the whole country there are 25 with some 2856 beds. However, this figure also includes a few private hospitals.

There is one hospital for each of the 14 provinces, but the only real hospital is the General Hospital in Phnom-Penh. There is no phthisiology service and the TB patients are admitted to all the wards according to expediency. However, it was recently possible to isolate all the more advanced cases, so that they would not be in contact with others. This group which at the beginning amounted to some 20 patients, now includes over a hundred, but there are not enough beds to provide each patient with one.

The Officer de Santé in charge of the BCG campaign has to treat these patients.

The radiological service of the hospital is practically the only one in the country.

Apart from the Phnom-Penh Hospital, there is in the outskirts of the city a TB dispensary with rather rudimentary equipment. Nevertheless, X-ray examinations can be made as well as pneumothoraces. Some 25 beds allow hospitalization of certain patients. Bonzes* were admitted in priority before the creation of their own hospital.

*Buddhist priests
Owing to various difficulties, we therefore had to wait until 1954 to set up an international team and to start the activities in Vietnam. In April of this same year, however, the special team directed by Dr. Geser "BCG Assessment Team" made several surveys in Cambodia in order to obtain data concerning the sensitivity to tuberculin and this team also visited certain large schools of the city of Phnom-Penh.

New delays due to various difficulties arose (shortage of housing for instance). However, from January 1955 onwards, it was decided to assign permanently one of the two international nurses to Cambodia and it was on 14 January that the first tests were made, thus starting a mass campaign at the National School for Teaching Staff of the Khmèr capital.

Plan of operations

The main points of this plan of operations were the following:

(a) Organization and implementation of a BCG mass vaccination campaign in order to protect an important part of the population.

(b) Creation of a national BCG vaccination service for demonstration and training of the staff.

(c) The possibility granted to the Government to benefit from technical advice on BCG vaccination as a practical measure for the prevention of TB and on the co-ordination of the various services for TB control.

The mass campaign was supposed to start in the cities and progressively spread to all accessible rural communities.

For the 18 first months of the campaign with international assistance, the target figure of 475,000 tuberculin tests was envisaged as well as the vaccination of all non-reactors.

The long-term objective was to test and vaccinate the largest possible number of children and adolescents in all of the Kingdom of Cambodia and to integrate progressively the BCG vaccination campaign into the government TB control service.

According to the original plan of operations, the BCG campaign in Cambodia was to be implemented in two phases: (a) during the first three months, two local teams would be set up and the characteristics of the reactions to tuberculin and BCG would be studied. This pilot study would be made with at least 25,000 tuberculin tests; (b) then the mass campaign would be started and be gradually extended to smaller cities than Phnom-Penh and if possible even to the rural areas.
not found in the country and files and forms for statistical data. In addition, UNICEF was to reimburse WHO for part of the cost of the international team. Finally WHO was in charge of the recruitment of the international staff: 1 medical officer, expert in BCG, who would be engaged for 18 months; and two specialized BCG nurses for 18 months also. Furthermore, WHO should see to it that all the operations of the campaign would be carried out according to the approved techniques. The international staff was supposed to be assigned to the country on 1 October 1952. The same team was also put in charge of the campaign in Vietnam.

* * *

In fact, the operations were not begun as planned and the target date of 1 October 1952 was not kept, as already mentioned, as the campaign officially started during January 1955.

The main features of the campaign will be described in the following sequence: selected tuberculin test, vaccination method, conservation of tuberculin and vaccine, composition of the staff, means of transportation, and propaganda techniques.

Afterwards the actual operations will be described and after having examined the cost of this campaign up to now the means necessary for the continuation and intensification of the campaign will be indicated.

**Tuberculin and tuberculin test**

The BCG vaccination was never performed without a previous tuberculin test, and the test used during the mass campaign is still the intradermal Mantoux with a PPD dilution (5 international units).

The PPD for Cambodia has been obtained regularly from the State Serum Institute in Copenhagen which sends "stock solution" at regular intervals to the Pasteur Institute in Saigon. The latter is in charge of the preparation of the dilutions which cannot be prepared in Cambodia, owing to the lack of adequate facilities.

The dilution is made according to the international standards required for any mass campaign and the product is distributed in colored glass vials of 50 cc covered with a rubber cap which facilitates use in the field. In fact, it is easy to fill the syringes in an aseptic way by sticking the needle through the cap.
The WHO expiry date for BCG vaccine is six weeks after its preparation. It is therefore very important to see that each vial has a label with the batch number and date of manufacture. In spite of this very wide security margin, however, we always tried in Cambodia to renew the stock of vaccine as often as possible and to reduce to a considerable extent the period of utilization of the same batch in having new batches sent more often.

From the practical point of view, the procedure is very simple due to the fact that the Pasteur Institute makes new vaccines every Monday. Two days are necessary for the usual biological control and on Wednesday night the delivery of the vaccine is made to the Central BCG officer in Saigon. This Bureau serves as distributing agent, and sends the vaccine by a special plane to Phnom-Penhn every Thursday.

According to the technique used in all mass campaigns, the vaccination is always performed intradermally and the site is always the external surface of the left deltoid.

**Protection against heat and light**

All measures have always been taken to insure that tuberculin and vaccine be preserved under the best possible conditions and protected from heat. The ideal is that those products be never exposed to a temperature over 4 degrees centigrade. It is a measure which has always been strictly respected.

Upon departure from the Pasteur Institute in Saigon, the vaccine and the tuberculin are placed in special isothermal packings in refrigerated containers and are sent by plane to Phnom-Penhn where a driver receives them and places them immediately in the refrigerator of the headquarters of the campaign. From there, they are sent according to the needs and the possibilities in amounts comparable to the previous ones, but smaller and are shipped either by plane, by road or by rail.

All these shipments are announced by cable to the team leaders, so that there is no confusion and no delay at the arrival. Once again the products are stored in the refrigerator which is always placed where a team has its headquarters, since this is a condition sine qua non. In order to bring the vaccine from the headquarters of the team to the table where the tests or the vaccinations are done, the nurses or vaccinators always use thermos vials in which they never fail to place ice.

All measures are therefore taken so that tuberculin and vaccine are never exposed to the heat of the sun.
As for the head nurse assigned to the BCG programme after the departure of the first international nurse, who had stayed permanently in Cambodia up to October 1955, since the officier de santé is most of the time in the city of Phnom-Penh, the nurse has to be at all times in the provinces in order to keep permanent contact with the teams in the field.

Each team is directed by a nurse team-leader whose main duty is to see that the plan set up by the officer de santé and the head nurse is fully followed. He supervises vaccinators.

The term "vaccinator" is being used for a special category of technicians who are, above all, executing agents. It was decided to create this category since it was felt that it was not justified to have in the vaccination teams a too great number of graduate nurses while in other services there was a great shortage of nursing staff. The great shortage of trained staff, especially in provincial hospitals, was noticed on several occasions, and therefore it was thought to be preferable to put them at the disposal of the Ministry, so that they could be used for the benefit of all, whereas on the BCG side we could work with a relatively small number of people to whom it was not too difficult to teach a standardized technique, teaching them precise gestures and prohibiting any initiative.

Examinations were therefore organized with a view to electing the best people among numerous candidates, all of whom had just finished their primary school education.

Generally speaking, the results were rather satisfactory and this formula had also the advantage of giving the team leader more importance. The discipline which played a great part in this kind of activity was therefore reinforced with these alterations in the structure of the teams.

Another advantage which was not negligible was that it was possible to have some savings made on these young and non-specialized people who did not receive the same salaries as trained nurses.

Apart from this purely technical staff, there was a certain number of others, among them a clerk-secretary who had to be replaced quite often, since this category of staff is rather rare in Cambodia.

Each vehicle had a driver and these are consequently six, in spite of the fact that the two last vehicles are not yet used.
Each vehicle has its own driver, but at the beginning at least the behaviour of the drivers was not satisfactory and they were the only staff members who did not give full satisfaction. The maintenance was poor and in spite of the remarks or even actions taken by the Officer de Santé responsible for the campaign, the drivers were not very anxious to take good care of the vehicles. We therefore lost quite a number of working days which hampered the operations and made on certain people a general impression which was not the best.

Finally, little by little, the situation improved and it was possible to have better discipline. The Government itself took an active part in the implementation of this improvement in answering our calls and issuing very strict notes to the various provincial authorities in order that the latter could have a firm control on utilization and maintenance of the cars in the field.

Another drawback was that the BCG vehicles had waited for some two years before being used by the teams, and that in the meantime they had been taken over by other services which did not always take care of them. So, instead of finding four new vehicles when starting the campaign, we had to use 2 which had already been used and one of which had suffered an accident under mysterious circumstances. As concerns the two others, they had already been driven for a number of kilometres by various drivers.

It can, therefore, be seen that the question of transportation caused us quite some trouble.

Apart from transport by road, rail transport should also be mentioned and was sometimes particularly useful for dispatch of tuberculin and vaccine as well as for transportation of the teams under certain circumstances. Cambodia has a railway connection between Phnom-Penh and Bangkok which goes through part of the Khmer territory for about 400 kilometres, thus serving quite a number of centres among which Pursat and Battambang are the main ones.

Finally, there are also regular air connections with Saigon and Bangkok and the plane which stops over at Siesu"ep was particularly useful for transport of vaccine and tuberculin into this vast province as well as into the neighbouring one.

There are some 7000 kms of roads. The main roads are usually covered with asphalt and in any case they can be used throughout the year. It is therefore easy to travel to Vietnam, Laos or Thailand or to the Gulf of Siam.

There are quite numerous water transportations especially around the Tonlé-Sap lake, but generally speaking the teams used them only exceptionally.
All this written and spoken propaganda was intensified through the fact that the cars with loud-speakers went through the neighbouring region constantly repeating simple slogans to attract public attention. These slogans were recorded on a record which was played practically without interruption and the comments were preceded and followed by Cambodian folk songs contributing to the success of the operation. Furthermore, pamphlets had been prepared and distributed to the public which supplemented the press releases.

In short, practically everything was done to make a well organized propaganda campaign.

However, it would have been desirable to have a movie film and several attempts were made. The shooting was started but each time difficulties arose and the attempt failed. This would in fact have been an excellent supplementary means of propaganda, and in order to be convinced of that one had only to attend some of the few meetings where some old films concerning vaccination were shown. There is no doubt that under these conditions the interest of the rural population in particular would have been great if they had recognized on the screen typical villages of their own country with typical familiar faces undergoing the various phases of the vaccination.

It is not to be contested that a propaganda film made in the country itself is perhaps a costly enterprise, but it has a tremendous influence on any mass campaign.

Apart from all this, the writer gave talks to various communities and in certain instances, as was the case in Siemreap and Battambang, the Inspector of Education gathered all his staff for a conference where each participant could ask as many questions as he wanted.

The last point to be mentioned in this chapter was not the most successful one: it is the matter of the posters.

From the very beginning a bilateral agency undertook to have several tons of thousands of posters printed. This was only reasonable since funds earmarked for propaganda came from the national budget which in turn was financed by the agency concerned.

The subject of posters was simple and in a few pictures the difference between a vaccinated and a non-vaccinated subject were shown. Each picture had a caption and vividly described the method. Unfortunately, each poster had at the bottom the sign of the bilateral agency without mentioning either WHO or UNICEF; the letters BCG themselves were hardly visible. This created a bad impression. According to the latest news, it seems that periodically this idea is still being used possibly for political reasons.
vaccinated are concerned, this is mainly due to special holidays or school holidays rather than to a slowing down of the activities of the teams.

The subjects tested were normally divided into three groups:
1) from 0 to 6 years
2) from 7 to 14 years
3) above 15 years

It is evident that it is the age group 7 to 14 years which gives the most precise data and this group is the actual school age group and consequently the one which can be gathered with the greatest success.

All working plans were established in order to cover the schools first, and if practically no pupil in any school of the city of Phnom-Penh did not undergo the tuberculin test, the same results have been obtained in all the capitals of the provinces and other relatively important centres of population.

One annex (Table 4 a) shows that more than 253,000 pupils go to the primary schools in Cambodia as compared to a total of 282,260 pupils for all schools. More than 210,000 tests were made for the group from 7 to 14 years.

It should also be stressed how much all the teaching staff and in Cambodia the inspectors of public education have always been the first ones to be consulted when it came to the setting up of programmes.

All the results obtained have been computed at the Central Office of the campaign in Phnom-Penh where monthly and quarterly reports were drafted regularly and sent to international agencies. A monthly statistical report was made especially for the Tuberculosis Research Office (TRO) in Copenhagen.

Generally speaking, teams used the "group cards" thanks to which it was easy to compute the monthly tables. In some cases, however, individual cards were used on which several precise indications concerning marital status of the subject as well as his reaction to tuberculin were shown, thus making follow-up relatively easy.

It will not be necessary to describe the follow-up activities which were one of the major activities of the BCG Assessment Team, but it may be mentioned that this team, on several occasions, examined children vaccinated in the same schools several months before. In such cases, the results show that this was performed under the best possible conditions (see annex). Finally, there have been practically no complications worth reporting, since the few post-vaccinal incidents always subsided very quickly.
Future of the campaign

What is the future for a probable consolidation of the BCG campaign?

Before leaving the country at the end of 1955*, a plan was drawn up for the long term, since the first year of operations mainly covered the most populated and most accessible areas of Cambodia. It was the intention to divide the country into four sections which, in spite of their geographical disproportion would represent an identical work load. Each of these sections with the proposed composition (below) would have its own team and the BCG campaign would thus become a permanent activity. Here is the summary of the plan:

Team I would visit Sector I which contains the capital, Phnom-Penh, the Province of Kandal and the small provinces of Svey-Rieng and Prey-Veng.

Team II would visit Sector II, i.e. the Provinces of Takeo, Kampot and Kompong-Speu.

Team III would work in Sector III, i.e. the provinces of Kompong-Chnang, Pursat, Battambang and Siemrêap.

Team IV would visit Sector IV, i.e. the provinces of Kompong-Thom, Kompong-Cham, Kratié and Strung-Streng.

In spite of the great distances, it was hoped that the average of tests would amount to 8000 per team per month. Team I would probably have the highest figures and it was possible to estimate at 350,000 tests the total number of tests for four teams in 1956.

According to the plan which had been set up, each team should be composed as follows: 1 nurse team-leader, 4 vaccinators and a driver.

The vaccinators are not necessarily recruited among the medical or paramedical staff which is in too high demand for more urgent duties in a country where specialized staff is so scarce. In order to be a vaccinator, it is necessary to have a good technique, sure hand and eye, an absolute sense of precision and method and a certain amount of professional conscience. Of course, these vaccinators are being trained very accurately and are only assigned to teams when their work is fully satisfactory.

According to information received since our departure, this plan has been tried and seems to work out satisfactorily. Teams were ready in July to be placed under the supervision of the Chief Medical Officer of the province, the BCG Office in Phnom-Penh being in charge of the centralization of the results, the supplies, etc. In each province, the programme is set up by the Governor and the Chief Medical Officer who send it to the Phnom-Penh Office for approval.