

## TUBERCULOSIS IN MALAYA

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### SOME FACTS AND FIGURES

Tuberculosis is a major public health problem in Malaya. It kills and causes suffering to more persons than any other single disease. It is by far the biggest killer in the country. More than 5,000 persons die from tuberculosis every year, about 7% of deaths from all causes. Against this there is a yearly crop of 25,000 new cases, which means that for every death from tuberculosis five new cases appear thus swelling quite relentlessly the pool of tuberculosis sufferers in the country. This in turn increases with a vengeance the risk to healthy individuals of contracting the disease.

More than one quarter of our hospital beds are occupied by tuberculous patients, most of them in an advanced stage of the disease. More than one quarter of the time of our doctors and nurses in our hospitals is taken up looking after and treating tuberculosis sufferers. Almost one-tenth of the total Health Budget of the country is expended on tuberculosis.

So large is the pool of infectious cases in the country that one child out of every four is infected with tuberculosis before the age of five years. At the age of 10 years about half the children are already infected. By 15 years of age three out of four children are found to be infected. Fortunately not all these infected children develop disease but they certainly constitute the vast reservoir from which new cases appear in our community. The larger the number of infected persons in the country the greater is the potential for the appearance of new cases of tuberculosis.

Although tuberculosis is usually a disease of townfolk or unbanished communities, our rural areas are affected almost as seriously as our towns. The prevalence of this disease amongst the aboriginal population in Malaya has been found in recent surveys to be as high as in our towns. The kampong folk, particularly those in Kedah and the east coast states have an incidence almost as high as is found in the slum areas of our big cities and towns.

No community in Malaya enjoys freedom from tuberculous infection and disease; no social stratum is exempt from the ravages of

this disease. Malays, Chinese, Indians contract this disease with equal facility and spread it as readily as they contract it. Rich and poor alike are prone to it. Nobody can be safe until all are safe.

### THE SITUATION BEFORE MERDEKA

Before Merdeka no organized attempt was made to combat the spread of tuberculosis in Malaya. Only those cases who voluntarily sought treatment in our hospitals were given treatment and even for these cases the facilities for accommodation and treatment in our hospitals were grossly inadequate. All hospitals were embarrassed by the number of cases who sought treatment. They maintained long waiting lists of cases seeking admission. The available beds for tuberculosis were always full. Those patients who managed to gain admission were found almost invariably to be in an advanced stage of the disease requiring long-term hospitalisation. This accentuated further the acute bed shortage. Waiting lists mounted inexorably. Advanced chronic cases for whom little could be done occupied the available beds for several years and early treatable cases were turned away for lack of accommodation.

Little wonder no attempt was made to institute proper public health measures to control the spread of this disease in accordance with the accepted principles governing the control of any infectious disease. One of the cardinal principles is to find the infectious cases in the community and render them non-infectious with treatment and/or quarantine. The other important measure is to protect the susceptible members of the community with reliable vaccination. One can well imagine the dilemma facing the health authorities. When the existing facilities in our hospitals were already bursting at the seams to cope with those cases who voluntarily sought treatment what would happen when a systematic case-finding campaign was launched? Acute and utter embarrassment!

The guardians of our public health decided to tackle the problem by ignoring it completely. Not quite completely, really, because they did make an attempt to introduce at least the

other less difficult measure: BCG vaccination. Even in this the interest shown was so meagre and the general apathy so formidable that the BCG vaccination campaign was poorly organized and enjoyed only lukewarm support. Also in order to appease the public clamour, experts were invited to study the tuberculosis problem in Malaya and recommend suitable measures for its effective control. One after the other these experts came, saw, recommended and went their way. All their reports and recommendations were neatly filed away, never disclosed to the clamouring public. Dr. Andrew Moreland came in 1947, Sir Frederick Heaf in 1952. Their reports were never made public. In the meantime the spread of tuberculosis in the country continued with unabating fury. During the 10 years, 1947 to 1957 the risk to healthy individuals of contracting tuberculosis quadrupled. Whereas in 1947 for every death from tuberculosis two new cases developed, by 1957 this ratio had quadrupled to eight new cases per death.

### **AFTER MERDEKA**

In 1957 came Merdeka and with Merdeka came also a sense of greater responsibility on the part of our Government for the well-being of our people. The elimination of tuberculosis was included in the Alliance Party manifesto, and one of the very first steps taken by the Ministry of Health after the general elections was to create the post at the Federal level of a Senior Tuberculosis Specialist who was charged with the responsibility of studying the tuberculosis problem in the country and drawing up a plan for its control. Assistance was sought from the World Health Organization for the services of a tuberculosis consultant, Sir Harry Wunderly, the chief W.H.O. Consultant on Tuberculosis, formerly Commonwealth Director of Tuberculosis in Australia, a recognized world authority on tuberculosis control who had been mainly responsible for the effective control of tuberculosis in Australia during his tenure of office was assigned to Malaya in 1959. Sir Harry remained in Malaya for two months during which he made a thorough study with the Senior Tuberculosis Specialist of the existing resources for the prevention and treatment of tuberculosis.

They travelled extensively up and down the peninsula visiting all the hospitals and medical institutions in the country, making an exhaustive study of the situation prevailing in Malaya. At the end of his tour Sir Harry

submitted a report on his findings and made recommendations. These recommendations were accepted by the Government, and based on them and in close consultation with him a comprehensive long-term plan for the Control of Tuberculosis was drawn up by the Ministry of Health in 1960.

A separate Division of Tuberculosis was set up in the Ministry of Health under the charge of the Senior Tuberculosis Specialist to implement this plan. Funds were allocated under the National Second Five-Year Development Plan, 1961-1965. In 1961 the National Tuberculosis Control Campaign was officially launched to eliminate tuberculosis as a public health problem in Malaya. The control campaign is now in operation and is fast gathering momentum. By 1965 it will be fully developed with all its components functioning in top gear. Ten years from then, that is by 1975, it is hoped to bring tuberculosis under effective control so that it will no longer be a public health menace.

### **THE NATIONAL TUBERCULOSIS CONTROL CAMPAIGN IN MALAYA**

#### **Principles**

The National Tuberculosis Control Campaign which was launched in 1961 under the Second Five-Year Development Plan and is scheduled to be fully developed and operational by 1965 is based essentially on two important principles which, incidentally, govern the control of any infectious disease, namely: -

1. find the infectious cases in the community and render them non-infectious with treatment;
2. protect with a reliable vaccination all those who are susceptible to infection

#### **Effective Weapons**

The degree of success which may be expected in the control of an infectious disease depends largely on the effectiveness of the weapons which are available and the possibility of their practical application on a mass scale. In so far as tuberculosis is concerned we have not only extremely effective weapons but also ample proof from the experience of technologically advanced countries of their efficacy and practical applicability on a mass scale. We can find the infectious cases in the community very rapidly by carrying out simple bacteriological tests on those found to have

abnormal chest X-ray findings suggestive of tuberculosis. The mass miniature X-ray machine is capable of examining a hundred persons an hour and serves as a very effective sieve to pick up suspects for bacteriological investigation. We have specific drugs to treat, render non-infectious and cure the cases of tuberculosis discovered. And in BCG we have a very effective and reliable vaccine to protect the susceptible members of our community.

### Important Discovery

One other important discovery is of special interest to us in Malaya: hospitalisation is not necessary to treat every case of tuberculosis. Treatment is in most cases as effective when given on an out-patient basis, where the patient attends the hospital once a week or even once a month to collect the drugs for consumption at home and takes them regularly for the necessary period of time. What is even more important: the vast majority of cases discovered need not stop work while they are having treatment. If and when leave from work is advised it need rarely exceed three months, six weeks being ample in most cases.

### Public Health Approach

The accent in our control campaign is on the protection of healthy people. It consists of an organized national effort to reduce the risk to healthy individuals of contracting tuberculosis. The approach is a public health one directed to the community rather than to the individual patient. The individual patient is important only because rendering him non-infectious prevents him from infecting the community. Protection of the health of the community is the primary aim.

### The Control Campaign in Malaya

The Control Campaign in Malaya consists of a three-pronged attack on tuberculosis in this order of priority:

1. **The Training Programme** to train the different categories of technical personnel required for the country-wide control campaign.
2. **B.C.G. Vaccination Drive** to protect the susceptible members of our population against tuberculous infection.
3. **Case-finding Drive** using mass miniature chest X-ray units followed

by bacteriological examination of sputum of suspects to discover the infectious cases in the community so that they may be rendered non-infectious with treatment.

### Organization to implement the Control Campaign

As stated previously a separate Division of Tuberculosis was set up in the Ministry of Health in 1961. The Senior Tuberculosis Specialist was appointed to head this Division and charged with the responsibility of planning, organizing and directing the National Tuberculosis Control Campaign.

A National Tuberculosis Centre was set up in Kuala Lumpur to serve as the headquarters of the national tuberculosis service. This Centre is responsible for the co-ordination and technical direction of the National Control Campaign. It also undertakes the training of all categories of technical personnel required for the country-wide control campaign. Initially this training was conducted with the assistance of technical experts provided by Australia under Colombo Plan Aid and by the World Health Organization. Since the beginning of this year (1964) the training is conducted almost entirely by our own local officers.

Although the National Tuberculosis Centre started functioning in 1961 it is still in the process of development and will be fully developed and fully operational at the end of 1964.

Also in the stage of development are State Tuberculosis Centres which were set up in 1961 in Alor Star, Ipoh, Johore Bahru, Kota Bharu, Kuantan, Kuala Trengganu, Malacca, Penang and Seremban. These Centres, most of which are already developed, serve as the headquarters of the state tuberculosis service and are responsible for the implementation of the control campaign in their respective states. Each State Centre is modelled on the National Centre in Kuala Lumpur having the same range of activities and provided with similar facilities but on a smaller scale relative to the individual needs of the State Centre.

In order to implement the campaign at the district and rural level 20 District Tuberculosis Clinics are being developed in 20 of the 42 district hospitals in the country. In making the choice of the 20 district hospitals where fully equipped and adequately staffed District Tuberculosis Clinics are being set up, many factors have been taken into consideration,

the more important ones being population density of the area served, accessibility, geographical location and the load of tuberculosis work borne by the hospitals in past years.

The following 20 District Hospitals were chosen: Kangar (Perlis), Sungei Patani (Kedah), Bukit Mertajam (Penang), Taiping, Kuala Kangsar, Tapah, Telok Anson, Tanjong Malim (Perak), Kuala Kubu Bharu, Klang, Kajang (Selangor), Kuala Pilah (Negri Sembilan), Segamat, Muar, Batu Pahat, Kluang (Johore), Mentakab, Kuala Lipis (Pahang), Kuala Dungun (Trengganu) and Kuala Krai (Kelantan).

Most of these district tuberculosis clinics have been almost completely developed; the others will be fully developed and operational by 1965.

In addition to these district tuberculosis clinics, all the other district hospitals in the country together with all the Maternity and Child Health Clinics and Rural Health Units are participating actively in the implementation of the control campaign.

### **Cost of the Control Campaign**

\$6.7 million were allocated to the National Tuberculosis Control Project as capital expenditure under the National Second Five-Year Development Plan to provide new buildings and equipment. \$3.87 million have already been spent and the remaining \$2.83 million will be fully utilized by the end of 1965 when the National Control Campaign will be fully developed.

In so far as annually recurrent expenditure for the Control Project is concerned \$223,553 were allocated in 1961, \$1,379,466 in 1962, \$1,505,163 in 1963 and \$1,769,928 have been allocated for 1964.

This special allocation for the Project is intended to augment the expenditure normally borne by the states for tuberculosis prevention and treatment out of their total annual allocation. A study of the expenditure incurred by the nation prior to the commencement of the National Tuberculosis Control Project reveals that tuberculosis alone consumed almost one-tenth of the total annual Health Budget of nearly \$100 million.

The special allocation for the Tuberculosis Control Project does not therefore represent the total annually recurrent expenditure incurred by the country for the prevention and

treatment of tuberculosis. It is intended merely to supplement it, to meet particularly the additional financial commitments occasioned by the special requirements of the control project.

### **Duration and Aim of the Campaign**

The National Tuberculosis Control Campaign launched in 1961 will be fully developed by 1965. By then all the components of the campaign will be operating with optimum speed and efficiency. Only by 1965, therefore, will the campaign become fully operational. Within five years of that date, that is by 1970, a definite decline may be expected in the incidence of tuberculosis in the country. By 1975, that is 10 years after the campaign got into full swing and 5 years after a drop is noticed in the prevalence of the disease the target of the control campaign will be achieved — elimination of tuberculosis as a public health problem. Cases of tuberculosis will still continue to occur, but they will be few and far between, occasional sporadic cases easily controlled, presenting little or no danger to the health of the community.

When that stage is reached the ultimate aim of the current campaign will have been achieved but that does not mean that we could then afford to put away our weapons and call off the fight. Constant vigilance will be necessary to keep the enemy safely contained and effectively controlled. The cost to the country of this careful and constant vigilance will be only a tiny fraction of the vast sums of money that have been and are being spent to prosecute the control campaign. Handsome dividends are in store for us for the wise investment we are making to ensure freedom from the tuberculosis menace to ourselves, to our children and to our children's children.

### **THE TRAINING PROGRAMME**

The Training Programme constitutes the first prong of the National Tuberculosis Control Campaign. It commands the highest priority in the control campaign. The reason for this is pretty obvious. No technical project, however sound it may be in principle, can possibly succeed unless technically skilled persons are available in adequate numbers to operate the various technical components comprising the project. Malaya, like other developing countries, does not have enough skilled technicians. There is a grave shortage of technically trained medical personnel at all

levels from doctors and nurses to technicians and other para-medical staff.

### **Role of the National Tuberculosis Centre**

Since June, 1961, a vigorous training programme has been under way for all categories of technical personnel required for the nation-wide tuberculosis control campaign: doctors, nurses, laboratory technicians, mass X-ray operators, X-ray technologists, home-visitors, record clerks, etc. The training is conducted in the National Tuberculosis Centre in Kuala Lumpur. The training courses which are conducted by the senior staff at the Centre have been organised and evolved with the assistance of technical experts. Since the beginning of this year, (1964) the training courses are conducted almost entirely by our own local officers.

The National Centre in Kuala Lumpur is, apart from its many other functions, also actively engaged in providing a tuberculosis service to the State of Selangor and functions as a model State Centre. In so doing it affords ample and ideal demonstration facilities for the training of all categories of technical personnel required for the country-wide control campaign. Here the latest methods of tuberculosis control are tried, appraised and appropriately modified to suit local conditions before they are introduced for country-wide application.

The training programme at the Centre caters for two categories of personnel. One: in-service training for technical personnel who are already in the service and able to engage in tuberculosis control duties in their particular spheres of activity in addition to their normal duties. In this category are doctors, nurses, hospital assistants, health visitors, radiographers, record clerks, statistical clerks, etc. The other category comprises technical personnel specially recruited for the campaign who work exclusively in tuberculosis institutions like assistant nurses, mass X-ray operators, laboratory assistants, etc.

The development of the control campaign throughout the country is carefully geared to the training programme. As more and more trained technical personnel become available the scope and extent of the control campaign is stepped up in all the different parts of the country.

### **Nursing Staff**

The most important training course conducted for nursing personnel is the *Training*

*Course in Tuberculosis Control Methods for Supervisory Nursing Staff.* It is the most important course for two reasons. Firstly, it forms the basis for all training courses arranged for all categories of nursing personnel — orientation courses for senior nursing officers like Matrons and Sister Tutors, practical training courses for auxiliary nursing personnel like Assistant Nurses, training in Tuberculosis Nursing and Control Methods as an integral part of the prescribed course for Student Nurses in their third year at the School of Nursing, training in the public health aspects of Tuberculosis Control for Public Health Nurses attending the Health Visitors Training Course. Secondly, supervisory nursing staff (Nursing Sisters, Health Sisters, Staff Nurses and Health Nurses) constitute the backbone of the BCG vaccination drive, examination of Contacts, tuberculosis nursing, chest clinic practice, home-visiting and follow-up and after-care of patients — the vital components of the tuberculosis control campaign. On their return to their home stations after completing the training course at the Centre, they not only participate actively in the control campaign but also undertake the training of their junior colleagues in new techniques and procedures they have learnt, thus broadening both the concept and scope of the National Tuberculosis Control Campaign.

This course extends over a period of four weeks. The first week is taken up with instruction in the classroom and consists of 11 Lectures, 10 Lecture-Demonstrations and 4 Demonstrations. During the subsequent three weeks the trainees are posted for practical training to the different sections of the tuberculosis control department of the National Tuberculosis Centre — Contact Clinic, School BCG Vaccination Service, Maternity Hospital Vaccination Service for Newborns, Medico-social Service including home-visiting, health education, policing of defaulters and after-care of discharged patients. These postings for practical instruction are made on a rotation basis so that not more than three are attached to any one section at a time. The trainees are able thus to participate actively in all the duties undertaken by the section to which they are posted under the close personal supervision of the officer-in-charge of the Section. During this three-week period of practical training emphasis is placed on active participation as a responsible member of the staff.

Student Nurses in their third year at the School of Nursing attend the full course of four weeks and in addition spend two weeks

doing tuberculosis nursing in the wards and out-patients department of the Centre. At the end of their 6 weeks' training they are given a written examination.

Assistant Nurses undergo an 8 weeks' training course. Their curriculum is essentially the same as the main course except that it is considerably simplified. The theoretical component is substantially curtailed and the scope of practical training correspondingly increased. On their return to their home stations after completing the course, they are posted to tuberculosis institutions to engage exclusively in tuberculosis nursing and control duties.

Public Health Nurses attending the Health Visitors Training Course spend one week at the Centre as part of their prescribed course of training. This week coincides with the first week of the Main Course which consists of Lectures, Lecture-Demonstrations and Demonstrations which they attend together with the nursing supervisory staff.

Senior nursing officers (State Matrons, Health Matrons, Hospital Matrons, Sister Tutors, Male Tutors and Midwifery Tutors) attend Orientation Courses on Tuberculosis Control of three days' duration. The main purpose of these orientation courses is to broaden the concept of the National Tuberculosis Control Campaign at all levels of the Nursing Service and to ensure enlightened supervision and co-ordination of effort.

Since 1961 as many as 589 Nursing personnel comprising all grades and categories of nurses have completed courses of instruction at the Centre (37 Matrons, 9 Nursing Tutors, 74 Nursing Sisters, 185 Staff Nurses, 162 Assistant Nurses, 58 Student Nurses, 16 Health Visitors, 23 Hospital Assistants, 25 Public Health Inspectors).

All these nursing personnel are now actively engaged in prosecuting the control campaign particularly the BCG vaccination drive throughout the country.

**Mass X-ray Operators** constitute another important category of technical personnel receiving training in the National Tuberculosis Centre in Kuala Lumpur. They are trained to operate the Mass Miniature X-ray Units deployed all over the country in the case-finding drive. Young lads in their late teens or early twenties fresh from school with a Lower Certificate of Education are recruited for training as Mass X-ray Operators. After an introductory course in Public Relations and orientation in the different aspects of the

tuberculosis control project to provide them with an enlightened approach to their particular field of operation they are put through an intensive three-month practical course in mass X-ray techniques and procedures. They learn how to operate the mass miniature X-ray units, how to take care of these very expensive pieces of equipment by learning the basic elements of X-ray technology and electricity. They are also taught how to process films in the dark room, how to record particulars of persons to be X-rayed correctly on the X-ray cards, and also all the technical, clerical and ethical procedures connected with the whole mass X-ray operation. Then they are posted to the field to operate the mass X-ray units under the supervision of senior operators and radiographers. When they have attained proficiency in this work — usually after 3 to 6 months in the field — they are ready to take independent charge of mobile or static X-ray units. Three mass X-ray operators are assigned to each mobile unit and two to each static unit.

This novel yet simple approach to the problem of finding suitable personnel in adequate numbers to operate mass miniature X-ray units is proving to be very successful and extremely effective. When the scheme was first mooted considerable opposition was encountered from some quarters particularly in view of their youth and the highly technical and hazardous nature of the work expected of them. It was suggested that only trained radiographers were qualified to operate X-ray units. With the country-wide shortage of radiographers which was expected to continue for some years the prospect of launching a mass chest X-ray drive to implement the Tuberculosis Control Plan did not at all look bright. Radiographers take three years to qualify which meant that the case-finding drive using mass X-ray units would have to be postponed for at least three years. This delay the Division of Tuberculosis was not prepared to accept.

It stands to the credit of all the parties who had grave misgivings about the proposed scheme, that good sense prevailed in the end and the scheme was allowed to proceed as planned. When the scope of the work expected of Mass X-ray Operators was properly clarified and its limitations carefully defined, opposition to the scheme soon vanished. The modern mass miniature X-ray unit is extremely easy and safe to operate. With its built-in safety and automatic devices the whole operation of X-ray taking is a simple push-button procedure requiring no special

technical training or knowledge. All that is necessary is to posture the subject and then press the button. The intricate electronic automatic devices built into the unit compute exposure time and X-ray dosage more accurately than a human being. The whole mass X-ray procedure is a repetitive type of work which would not appeal to a qualified radiographer who is trained to exercise judgement and initiative in the many intricate techniques of medical radiography of which the operation of mass miniature X-ray units forms but a small and uninteresting part. Assigned whole time to mass miniature chest radiography such a highly qualified and skilful technologist as a radiographer would find the work tiresome and even frustrating. So it was agreed to give the scheme we had in mind a try. The results have been most gratifying and the experiment has been a resounding success.

Since 1962 when this training started, 50 mass X-ray operators have been trained and are operating the mobile and static mass X-ray units deployed all over the country in the Case-finding Drive. Another 50 will be recruited for training in 1964.

### Laboratory Assistants

Also receiving training at the Centre are Laboratory Assistants, a very important category of technicians, whose work is vital to the successful prosecution of the control campaign, for the diagnosis of infectious tuberculosis can be made only by them in the laboratory. The X-ray does not make a diagnosis of tuberculosis. It merely picks up the suspects who might or might not be cases of tuberculosis. It is in the laboratory that the diagnosis is made after the examination of sputum specimens and it is in the laboratory that progress of patients under treatment and their eventual cure is assessed and established. The laboratory with its technicians working in it constitute the sheet anchor of the National Tuberculosis Control Campaign.

Training of laboratory assistants forms an important and integral part of the Training Programme at the Centre. Unfortunately this particular vocation does not appear to attract enough applicants for reasons which are pretty obvious. It is not pleasant work examining sputum specimens all day and furthermore the qualifications required of prospective candidates command more attractive and lucrative jobs in other fields. Little wonder that when 20 candidates were offered employment only 13 accepted. Of these, three left during the

training course for better jobs and most of the remaining ten after they have been trained as laboratory assistants are constantly keeping a watchful eye for openings in other fields and vocations. It is a problem which is actively engaging the attention of the Division of Tuberculosis and a solution is being sought. Of the ten that have been trained, six have been posted to State and District Tuberculosis Clinics which were in urgent need of this essential laboratory service.

There are now in all 40 vacant posts for laboratory assistants in the Division of Tuberculosis and it is proposed to recruit them this year (1964) in two batches of 20 each for training. After they have been trained they will be posted to laboratories in state tuberculosis centres and district tuberculosis clinics. How many we shall be able to retain after training them is open to speculation. If the exodus continues an alternative scheme will have to be considered.

### Other technical personnel

Also receiving training in the Centre are doctors, social welfare assistants and paramedical personnel required for the control campaign.

## THE B.C.G. VACCINATION DRIVE

The BCG Vaccination Drive constitutes the second prong of the attack that is being mounted against tuberculosis in Malaya. It was launched almost simultaneously with the training programme and has kept pace with it, being steadily extended as more and more trained personnel become available.

### Protection given by BCG

BCG vaccination is a most valuable weapon in the fight against tuberculosis. Its efficacy as a protective vaccine providing protection against tuberculosis infection and disease has been established beyond doubt. A successful vaccination reduces the chances of infection developing into tuberculous disease by about 80%; or to put it another way: of every five cases of tuberculosis appearing in unvaccinated persons, four could have been prevented by vaccination. It has also been shown that if tuberculosis does develop in vaccinated persons it tends to run a mild course, responds readily to treatment and rarely proves fatal. In infants and children BCG affords absolute protection against the fulminating fatal forms of tuberculosis — tuber-

culous meningitis and miliary tuberculosis, which occur with alarming frequency in Malaya. No case of tuberculous meningitis or miliary tuberculosis has yet been reported in a child who has been successfully vaccinated with BCG.

### Selection of Groups for Vaccination

As the infection rate amongst the child population in Malaya is extremely high (25% at the age of 5, 50% at 10 years and 75% at 15 years of age) protection with BCG should be given at the youngest age group possible, preferably at birth. BCG is, therefore, offered to all babies born in hospitals, infants and children attending Maternity and Child Health Clinics, primary school children, contacts of known cases and hospital workers who have not yet been naturally infected. In other words all those who are living and working "at risk" are offered BCG. Since at the age of 15 years three out of four are already naturally infected and are, therefore, too late for protective vaccination, the BCG drive in the country is directed mainly at the child population. The aim is to provide protection with BCG, before the child can be naturally infected with virulent tuberculosis, so that when he is subsequently challenged with tuberculous infection he is able to resist it.

### Priorities

As only readily accessible groups of the child population can be covered and different states vary in their ability to cover even the accessible groups the following priorities have been established in the BCG drive:

1. All babies born in hospitals are automatically vaccinated 12 hours after birth by nurses in maternity hospitals and wards. All these nursing personnel have received training at the National Tuberculosis Centre.
2. Most of the larger Maternity and Child Health Clinics are able to vaccinate non-reactors to Tuberculin (not yet naturally infected) amongst the infants and children attending the clinics. Infants under three months of age are given BCG without a preliminary tuberculin test and because only one attendance is necessary, most of the smaller clinics are able to undertake this. The coverage of infants and pre-school children in Maternity and Child Health Clinics will increase considerably in coming years as Malaya is now engaged in an extensive Rural Development Programme which envisages in the

Health Sector the provision of essential Maternity and Child Health Services for the entire rural population. Each rural district of about 50,000 inhabitants will be served by a Rural Health Unit consisting of a Main Health Centre, 4 Sub-Health Centres and 25 Midwife's Clinics. Each midwife's clinic will serve a population of 2,000 persons and a Sub-Health Centre 10,000 persons. Most of the Health Centres and a considerable number of midwife's clinics have been built, equipped and adequately staffed. All nursing personnel posted to these centres and clinics receive training at the National Tuberculosis Centre in Kuala Lumpur in tuberculin testing and BCG vaccination techniques, and are able to undertake BCG vaccination of infants and pre-school children in addition to their other duties at these centres and clinics. The coverage of infants in the rural areas will, therefore, increase substantially and rapidly with the development and expansion of the rural health services.

3. Contacts of known cases and hospital workers who are tuberculin negative (not yet naturally infected) enjoy equal priority with newborn babies in the BCG programme, contacts of infectious cases claiming the highest priority.
4. Primary school children come next on the priority list. In this group primary school *entrants* are accorded priority over *leavers* and the children in the other classes are offered BCG only after all entrants and leavers have been covered before the school year is out. The extent of cover varies from state to state but every effort is made to cover at least the primary school entrants.

### Progress and Targets

Since the control campaign started in June 1961, more than half a million infants and children have been vaccinated. Of these more than 200,000 were newborn babies, 85,196 were vaccinated in 1961, 164,024 in 1962, 213,573 in 1963. The target for 1964 is 350,000 children and when the control campaign is fully developed in 1965 it is hoped to get an annual coverage of half a million children.

### THE CASE-FINDING DRIVE

The Case-finding Drive which constitutes the third prong of the attack on tuberculosis



was a much later development than the other two — the Training Programme and the BCG Vaccination Drive — which became operational in June 1961 almost simultaneously with the official launching of the control campaign. It was only two years later, that it was possible to institute the case-finding drive on a mass country-wide scale.

### Launching of Mass Case-finding Drive

The case-finding drive on a mass scale was officially launched by the Minister of Health on Monday, 4th March 1963. To mark the occasion a procession was held in Kuala Lumpur of 8 mass miniature X-ray units and 11 vehicles with all the departments and units of the National Tuberculosis Centre participating. The purpose of the procession was to display the mobile and static X-ray units which would be going into operation, give the widest publicity to the campaign through the media of the Information Services, the Press, the Malayan Film Unit and Radio Malaya to make every Malayan fully aware of the attack which was being mounted on a national scale to eliminate the menace of tuberculosis from his midst and at the same time to impress upon him the important part he was expected to play in the achievement of this object.

The institution of the Mass Case-finding Drive opened a new and important phase in the development of the National Tuberculosis Control Campaign. The first phase — the Training Programme and the BCG Vaccination Drive — had already been developed and was being firmly consolidated. With the advent of this second phase — the Case-finding Drive — for the first time since the National Control Campaign was launched in June 1961, all three components of the campaign started operating together in the all-out attack on tuberculosis.

Not that no case-finding was carried out before 1963. For one whole year prior to March 1963, two mobile and two static mass X-ray units were operating on a pilot or demonstration footing, serving as an exercise to provide training for mass X-ray operators and experience for tuberculosis control personnel in the many and varied technical aspects of the case-finding procedure. Although more than 150,000 persons were X-rayed during the course of this exercise it was nevertheless merely a pilot or demonstration project.

During 1963, 9 Mobile and 9 Static X-ray Units were operating in the country. In 1964 another 6 Units (two mobile and four static)

will be put into operation to provide a complete cover of the whole of Malaya. Except for Penang all the states in Malaya are being covered with mobile X-ray units since March, 1963. Penang will be served with a mobile unit commencing April, 1964.

Static units are operating in Kangar, Alor Star, Taiping, Kuala Lumpur (two units), Seremban, Malacca, Johore Bharu and Kota Bharu. During 1964 static units will be installed in Penang, Ipoh, Kuantan and Kuala Trengganu.

### Selection of groups for Mass X-ray

Only selected groups of the adult population are X-rayed in the Case-finding Drive:

1. **High Prevalence Group** (those likely to produce a high yield of cases).
  - (i) Out-patients and in-patients of all hospitals.
  - (ii) Patients referred by private medical practitioners.
  - (iii) Contacts of known cases of tuberculosis.
  - (iv) Self-referred persons: any member of the general public who wishes to have a chest X-ray usually on account of symptoms.
2. **Danger Group** (those who if suffering from tuberculosis constitute a danger to the community as their work brings them into frequent and prolonged contact with the general public, particularly children).
  - (i) Food handlers (hawkers, cooks, waiters, coffee-shop and eating-house assistants, stall-holders, etc.) barbers, hairdressers, trishaw riders, bus conductors, etc.
  - (ii) All school teachers and school children over 15 years of age.
  - (iii) Domestic servants, baby amahs, etc.
3. **Other Groups**
  - (i) Hospital staff and their families.
  - (ii) Government Servants and their families.
  - (iii) Members of the Armed Forces and their families.

There are of course other ways of covering the adult population of a country, particularly the conventional way which is to divide the

country into areas and then proceed to X-ray the whole adult population area by area until the whole country is covered and repeat the survey every three or four years. In Malaya we have decided to cover only selected groups of the population for two very good reasons. Firstly, we wish to derive the utmost benefit in our campaign with the limited resources available. Secondly, we must endeavour to keep the number of persons requiring further investigation after X-ray at a level which is comfortably within the capacity of our district hospitals to handle efficiently. Even when the available resources improve in quantity and quality it is not the intention to alter this policy but rather to increase the coverage of the selected groups. Experience has shown that it is infinitely more rewarding to focus the case-finding effort on selected groups of the population than dissipate it by attempting to cover the whole eligible population on a geographical basis. Specificity in approach concentrating on the groups that matter seems more logical and sensible than indiscriminate cover in an all-embracing operation.

### The Mass X-ray Unit

The primary aim of the case-finding drive is to find the infectious cases of tuberculosis in the community and render them non-infectious with treatment. The mass miniature X-ray machine is a most valuable electro-mechanical device for the quick detection of such cases but it has its limitations which, regretfully enough, are not often fully recognized. It is capable of X-raying up to 100 persons an hour, provided the X-ray cards carrying particulars of the persons to be X-rayed are completed in bulk before hand. When the cards are completed individually before each X-ray examination the time taken for the whole X-ray procedure is hardly two minutes from the moment one presents oneself for examination. In actual practice a combination of these two methods usually obtains and provided a continuous flow of examinees is assured, each X-ray unit can comfortably X-ray 500 persons in one working day. In order to make its operation worthwhile each unit should X-ray at least 20,000 persons a year, though 40,000 a year is more like the figure which could be achieved without much difficulty.

### X-ray does not provide diagnosis — importance of bacteriology

What of the limitations of the X-ray machine? Although it is a very valuable tool

in the mass case-finding operation it does not by itself actually detect infectious cases of tuberculosis. The X-ray does not provide a diagnosis. All it does and all it is capable of doing is to separate the examinees into two distinct groups: a large group comprising (according to our experience in Malaya) about 95% of those examined who are free from an X-ray abnormality of the lungs and a small group of about 5% whose X-rays reveal a lung abnormality. The later group, the so called "X-ray abnormal" require further investigations in a chest clinic of which sputum examination is the most important before a diagnosis of infectious tuberculosis can be made. The mass X-ray operation merely picks up "X-ray abnormal" for further investigation. It does not and cannot make a diagnosis. The diagnosis is made only after further examination in a chest clinic, particularly bacteriological examination in the clinic laboratory.

### Investigation of X-ray abnormal

A lung abnormality picked up by the X-ray does not, therefore, automatically mean tuberculosis as is erroneously believed by many people. There are many conditions, some serious, others quite harmless, which produce shadows in the X-ray film which are quite indistinguishable from those produced by tuberculosis. The chances of the abnormality being tuberculosis, according to our experience in Malaya, are roughly even. About one half of the "X-ray abnormal", therefore, are found to be suffering from active tuberculosis. Of these nearly half have infectious tuberculosis.

In case-finding it is not the taking of an X-ray which is important but the subsequent investigation in the chest clinic of the X-ray abnormal discovered to determine which amongst them are cases of tuberculosis. This involves the hospital concerned in extra work. Also the hospital must be within easy reach of the persons recalled for further investigation. For these two very important reasons our case-finding drive operates in and near our hospitals and is geared to keep within the capacity of the hospital to cope efficiently with the extra load.

The success of the case-finding drive is measured not by the number of persons X-rayed but by the speed, efficiency and completeness of the investigation of "X-ray abnormal" discovered. The taking of an X-ray merely initiates the case-finding drive. It is the subsequent investigation of *all* the X-ray abnormal discovered which brings the whole

operation to a successful conclusion. This important point needs particular emphasis because it is often over-looked in the understandable desire and over-eagerness to X-ray as many people as possible as if the taking of an X-ray in itself is the paramount aim of case-finding. The case-finding drive initiated by the X-ray operation concludes successfully only when each and every X-ray abnormality discovered has been fully investigated and dealt with as is appropriate to the particular case.

### **Deployment of Mass X-ray Units**

Apart from the static X-ray units which operate continuously throughout the year in the hospitals in which they have been installed, the mobile units are so deployed that they make regular monthly visits to all the hospitals in the country for two to six consecutive days depending upon the size of the hospital and the population to be served in the area. When circumstances require that a special group should be X-rayed outside the hospital a special mobile unit is usually assigned for this purpose so as not to interfere with the scheduled programme of the unit operating in that area. The special groups served under this scheme are usually Government Servants, members of the Armed Forces, licensees of Municipalities and other Local Authorities, factories, etc. provided, of course, they fall within the selected groups of the population listed on page 247.

The mobile units are deployed from and controlled by the National Tuberculosis Centre in Kuala Lumpur. They operate for eleven months in the year, returning to the Centre in December for servicing when the mass X-ray operators and drivers of the vans take their annual vacation.

### **Central Processing and Reading of X-rays**

All the rolls of exposed X-ray film are processed in the National Centre to ensure that the diagnostic quality of the X-ray picture is maintained at a uniform optimal standard. Every roll is scrupulously inspected for flaws due to poor technique or reduced efficiency of the equipment and steps are immediately taken by our technologists to rectify them.

The X-ray films are subjected to dual independent reading by experienced doctors in the Centre. The X-rays which show abnormalities are returned forthwith to the hospital responsible for further investigation of the "X-ray abnormalities" discovered. At the same

time letters are despatched to the "X-ray abnormalities" themselves requesting them to report to the hospital concerned for this investigation. The Medical Officer in the hospital who undertakes this investigation is obliged to complete and return to the National Centre monthly returns of the progress he has made in carrying out the investigation. Constant reminders are sent to defaulters who fail to turn up for investigation and in extreme cases home visits are made to urge their attendance.

### **No News is Good News**

To avoid tedious secretarial work and to save considerable expense, no reports are made on normal X-rays nor are the persons concerned notified by letter. No news should be regarded as good news.

The result of the chest X-ray examination when an abnormality is discovered, or of any subsequent investigation at the chest clinic is treated as strictly confidential. It is disclosed only to the individual concerned, never to any other person however closely he may be related to or associated with him, except with his express permission.

### **Progress and Targets**

Since the case-finding drive was instituted initially as an exercise and later on a mass scale, more than 400,000 persons have been X-rayed by our mass miniature units and about 20,000 persons have been found to have X-ray abnormalities suggestive of tuberculosis. Not all these 20,000 "X-ray abnormalities" have been investigated to find out how many of them have active tuberculosis and how many are in an infectious state. The response to recall for further investigation has been far from satisfactory. A substantial number — almost a quarter of them — have not turned up at all despite several reminders. Of those who have responded to recall, almost one quarter have failed to complete the full investigation required, having defaulted after one or two attendances at our chest clinics. There are many reasons for this lack of cooperation. The most important is just plain apathy which is a pretty universal human failing not at all peculiar to Malaya. The experience of other countries is much the same. Human beings all over the world will not submit readily and whole-heartedly to a full and complete medical examination if they feel well and are free from distressing symptoms. Early tuberculosis is notorious for the remarkably few and quite inconsequential symptoms, if any, it produces

and the slow and insidious way in which it develops. Another important reason is fear — fear of detection, fear of losing one's job, fear of social ostracism, fear of prolonged hospitalisation, fear of being a hopeless case. We know that most of these fears are quite groundless but there is little we can do to dispel them until education, particularly health education, and the healthy growth of the sense of civic responsibility are able in their own time to bring about enlightenment and proper understanding.

This sad lack of response to recall is causing some considerable concern and many methods are being devised and tried to reduce the defaulter rate. The most effective method we have found is direct personal approach by visiting the home of the defaulter and urging him to attend at the chest clinic for further investigation. Unfortunately this method cannot be applied with equal effectiveness throughout the country owing to shortage of trained personnel. Nor is there any prospect of our being able to do so in the near future as we are not likely for some considerable time to have enough home visitors to chase every defaulter. We have, therefore, established certain priorities in chasing defaulters. Only those with gross X-ray abnormalities who if tuberculous are very likely to be infectious are visited in their homes to ferret them out for further investigation. They represent about a quarter of those found with X-ray abnormalities. Home visits are also made to infectious cases who default in their treatment. In this way the limited number of trained personnel available are used to best advantage by concentrating on those defaulters who pose a real danger to the community.

About 7,000 new cases of tuberculosis have been discovered in the case-finding drive and put on active treatment. Almost all those with gross X-ray abnormalities have been rounded up for investigation and all the infectious cases discovered placed under close and careful supervision to ensure that they take their treatment regularly. Thus by a judicious use of the limited number of trained personnel available the utmost benefit is derived in protecting the health of the community.

It must be remembered, however, that a normal chest X-ray is no guarantee that a person will continue for the rest of his life to be free from tuberculosis. Our ultimate aim is to make every adult over the age of 15 years subscribe voluntarily to the inviolable rule of having a chest X-ray once a year. Only then will the case-finding drive achieve a complete cover of the eligible population of the country. Although this is an ideal no country in the world has succeeded in attaining, it must, nevertheless, constitute the ultimate aim of the case-finding drive in Malaya.

#### **Public Support and Cooperation Most Essential**

The success of the campaign will depend on the cooperation and support of the general public, for this is really their problem. If they are determined to rid this country of this curable and preventable disease and so protect the health of those who are still uninfected, they *must* come forward for a regular chest X-ray and they *must* report for further investigation when requested to do so and they *must* also persist with treatment when they are found to be suffering from tuberculosis.