



National Mobilization Plan to Halve TB in 10 Years - Phase 2

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National Mobilization Plan to Halve TB in 10 Years - Phase 2

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National Mobilization Plan to Halve TB in 10 Years - Phase 2

I. Origin of the Plan

Tuberculosis has always been a serious communicable disease in Taiwan. Today when the country's per capita GNP has surpassed US\$ 13,000, close to 13,000 new cases of tuberculosis are detected each year. The severity of the infection is greater than the sum of all communicable diseases combined.

Tuberculosis not only endangers the health of the public and wears thin social productivity, it also seriously undermines national competitiveness and tarnishes our international image. Taiwan has been promoting tuberculosis control for more than a half century. Through the longstanding efforts of the tuberculosis workers, we have made significant progress in disease control. However, there still exists a gap of some ten years as compared to the situation in the advanced nations. We need to speed up our progress in tuberculosis control and catch up.

Taiwan is a small island with a large population of high density and mobility. The rapid development of the society has resulted in estranged interpersonal relationship, while the prevalence of medical care resources allows people to seek medical care anywhere they like. The detection and management of cases under such circumstances are made more difficult than that in the agricultural society. In recent years, tuberculosis seems to re-emerge around the world. Tuberculosis control in Taiwan has faced considerable challenges due to a number of factors, such as the increasing number of tourists, importation of foreign workers, and high international mobility. To safeguard the health of the people, more positive and active intervention measures are called for in order to break through the bottlenecks of control works.

The Executive Yuan has approved a "National Mobilization Plan to Halve TB in 10 Years" in 2006. The Plan has an implementation period of 10 years. Since the Phase 1 5-year program was in action, the number of new cases each year has declined from 16,472 in 2005 to 14,265 in 2008, achieving modest success. In consideration of the current status of tuberculosis infection and after assessing the results of Phase 1 implementation, in coordination with The Global Plan to Stop TB 2006-2015 recommended by the Stop TB Partnership, and in reference to the suggestions and recommendations of scholars and experts, the Department of Health (DOH) proposes the Phase 2 National Mobilization Plan to Halve TB in 10 Years in the continuing efforts to fight tuberculosis.

A. Basis of the Plan

The "National Mobilization Plan to Halve TB in 10 Years" was approved by the Executive Yuan under Yuan-Tai-Wei-Zi-0950031290 on July 7, 2006.

B. Monitoring of Future Environment

(A) Current status and trends of tuberculosis infection worldwide

Tuberculosis is a droplet-transmitted communicable disease caused by *Mycobacterium tuberculosis*. Due to the shortness of effective medicines to cure in the past, half of the TB patients would die of the disease, while a quarter would become chronic sources of infection. Hence the disease used to be considered incurable. Since 1944, medicines for tuberculosis have been introduced and the control of tuberculosis in every country has made significant progress. However, since the 1980s, for reasons such as inadequate control programs, the emergence of multi-drug-resistant tuberculosis (MDR-TB), the spread of AIDS, and the rapid movement of the world population, the world is facing the resurgence of tuberculosis. Realizing the increasing seriousness of tuberculosis infection, the World Health Organization (WHO) declared TB a “global emergency” in 1993, urging countries to focus more on the prevention and control of tuberculosis to prevent a full blown TB pandemic.

The data of World Health Organization (WHO) show that there were 9,270,000 TB cases globally in 2007, higher than the levels in 2006 (9,240,000 cases), 2000 (8,300,000 cases), and 1990 (6,600,000 cases). The majority of cases occurred in Asia (55%) and Africa (31%), while a smaller percentage occurred in Eastern Mediterranean (6%), Europe (5%) and Americas (3%). The top five countries by the number of TB cases in 2007 were: India (2,000,000), China (1,300,000), Indonesia (530,000), Nigeria (460,000) and South Africa (460,000). TB incidence rates are steadily declining in five regions out of the six WHO regions (Europe stays the same), but the decline rate is less than 1% a year. The TB incidence rate in 2007 was 139 per 100,000 population and its prevalence was 206 per 100,000 population. In the same year, there were an estimated 500,000 plus cases of MDR-TB, and 85% of which were concentrated in 27 countries. The top five countries by the number of MDR-TB cases were India (131,000), China (112,000), Russia (43,000), South Africa (16,000) and Bangladesh (15,000).

Currently most countries have included the diagnosis and treatment of tuberculosis into their free healthcare services. The majority of high-burden countries have formulated national TB control program to combine national resources in the prevention and treatment of TB. After a few years of efforts, the global TB burden is decreasing. But an estimated 37% TB patients are not treated under the supervision of “directly observed treatment, short-course” (DOTS), and as high as 96% of MDR-TB are not receiving diagnosis and treatment that meet the international standards. To speed up progress towards the attainment of the goal of halving TB in 10 years, the WHO and Stop TB Partnership have formulated a series of strategies, calling all countries to join the efforts.

(B) Current status and trends of tuberculosis infection in Taiwan

1. Incidence

In 2005, there were a total of 16,472 reported and confirmed new tuberculosis

cases in Taiwan, representing an incidence rate of 72 per 100,000 population. In 2007, there were 14,265 reported and confirmed new tuberculosis cases, representing an incidence rate of 62 per 100,000 population, dropping 14% since 2005.

In the newly reported TB cases in 2005 to 2007, the number and incidence rate showed male-to-female ratio of 2 to 1. By age, the incidence rate of TB rose significantly with age. Of the newly detected TB cases in 2005 to 2007, approximately 52% were elderly over 65 years of age.

By cities and counties, estimated incidence is higher in the eastern part of Taiwan than in the western part; higher in the southern area than in the northern area. In 2005, Taitung County had the highest incidence of 259 per 100,000, followed by Kaohsiung County and Hualien County; Hualien County had the highest estimated incidence in both 2006 and 2007, reaching 190 and 166 per 100,000 population, respectively, followed by Pingtung County and Taitung County. Incidence in mountainous areas was 293, 267 and 206 per 100,000 population in 2005, 2006 and 2007 respectively; which was significantly higher than the TB incidence in non-mountainous area (71, 66 and 62 per 100,000 population, respectively).

2. Mortality rate

In 2005, mortality rate of tuberculosis in the Taiwan Area was 4.3 per 100,000 population, or 970 deaths, accounting for 0.7% of all deaths. In 2006, mortality rate was 3.65 per 100,000 population, or 832 deaths, accounting for 0.6% of all deaths. In 2007, mortality rate was 3.4 per 100,000 population, or 783 deaths, accounting for 0.6% of all deaths. In the past years, tuberculosis mortality had declined from 294.44 per 100,000 population in 1947 to 3.4 per 100,000 population in 2007, a significant decline over the years.

By sex, male-to-female TB deaths were 3.2:1, 2.7:1, and 3.7:1 in 2005, 2006 and 2007, respectively, indicating higher TB mortality rate among men than women. By age, TB mortality increases with age. Of all TB deaths, approximately 80% were elderly of 65 years of age or older, indicating that tuberculosis deaths in Taiwan concentrate primarily in the elderly population.

By cities and counties, TB mortality rate is higher in the eastern part of Taiwan than in the western part; higher in the southern area than in the northern area. Taitung County had the highest mortality in 2005 and 2006, reaching 10 and 9.69 per 100,000 population respectively, followed by Hualien County and Pingtung County. In 2007, Pingtung County had the highest TB mortality rate of 8.19 per 100,000 population, followed by Taitung County and Hualien County.

In comparison with other countries, the estimated TB incidence rate in Taiwan is higher than that in the USA, UK, Japan and Singapore, while comparable to that in Korea and Malaysia, and lower than that in Southeast Asian countries, such as Vietnam, Thailand, Philippines and Indonesia. Taiwan's TB mortality rate is higher

than the USA and the majority of European countries, comparable to that in Japan and Singapore, while lower than that in most Southeastern countries.

3. Treatment success rate

The treatment success rate of new sputum smear-positive TB cases in 12-month follow-up care in Taiwan was 61% in 2004 and 64% in 2005, which is comparable to that in the USA, but fell short of the WHO target of 85%. By sex, the treatment success rate was 62% among males and 70% among females in 2005.

C. Problem Analysis

The tuberculosis control work in Taiwan enters a new milestone since its charge was transferred from the Chronic Disease Control Bureau to the Centers for Disease Control (CDC) under the Department of Health in 2001. Through a series of policies, including “No Reporting, No Payment”, “Register upon Reporting”, “DOTS”, “DOTS-Plus”, and “Pay TB-related Medical Costs with Government Budget”, plus the resources inputted in the “Phase 1 National Mobilization Plan to Reduce TB by Half in 10 Years”, we have turned in brilliant performance in TB control in the past few years. The incidence rate dropped to 62 per 100,000 population in 2008 from 72 per 100,000 population in 2005, a decline of 14%. However in response to the repeated calls of the WHO for actions, countries around the world are allocating more resources to tuberculosis infection control. Also in light of the fact that Southeast Asian countries that have close ties with Taiwan still have high incidence of TB, we must take more aggressive and effective strategies for tuberculosis control if we aspire to reach the goal of “reducing tuberculosis by half in 10 years” under the Global Plan to Stop TB.

Below is a discussion of the problems we face in tuberculosis control:

(A) Case detection and reporting

1. Long incubation period and incongruous disease onset time

Because of the long incubation period of tuberculosis, there is a 5-10% chance of endogenous reactivation of tubercle bacilli over the lifetime of a person after initial infection. About half of the TB-infected persons develop the disease within the first two years of infection. The first year poses the highest risk, and the chance of disease onset decreases each year thereafter. But the possibility of disease development is present over the lifetime of the infected person. Symptoms of the initial infection are atypical; symptoms such as fever, coughing and loss of weight are not distinct; and tubercle bacilli may not be detected in sputum. As a result, delay in the time of intervention often leads to the spread of disease. A myriad of international studies indicate that if the contact person of contagious TB carrier is a child, the chance of disease onset over the child's lifetime is 17%, higher than the 5-10% chance of disease development among adult contacts. Follow-up data of domestic contacts also show the younger the person when they first had contact with a person with active tuberculosis, the higher the likelihood for them to develop the disease after infection. The phenomenon is

particularly pronounced among preschool children where their probability of disease development is 240 times higher than non-contacts in the same age group. The probability of disease development among adult contacts is 8 ~ 50 times higher than adults in the same age group.

2. Patient delay

The atypical early symptoms of tuberculosis and the lack of awareness would result in delay in the time patients seek medical care. In addition, people in Taiwan like to take over-the-counter medicines on their own, which oftentimes suppresses the symptoms and renders diagnosis more difficult. The discrimination and taboos associated with tuberculosis also keep patients from seeking medical care early, or the lack of disease insight would also delay the time a person seeks medical attention.

Elderly age 65 or older account for 51% of TB patients in Taiwan, and TB incidence tends to rise with age. Taiwan has entered the ageing society. The multiple health problems of elderly patients, such as diabetes, cancer, smoking and reduced immunity all add to the challenges of medical care for elderly TB patients.

3. Delayed diagnosis

Delayed diagnosis of tuberculosis often occurs due to its atypical symptoms that could be mixed up with other diseases, and unfamiliarity with the disease among medical practitioners. If the doctor lacks alertness, diagnosis of the disease is often missed and delayed. To acquaint all doctors with the disease so all patients can receive proper diagnosis is an important key to the success of tuberculosis control.

4. Delayed reporting

Not all medical personnel are familiar with the process of communicable disease reporting or sufficiently attentive to disease reporting. If a TB case is not promptly reported to the public health department so public health personnel can start case management right away, the germs might be spread in the community.

5. Uneven quality of laboratories

Testing facilities in Taiwan need to handle a huge number of TB specimens every year. Many of the TB screening test methods available at the present time still require manual operation and cannot rely on automation. It also takes a considerable period of time to train conventional testing personnel. The workload, testing personnel's adeptness with the testing operation and compliance with the standard operating procedures will all affect the testing quality. In addition, *M. tuberculosis* belongs to Biohazard Level 3 according to international classification that poses higher infection risk. As the safety of working environment and facilities for testing personnel still has room for improvement and there lacks proper incentives or hazard pay, lab technicians in general are not willing to perform TB screening tests. Currently more than one hundred laboratories in Taiwan offer TB testing services, but there is no established mechanism for quality supervision. Thus it is a pressing task to obtain more resources to improve the quality of tuberculosis laboratories and offer more incentives for

professional technicians to participate in TB testing.

(B) Clinical services

1. Disparity in medical care

In the early days TB patients were cared for by designated institutions. Since the inception of the National Health Insurance (NHI), more medical care resources have become available and accessible. Nowadays tuberculosis patients can seek care at practically all medical facilities. However as general practitioners are not well experienced in the diagnosis and treatment of TB, improper prescription might result in treatment failure or drug-resistant tuberculosis, causing more problems later on.

2. Lack of incentives for medical care institutions to provide diagnostic and treatment services

The existing NHI payment system takes away the incentive for hospitals to treat TB patients, which could lead to disruption in patient treatment and the problem of nosocomial infection as patients hop from one hospital to another seeking treatment. Making proper use of government budget to enhance the willingness of hospitals to treat TB patients can help the early attainment of the goal of halving TB in 10 years. Another problem that makes hospitals reluctant to accept TB patients is the media reports of nosocomial infection of tuberculosis. Although in the majority of cases nosocomial infection were ruled out later on, hospitals are still reluctant over the concern that their image might be adversely affected.

3. Treatment of recalcitrant cases

WHO has been calling on governments around the world to pay attention to the multi-drug-resistant TB crisis. Taiwan began the registration and surveillance of MDR-TB in 2006. MDR-TB is found in as many as 1% of the new TB cases in Taiwan, which is a warning sign that warrants attention. Along with the advancement of testing technology, extensively drug-resistant tuberculosis (XDR-TB) is gradually being diagnosed. Currently Taiwan has 15 XDR-TB cases that are difficult to cure with the currently available medicines. The presence of such bacilli makes the treatment of new cases more difficult. If the MDR-TB problem cannot be remedied, there will be fewer and fewer effective TB drugs available and the treatment of TB will become more and more difficult. This is also a serious challenge faced by Taiwan and the world in the work on TB control.

(C) Case management

1. Long process of treatment makes case management difficult

The duration of treatment for TB lasts more than six months, and in some difficult cases, it may takes more than two years. In addition, at least four different kinds of medicines need to be taken together, and those medicines often produce side effects that result in low patient compliance. A result of treatment interruption is the occurrence of more drug-resistant strains and continuous spread of the disease. Therefore it is

important that public health workers need to be involved in the treatment of every TB patient, and only through the combination of medical care and public health service can the work of TB control be properly carried out.

2. Insufficient primary public health manpower

Taiwan has approximately 14,000 new TB cases every year that all need the involvement of public health nurse during the course of treatment to provide them with health education and psychological support. Conceivably tremendous manpower is required in the process. Public health centers in cities/counties now offer general wellness services, and every public health nurse participates in the work of TB control. However public health nurses have many other tasks to attend to. So the public health manpower is still insufficient. Under the Phase 1 National Mobilization Plan to Halve TB in 10 Years, cities and counties are provided with resources to employ observers to assist public health nurses in making sure TB patients take their medicine and help reduce the workload of public health nurses. So aside from getting involved in case management, public health nurses can put forth more time and efforts in the quality management of DOTS.

3. Management of uncooperative and special cases

Elderly people over 65 years of age have the highest incidence of TB, accounting for more than 50% of new TB cases, and they also account for 80% of TB mortality cases. As some elderly people are being cared for at home and some live in nursing home, the possibility of cross infection cannot be slighted. The number of TB cases in mountainous areas is relatively few in comparison with the rest of the country (about 400-500 new cases a year), but the incidence of 200 per 100,000 population is 3-4 folds higher than the average incidence in Taiwan. Other groups (vagrants without regular residence, the poor living alone and foreign workers) and crowded facilities (troops, jailhouses and respiratory care wards) are all considered high-risk groups and should be included in the focus of TB control. There are also a few extremely uncooperative cases that are small in number, but costly to the society and at times create panic among the public. Their behaviors also accentuate the stigma and discrimination surrounding tuberculosis patients. Taiwan has increasingly more foreign spouses, up from 330,000 in 2004 to 410,000 in 2008 with females outnumbering males by 13 folds and the majority of foreign spouses come from Southeast Asian countries with high incidence of tuberculosis. In 2006, 2007 and 2008, there were respectively 128, 143 and 139 foreign spouses living in Taiwan who were reported as TB cases. Those affected foreign spouses and the subsequent infection problems they present should also be a focus of the TB control work.

II. Objectives

A. Plan Objectives

To reach the goal of halving TB in 10 years, we need to plan control strategies based on the concept of public health. The objectives of the Plan are as follows:

- (A) To provide the already-detected patients with standard and proper medical care for prompt cure and thus to reduce the sources of infection in communities;
- (B) To detect early infected cases for early treatment and thus to break the chain of infection through high-quality case management of identifying people with probable recent transmission by conducting contact investigation according to the “stone-in-the-pond principle”;
- (C) To prevent the development of disease in people with latent infection and thus to effectively control new TB cases; and
- (D) To lower TB mortality rate.

B. Constraints in Reaching Objectives

- (A) Primary public health workforce will mostly likely be inadequate in the long run that the frontline staff will be overloaded in their work. In addition, high turnover among frontline public health staff and new staff’s unfamiliarity with the service will also affect the effectiveness of the control work.
- (B) Lack of funds appropriated for the control work keeps the plan from being promoted in full force, thereby undermining the attainment of plan objectives.
- (C) Under economic instability and high unemployment rate, many low-income individuals may have difficulty enrolling in NHI program and seeking medical attention. As a result, infected cases may not be able to receive treatment early and be included under the care of tuberculosis control system.
- (D) If medical personnel do not follow the practice guidelines to provide TB patients with proper care, the treatment outcome will be affected.
- (E) Without the active support of health bureaus of city/county governments, the implementation of the Plan will be undermined.
- (F) In the face of the fact that there are tens of thousands of TB specimens to be tested a year and more than one hundred laboratories provides TB testing, the transport of specimens and the operations of contracted laboratories cost tens of millions of dollars a year. But as the government budget and manpower are curtailed every year, we are faced with the predicament of not having sufficient manpower for supervision and monitoring the quality of laboratories. As manpower and funding continue to face cutback, the efforts in improving testing quality will probably be affected.

C. Anticipated Performance Indicators and Assessment Criteria

To render the indicators used in the Plan more meaningful, DOH, after consulting the opinions of experts and scholars, and taking into account the trends of tuberculosis epidemic in Taiwan, proposes the following anticipated performance indicators under the

suggestions of experts:

- (A) Age-standardized rate of new TB incidence drops to 36 per 100,000 population by 2015

As TB cases involving elderly 65 years old or older account for 53% of total TB cases and the issue of population ageing is becoming a major concern, using age-standardized TB incidence rate to exclude the unavoidable factor of population ageing can better demonstrate the results of TB control efforts. Using the standardized incidence of 72.5 per 100,000 population in the year prior to the year the Phase 1 Plan (2005) was approved as base, we set the incidence target of 36 per 100,000 population by 2015 (47 per 100,000 population in 2011).

- (B) Age-standardized treatment success rate reaches 94.5% in 2015

Taiwan's age-standardized treatment success rate reached 92% in 2007. Under the promotion of DOTS in recent years, the great majority of TB patients completed the treatment with the assistance of observers. After deducting the death cases, there is limited room for treatment success rate to grow. Still, DOH hopes to reach the target of 94.5% treatment success rate by 2015.

- (C) The 18-month treatment default rate drops below 1.0% in 2015

The 18-month treatment default rate in Taiwan was 1.42% in 2007. Under the promotion of DOTS in recent years, the room for further decline in default rate is limited for observers under DOTS are already deployed to perform the job of checking with TB patients daily. Still, DOH hopes to reach the target of 1.0% default rate by 2015.

- (D) TB mortality rate drops below 2 per 100,000 population in 2015

The TB mortality rate in Taiwan was 3.6 and 3.4 per 100,000 population in 2006 and 2007. Because more than 60% of TB cases fall in the 65 years and older group, the room for further decline in mortality rate is limited. Still, DOH sets the target of mortality rate of 2 per 100,000 population by 2015.

- (E) Active case-finding rate reaches 4% of total annual new cases or higher in 2015

Case finding is the first and foremost work in TB prevention and control. Early detection and early control actions help contain an outbreak. Actively found cases accounted for 2.9% of new cases in 2009. When the quality of case management improves and the sources of infection are reduced, the percentage of active case-finding will also drop. However in the efforts to find cases earlier, we will step up contact investigation and screening of latent infection cases to increase the percentage of active case-finding.

Given the significant disparity among cities and counties in terms of population and TB incidence, using the incidence halving in all cities and counties as an assessment indicator of the Plan is essentially meaningless. In addition, DOH has already set up performance indicators for respective cities and counties every year based on prior year's data analysis results. Thus DOH does not plan to establish indicators for respective cities

and counties for the Phase 2 Plan. In addition, given that tuberculosis is a chronic infectious disease, the computation of indicators based on related results cannot commence until 18 months after the treatment begins. Thus at the end of each year, only the results of two years earlier will be available.

Anticipated performance indicator	Assessment criteria	Annual targets 【Note 1】				
		2011	2012	2013	2014	2015
Age-standardized rate of new TB incidence (per 100,000 population)	Σ 【(number of incidence in a certain age group / in a certain year) \times number of people in that age group in 2005】/ total population in 2005	47	45	42	38	36
Age-standardized treatment success rate (%)	Based on the standard population adopted by WHO, calculate the age adjustment of the number of the year's new TB cases that have completed treatment as diagnosed by a doctor after 18 months of treatment 【Note 2】 / the number of new TB cases in the same year	93.5	93.5	94	94	94.5
18-month default rate (%)	The number of new cases found in the year that are lost-to-follow-up after 18 months of following up treatment 【Note 3】 / the number of new TB cases in the same year	1.3	1.2	1.2	1.1	1.0
TB mortality rate (per 100,000 population)	(Number of people died of TB in the year / mid-year population) \times 100,000	2.7	2.5	2.3	2.2	2.0
Active case-finding rate (%)	Number of cases actively found in the year 【Note 4】 / number of new TB cases in the same year \times 100%	3	3.5	3.5	4	4
Number of chest X-ray screening (person-times) for residents age 12 or older in remote areas 【Note 5】	Person-times with chest X-ray screening completed in the year	27000	35000	43000	51000	59000
Percentage of sputum specimens delivered to testing facility within 24 hours of collection (%)	【 (Number of tested specimens with date received by a lab as shown in testing network database \leq 1 day) / total sputum specimens tested \times 100%】	70	75	80	85	90
Percentage of TB testing laboratories accredited by Taiwan Accreditation Foundation (TAF) (%)	(Number of TAF accredited TB testing laboratories in the year / number of DOH-sanctioned TB testing laboratories) \times 100%	85	89	93	97	100

Notes:

1. All performance indicators of the Plan are defined the same as those provided in the WHO annual reports. The age-standardized rate of new TB incidence and TB mortality rate are computed based on statistical data in the one year before the year of the Plan; the other indicators are analyzed based on cohorts in two years before the year of the Plan (when the Plan ends on December 31, 2015, the age-standardized rate of new TB incidence and TB mortality rate will reflect the 2014 data, while other indicators will reflect the 2013 cohort data).
2. "Treatment success" means a patient who has completed the full course TB treatment and determined by a clinical practitioner as being able to complete the treatment.
3. "Lost-to-follow-up" means a reported and registered patient whose whereabouts are continuously unknown in the follow-up management process such that the treatment status of the patient cannot be learned.
4. "Active case-finding" means the number of people identified as having latent infection and/or disease development through contact screening, mobile screening or group screening.
5. "Remote area" means townships determined as remote by the Research, Development and Evaluation Commission and having TB incidence higher than 100 per 100,000 population in 2009.

III. Snapshots of Extant Policies and Programs

The "National Mobilization Plan to Halve TB in 10 Years - Phase 1" approved and implemented since 2006 has set out a number of action plans to address the problems raised at the beginning of the Plan.

We stepped up contact investigation and screening of high-risk groups coupled with mobile X-ray screening to detect TB cases early. With regard to strategies for clinical diagnosis and treatment, it is important to raise the TB awareness of medical care institutions and their ability to handle regular TB cases given the changes in social patterns and people's habits of seeking medical attention, and the fact that there are more than 10,000 new TB cases every year. To enhance the capability of medical care institutions in TB diagnosis and treatment, we made reference to international data and invited domestic experts and relevant medical society to compile a Taiwan Guidelines on TB Diagnosis & Treatment for the reference of the domestic medical community. We also worked with medical societies and associations to hold training sessions for hospital personnel to enhance their diagnosis, treatment and care quality so as to reduce the probability of delayed diagnosis. Since the National Mobilization Plan was implemented, we have been endeavoring to improve the quality of laboratories for testing tubercle bacilli. Besides providing subsidies to some laboratories for equipment upgrade, we also worked with relevant medical societies to hold training courses for lab personnel. We have also signed contract with several contracted laboratories to help hospitals that do not have their own

screening facilities undertake sputum culture. At the same time, we would perform quality audit and visit those laboratories to ensure their service quality. According to a questionnaire survey of tubercle bacilli laboratories of hospitals around the country conducted by CDC in 2009, 85.8% of TB specimens were sent to regional-level laboratories for acid-fast bacilli smear; 34.1% TB specimens were sent to CDC-subsidized and contracted laboratories for testing, indicating the quality of sputum culture in Taiwan has been greatly improved. CDC also worked with health bureaus of city/county governments, inviting TB experts to attend the regularly held TB advisory committee meetings, give advice on suspected cases and other diagnosis/treatment questions, and assist in making confirmed diagnosis. CDC has also established a communication channel for dialogue between the public health community and the medical community, and collaborated with the Bureau of National Health Insurance in conducting medical record audits to catch early any inappropriate prescriptions made and to ensure that TB patients are receiving proper care.

To prevent the incidents of nosocomial infection, CDC has invited domestic experts to compile a “Guideline for Preventing the Transmission of Mycobacterium Tuberculosis in Healthcare Facilities” for the reference of medical care institutions, and includes compliance with the guidelines in DOH hospital accreditation, while publicizing the importance of compliance. For cluster infection events, CDC has established a “Significant or Clustering Event Outbreak Investigation Reporting Platform”, requiring the online reporting of all suspected clustering events to render such information public and transparent.

In terms of case management strategy, we vigorously promoted the WHO-recommended tuberculosis control strategy – a patient-centered case management approach, DOTS (Directly Observed Treatment, Short-course). Under the care and concern of nurse or observer, this patient-centered strategy makes sure TB patients take all the prescribed medicines every day and are cured as expected, and prevents the emergence of drug-resistant strains. If patients are observed with side effects, DOTS nurse or supporter will remind the patient to make an appointment for recall visit. With public health care and clinical care closely connected, the health of the patients and the community is safeguarded. As of year-end 2008, more than 90% of sputum smear-positive cases have been included in the DOTS. DOTS will be expanded gradually under the planning of Phase 2 Plan.

In light of the rising trends of MDR-TB cases and in response to the WHO warning given in March 2007, we continued to strengthen DOTS management to prevent treatment interruption that could lead to the emergence of drug-resistant strains. We also endeavored to enhance the testing capacity of laboratories so as to speed up the speed and accuracy of MDR-TB diagnosis and detect such patients early. We have also constructed a “MDR-TB Medical Care System” in May 2007 to be responsible for the medical care for MDR-TB. In light that the treatment of MDR-TB is more complicated and the treatment cycle lasts longer, and adverse reactions and the treatment process need to be monitored closely,

hospitals that treat MDR-TB need to provide medical care, and in addition, carry out DOTS-Plus to put patients under rigorous monitoring insofar as treatment is treatment. Under DOTS-Plus program, medical care and community management are combined into one, supplemented with the visits of the public health nurse originally assigned to the patient so as to effectively mitigate the threat of MDR-TB. So far, the average rate of 12-month negative sputum culture among new patients cared for by a medical team reaches 90%, which is quite an outstanding achievement. DOH has also appropriated funds to purchase second-line medicines for tuberculosis and audit the prescriptions written by medical care institutions for TB patients to make sure patients receive proper treatment. DOH also arranged on-the-job training courses every year for frontline medical personnel to enhance their professional knowhow and collaborated with the Institute for Biotechnology and Medicine Industry in the research and development of testing technologies and treatment methods in the hope to control the MDR-TB situation.

For TB patients living in mountainous areas, with AIDS or who are foreign workers, CDC works with the Bureau of National Health Insurance to provide those disadvantaged people with medical assistance, and encourages city/county health bureaus (stations) to develop local TB control programs. For mountainous areas, DOH integrated the resources of its subordinate agencies to establish 2 counseling centers and 75 health construct centers, and subsidized the procurement of 296 medical equipment, 367 IT equipment, and 17 vans for mobile clinic to improve the quality of medical service and IT equipment for remote villages. DOH also arranged hospitals to support the home care, health education and mobile medical services in neighboring mountainous, offshore island and remote areas to strengthen primary care services. In 2008, DOH arranged continuing education training for public health centers in mountainous villages, and built the picture archiving and communication system (PACS) for mountainous, offshore island and remote areas. So far, public health centers in eight remote villages have PACS connectivity with DOH hospitals. DOH also mobilized the public health resources in mountainous areas to boost their performance in active case-finding and case management, which has effectively helped lower the TB incidence in those areas from 293 per 100,000 population in 2005 to 206 in 2007. The incidence rate is still higher than that in non-mountainous areas, but the gap is expected to be shortened gradually as various prevention and control measures in place continue to be implemented.

To address the high incidence among elderly people, DOH launched on a trial basis a latent TB infection treatment program, targeting congregate settings, such as nursing homes in the hope to lower the incidence rate among elderly population.

Through efforts on various fronts described above, the number of reported and confirmed TB cases have declined from 16,472 in 2005 to 14,265 in 2008. The rate of new TB incidence also fell from 72 per 100,000 population to 62 per 100,000 population over the same period, a 14% reduction cumulatively. In 2008, city and county governments stepped up contact investigation and the efforts of case-finding. As a result, the performance

indicators in that particular year fell behind the set targets under the Plan. However, early detection and early intervention will still aid the attainment of overall goal under the Plan, albeit the short-term targets are not met. Because *M. tuberculosis* can stay latent in the infected individuals for a long period of time and cause opportunistic infection, it is always a long-drawn-out battle to eliminate them. Taiwan has gained modest success in eradicating tuberculosis after several years of efforts. But there is still much room for progress in comparison with advanced nations, such as USA and Japan. Thus DOH proposes the Phase 2 National Mobilization Plan to continue the various control works while remedying the deficiencies in the Phase 1 Plan.

IV. Implementation Strategies and Methods

A. Major Tasks and Implementation Methods

(A) Strengthen case-finding and reporting strategy

1. Improve active case-finding

(1) Strengthen the monitoring of specific groups

i. Tuberculosis surveillance and monitoring of foreign workers (foreigners and foreign spouses)

(i) Foreign workers are required for take physical examination, which includes pulmonary tuberculosis screening, within 3 days after entering Taiwan, and within 30 days before or after 6 months, 18 months and 30 months of employment. Foreigners (including foreign spouses), nationals without household registration, citizens of Mainland China and residents of Hong Kong and Macao are required to submit a health certificate, which includes the result of pulmonary tuberculosis screening, when applying for residence or permanent residence permit.

(ii) To ensure the quality of hospitals that provide physical examination service for foreigners, those hospitals are required to establish standard operating procedures, and health agencies and accreditation institution will conduct regular and special quality audit of those hospitals.

(iii) Dispute cases without confirmed diagnosis may be submitted to the TB diagnosis and treatment advisory taskforce at respective division of the CDC by a doctor (or hospital) or through the city/county health bureau for discussion.

ii. Tuberculosis surveillance and monitoring of specific occupations and groups

(i) Tuberculosis surveillance and monitoring will be carried out targeting specific occupations such as health workers, and specific facilities, such as jailhouse, detention center and crowded establishment. In accordance with the “Communicable Disease Control and Monitoring Operation for Densely Populated Establishments” and “Tuberculosis Control Work Manual” published by DOH CDC, those establishments will be asked to step up pre-admission health examination, conduct regular TB screening, and monitor coughing, and leave a buffer zone in wards for temporary segregation when a suspected clustering event arises.

(ii) For crowded facilities such as nursing homes and respiratory care wards, infection control work and the monitoring of cluster infection will be strengthened.

(iii) In conjunction with the Labor Safety and Health Act, efforts will be made to enhance the quality of physical examination for workers and the screening of specific healthcare personnel. CDC will also collaborate with the Ministry of the Interior and the Bureau of National Health Insurance to improve the quality

of physical examination for elderly so as to actively find TB cases among certain occupations and among the elderly.

- (iv) For indigenous ethnic groups, TB related educational activities will be planned by means of community empowerment through indigenous organizations or organizations in mountainous areas. It is hoped that such activities better align with the needs of those groups so the concept of TB prevention will be ingrained in the minds of young indigenous people and reverse the long-term trend of high TB incidence among indigenous people living in mountainous areas.

(2) Step up contact investigation

The work of contact investigation will be stepped up according to the “stone-in-the-pond principle”, which means once a contact is confirmed as a new TB case, the circle of contacts will be extended for second-wave investigation in accordance with the Contact Investigation Rules. For instance, investigation is extended from the first circle of contacts in the same room to the second circle of contacts on the same floor, and to the third circle of contacts in the same building at different levels until all contacts in the same building. The contact investigation completion rate will be included in the work performance audit of city/county health bureaus, and the advanced contact tracing model adopted in the U.S. is introduced to promote contact investigation step-by-step. The aim is to detect infected cases early and provide proper treatment early. In addition, funds will be allocated to make sure TB contacts will receive medical care and help ease their burden brought by examination costs. All of these actions aim to detect early infected individuals and provide them with follow-up care services. It will help reduce the sources of infection, thereby facilitating tuberculosis control.

(3) Promote latent TB infection treatment policy

In consideration of the probability of morbidity following infection and the safety of undergoing treatment, DOH will gradually expand the treatment of latent TB infection to the following groups to effectively reduce the possibility of disease development at a later date.

- i. Children under 13 years of age with latent TB infection.
- ii. HIV positive individuals with latent TB infection.
- iii. People in crowded establishments, such as correctional facilities and long-term care facilities who have latent TB infection.
- iv. People with latent TB infection who have had close contact with confirmed infectious TB cases.

(4) Step up x-ray screening

In order to upgrade the quality of mobile x-ray screening and make the most of private-sector resources, four digital x-ray mobile vans have been purchased during the Phase 1 period, which are deployed in the northern, central, southern and eastern

parts of Taiwan each. Between 2008 and June 2010, the mobile X-ray units have screened 176,514 persons. Medical care institutions of high quality have also been commissioned to conduct chest x-ray screening in remote areas scarce in medical care resources, such as mountainous areas and offshore islands, as well as correctional facilities (including jailhouses, detention centers, observation centers, etc.), people in close contact with TB patients and high-risk groups. During the Phase 1 period, list of all indigenous peoples above 12 years of age was produced and chest X-ray screening was conducted according to the list. At the end of 2008, 64,488 people have been screened, representing a participation rate of 69.57%. The TB incidence rate in mountainous areas was 206 per 100,000 population in 2007, which is considerably higher than Taiwan's average incidence of 62 per 100,000 population. Thus in Phase 2, DOH will continue to combine the forces of government and private sector and use the purchased digital X-ray van or the X-ray van of medical institutions to step up the screening of residents living in mountainous areas.

2. Strengthen the training of medical personnel

(1) Strengthen medical education

Enhancing doctors' knowledge of tuberculosis control can start at the stage of their medical education.

(2) Step up education and training

- i. In collaboration with city/county health bureaus and relevant medical societies, continuing education on the diagnosis and treatment of tuberculosis will be organized to maintain the quality of diagnosis and treatment.
- ii. In collaboration with the Ministry of Education, the weight of TB-related curriculums for medical students can be increased to make the diagnosis and treatment of tuberculosis a part of doctor's general education that will help prevent delayed diagnosis of TB when they start practice.
- iii. On-the-job training program that integrates teaching and clinical practice will be planned for doctors during their internship to acquaint them with the clinical manifestations of tuberculosis, which will help lift the quality of medical care.
- iv. We will invite TB experts to form a tuberculosis advisory committee that can give advice on suspected cases and other diagnosis/treatment questions, and assist in making confirmed diagnosis, while establishing a communication channel for dialogue between the public health community and the medical community.

3. Case reporting and monitoring

(1) Strengthen the functions of tuberculosis database

We will maintain the normal operation of national tuberculosis database and collect and instantly update complete information on TB cases, including diagnosis, reporting, registration, treatment, examination, management and state of contacts,

and provide information needed for case management and situation analysis. The structural sources of TB cases and any changes thereto will also be included in the scope of monitoring. Such information will be analyzed with causes explored for the development of control measures commensurate with the local conditions.

(2) Improve the existing multi-functional TB case reporting and inquiry system

We will encourage medical care institutions to directly make online reporting of TB cases and increase the number of reporting spots to improve the timeliness of reporting. We will regularly announce the updated epidemiological information and provide real-time reports to make it convenient for health agencies and medical care institutions to grasp the conditions of individual cases and the epidemiological conditions in each region.

(3) Put into effect the TB reporting policy

- i. We will step up the promotion and strictly enforce the regulations of the Communicable Disease Control Act in connection with case reporting. We will instruct local health bureaus to strengthen supervision of medical care institutions in reporting tuberculosis cases as required to improve case reporting rate. We will regularly inspect medical care institutions on the interval between diagnosis and reporting so as to improve the timeliness of reporting and realize the spirit of the Communicable Disease Control Act.
- ii. In coordination with the inclusion of tuberculosis-related medical costs in government budgets, we will continue to promote the “no reporting, no payment” policy. In collaboration with the Bureau of National Health Insurance, medical claim cases will be linked up with the national tuberculosis database for cross-checking.

(4) Analyze and provide reported information

We will compile and analyze reported information from medical care institutions periodically and feedback the results to medical care institutions through local health bureaus to enable hospitals and clinics and public health workers understand what happens to the reported case information and make improvement in future reporting.

(5) Prevent delay on the part of the patient

- i. To prevent delay on the part of the patient, health education and campaign will be strengthened to remind the public that when there are symptoms, do not hesitate to visit a doctor and undergo examination as soon as possible.
- ii. To improve delay on the part of physicians, relevant workshops will be organized in collaboration with medical associations and local health bureaus to improve the alertness and capabilities of physicians in the diagnosis of tuberculosis. We will also upgrade the facilities of medical care institutions in TB diagnosis through subsidies and the establishment of a tubercle bacilli testing network.
- iii. We will continue to conduct checking of tuberculosis-related medical claims

submitted to the National Health Insurance against the national tuberculosis database, and continue the checking of death statistics compiled by DOH as a way to catch the missing information in case reporting.

4. Improve the quality of laboratory testing and promote laboratory accreditation system

To keep abreast with international practice that relies the diagnosis of tuberculosis on bacteriological evidence, and to assist doctors in making diagnosis and treatment on a scientific basis and evaluating the efficacy of treatment in registered patients by periodically tracking the bacterial count in sputum, CDC has established a contracted tuberculosis testing service network in 2001 to provide a convenient referral testing channel. In coordination with the implementation of the Phase 1, contracted laboratories provide comprehensive and fast testing services, including sputum smear testing for acid-fast bacilli, pathogen culture and identification, and drug susceptibility test, which helps improve accuracy and timeliness of tuberculosis tests.

In Phase 2, emphasis will be put on the classification of contracted laboratories in the tuberculosis testing network by promoting laboratory accreditation and on the research and development of testing techniques to align with the international practice. Through the stratification and division of labor among accredited laboratory, regional reference laboratory and national reference laboratory, TB testing services and monitoring will be made more convenient and reliable.

As of July 29, 2010, there are 33 accredited laboratories for tuberculosis testing, of which 9 are contracted laboratories for testing tubercle bacilli. The geographic distribution of those laboratories is as follows:

City/county	Accredited laboratories for tuberculosis testing (33)	Contracted laboratories for testing tubercle bacilli (9)
Keelung City	1	0
Taipei City	6	2
Taipei County	3	0
Taoyuan City	1	1
Taoyuan County	1	0
Taichung City	5	0
Yunlin County	1	0
Chiayi City	1	0
Chiayi County	2	0
Changhua City	1	1
Changhua County	1	1
Tainan City	1	0
Tainan County	3	1
Kaohsiung City	3	1

Kaohsiung County	2	1
Hualien City	1	1
Total	33	9

(1) Enhance the quality of specimen testing

The quality of TB specimen collection, delivery and testing has a bearing on the accuracy of test results, and directly influences the patient's diagnosis and treatment as well as subsequent infection control work. Implementation of the Plan can enhance the quality of specimens testing process, including the quality of sputum collection, timely delivery for testing, specimen preservation and delivery temperature (4-8 °C). Under the Plan, a policy for delivery of specimens to the laboratory in 24 hours after collection will be implemented in stages to improve the accuracy of test results. According to the data of CDC tuberculosis testing service network, the contracted laboratories carried out acid-fast bacilli smear test for 91,663 specimens in January ~ June, 2010, of which, 45,272 specimens or 49.3% were delivered to the laboratories within 24 hours of collection. In light of the importance of timely delivery of specimens, CDC hopes to break the predicament of gradually dwindling government budget and manpower with supports under the Plan. With sufficient funding and manpower, CDC hopes that the percentage of specimens delivered within 24 hours will reach 70% in 2011 and rise gradually to reach the target of 90% by 2015. In addition, education of low-level workers through doctors and nurses on the accurate collection, preservation and handling of specimens will also help improve the quality of collection and testing work. Also, through the "National Communicable Disease Specimen Collection and Delivery Quality Management Program", frontline personnel will be offered training on the collection and delivery of TB specimens to eventually achieve the goal of 24-hour specimen delivery.

(2) Stratified framework for tubercle bacilli testing

To further enhance the quality, timeliness and convenience of TB testing, DOH will adopt a stratified and division of labor mechanism that charges the work of TB testing to accredited laboratory, regional tuberculosis reference laboratory and national tuberculosis reference laboratory. The functions and missions of existing contracted tuberculosis laboratories may be gradually taken over by the accredited laboratories.

(3) Accredited laboratory for tuberculosis testing

According to Article 4 of the *Regulations Governing the Administration of Laboratory Diagnoses for Communicable Diseases and Laboratory Testing* and *Directions for the Operation of Accredited Communicable Disease Testing Facilities*, an accredited laboratory for tuberculosis is a communicable disease testing facility sanctioned by the Centers for Disease Control following document review to

perform four test items – acid-fast bacilli smear testing, pathogen culture, pathogen identification, and drug susceptibility test.

Accredited laboratories can play the role of a regional laboratory, providing full-range *M. tuberculosis* testing services for suspected TB patients seen at neighboring medical care institutions so that hospitals can have convenient access to high-quality tuberculosis testing services without having to set up their own laboratory.

Pursuant to the prevailing *Directions for the Operation of Accredited Communicable Disease Testing Facilities*, as of July 29, 2010, there are 24 laboratories in the country that are qualified to apply for the status of a DOH-accredited laboratory for tuberculosis testing, and 33 of them have passed the review. CDC will encourage more qualified laboratories to apply for accreditation and obtain the qualification to offer testing service so as to enhance the quality and timeliness of tuberculosis testing. It is expected that by 2011, all qualified laboratories for tuberculosis testing in the country will be accredited. CDC will also promote the accreditation of all DOH-accredited laboratories for tuberculosis testing by Taiwan Accreditation Foundation (TAF) by 2015 (currently only 81% are TAF accredited).

To increase the incentive for medical care institutions to apply for accreditation of their laboratory, CDC is assessing the possibility of linking up with the payment system of the Bureau of National Health Insurance (BNHI), and providing reasonable tubercle bacilli testing cost data to BNHI as reference for considering adjusting the current payment schedule for tubercle bacilli testing. Hopefully, an increase in testing fees will give more incentive to hospitals to set up their own laboratory for tubercle bacilli testing. CDC will also provide accredited laboratories with the function of posting their testing results on the communicable disease reporting system that will enable hospitals to check the test results instantly, thereby improving the timelines of test report, while cutting down the faxing or delivery of paper documents.

(4) Contracted laboratories for tuberculosis testing

CDC began to construct a contracted tuberculosis testing service network in October 2001. In the initial stage, the work focused on the construction of a specimen delivery network, information feedback and the process of receiving and delivering specimens. The aims of the network are to improve the convenience, access, and accuracy of tuberculosis testing so that the diagnosis and treatment of tuberculosis will be based on bacterial evidence, and the assessment of TB outbreak and planning of TB control policy will be more scientifically based.

In the efforts to establish a high-quality tubercle bacilli laboratory and testing network, CDC selects contracted laboratories in different parts of the country. Each contracted laboratory is equipped to provide full-range of tubercle bacilli testing to

make sure each TB or suspected TB patient that shows up at a hospital undergo sputum smear testing, acid-fast bacilli culture, and for positive cases, drug susceptibility test. This network effectively shortens the time between the time of specimen collection and the time a test report is produced to provide people in each area quality and efficient laboratory diagnosis services and achieve early detection and early treatment. This way, sources of infection in the community are cut down, and the rates of incidence, natural infection and mortality will be reduced as a result. Currently there are nine contracted laboratories (Taipei City Hospital, Wan Fang Hospital, Taoyuan General Hospital, Changhua Christian Hospital, Chest Hospital, Chang Gung Memorial Hospital Kaohsiung, Kaohsiung Medical University Chung-Ho Memorial Hospital, and Buddhist Tzu Chi Hospital). When those contracted laboratories complete their missions for the period at the end of 2011, their functions and missions will be gradually taken over by accredited laboratories.

(5) Establish regional tuberculosis reference laboratory

It is proposed that CDC will provide subsidy to a few selected tuberculosis laboratories of medical centers that will serve as regional tuberculosis reference laboratory. Those reference laboratories will assist in training the technicians of other tuberculosis laboratories in the region, take charge and oversee the quality management, supervision and counseling of tuberculosis laboratories in the region, and be responsible for testing in the event of suspected TB clusters in the region.

(6) Establish national tuberculosis reference laboratory

The CDC Tuberculosis Reference Laboratory will be responsible for special tubercle bacilli testing (e.g. genotyping and strain identification), establishment of tubercle bacilli repository / gene bank, establishment of standard laboratory operation system and national tuberculosis laboratory quality management system, research and development of tuberculosis testing technology, and providing guidance, support and audit of tuberculosis testing facilities around the country.

To effectively manage the quality of testing services provided by accredited laboratories contracted laboratories and regional tuberculosis reference laboratories, CDC will carry out control and audit operations through quality document review, onsite inspection, and external QC.

(7) Surveillance and confirmation of special tubercle bacilli

- i. In the surveillance of drug resistance, CDC will monitor the development of drug resistance in different areas through the drug susceptibility test data of accredited laboratories, and based on which, evaluate the quality of TB case management in the area, and if necessary, intervene early to address the problem.
- ii. CDC will integrate its system with the public health information system to monitor zoonotic tuberculosis and the side effects of BCG vaccination.
- iii. The isolation of nontuberculous *Mycobacterium* (NTM) in tuberculosis

specimens has become an increasingly serious problem. Establishing a NTM surveillance system will effectively clarify the drug resistance problem seen in the treatment of suspected TB patients.

(8) Tuberculosis research and improvement and development of testing methods

- i. We will encourage academic and research institutions and the biotech industry to jointly undertake tuberculosis related research, and assess and develop new testing methods and technological platform.
- ii. In coordination with the classification scheme adopted by WHO for molecular testing of tuberculosis, the molecular test items performed by our tuberculosis laboratories will be standardized, and a tiered testing network for nucleic acid testing and genotyping will be promoted.

(9) Others

- i. Establish new guidelines for tuberculosis testing

Meetings of scholars and experts will be held regularly to review the current “Tubercle Bacilli Testing Handbook” to stay abreast with new science and technology in laboratory testing in the world, and through consensus, to formulate guidelines (including external quality assurance, EQA) for the reference of tuberculosis laboratories throughout the country.

- ii. Training and certification of testing personnel

To provide more incentives for lab technologists and technicians to perform tuberculosis testing work and retain experienced TB testing personnel so as to enhance the quality of tuberculosis testing, CDC will collaborate with relevant associations or agencies to build a tuberculosis technical personnel certification system to protect the safety of lab operators. CDC will also offer regular training courses and draw up a long-term cultivation plan for laboratory personnel. It is hoped that through basic training program (meaning in-house training offered by accredited laboratory internally based on their own manpower needs), intermediate training program (meaning courses and practical training offered by a regional tuberculosis reference laboratory to accredited laboratories within the region), and advanced training program (cross-regional training courses and practical training offered jointly by two or more regional tuberculosis reference laboratories), tuberculosis technical personnel in the country will have the opportunity to learn more technical knowhow and develop more practical experience, thereby effectively enhancing the professional capacity and test accuracy of TB lab technicians.

(B) Enhance the quality of diagnosis and treatment of tuberculosis in clinical settings

1. Enhance the expertise of physicians

- (1) In collaboration with city/county health bureaus and relevant medical associations, continuing education on the diagnosis and treatment of tuberculosis

will be organized to maintain the quality of diagnosis and treatment.

- (2) In collaboration with the Ministry of Education, the weight of TB-related curriculums for medical students will be increased to make the diagnosis and treatment of tuberculosis a part of doctor's general education that will help prevent delayed diagnosis of TB when they start practice.
 - (3) On-the-job training program that integrates teaching and clinical practice will be planned for doctors during their internship to acquaint them with the clinical manifestations of tuberculosis, which will help lift the quality of medical care.
 - (4) CDC will invite TB experts to form a tuberculosis advisory committee that can give advice on suspected cases and other diagnosis/treatment questions, and assist in making confirmed diagnosis, while establishing a communication channel for dialogue between the public health community and the medical community.
 - (5) CDC will collaborate with the Bureau of National Health Insurance in conducting medical record audits and deny payment to prescriptions that do not follow the treatment guidelines so clinical practitioners will learn the right regimen for TB treatment. Those denied payment cases will also be included in case discussion during training to ensure high-quality patient management.
- 2. Provide more incentives for hospitals**
- (1) Pay tuberculosis-related medical costs with government budget
 - i. To give hospitals more incentives to provide diagnostic and treatment services to TB patients and address the longstanding problem of underpayment for related medical services under the National Health Insurance, DOH will set up budget to pay for certain services that will benefit tuberculosis control.
 - ii. We will implement a project management system to improve the quality of medical care for tuberculosis and fortify the horizontal integration between the medical care system and public health system. The Bureau of National Health Insurance will implement a payment system that encourages the quality of care for tuberculosis patients. Through the establishment of case manager and improvement in reimbursement, hospital services for TB patients are expected to improve. In addition, waiving the deductible for TB patients when they seek medical care will increase their willingness to continue the treatment, thereby reducing the loss-to-follow-up rate of TB patients while increasing the treatment success rate.
 - (2) Upgrade hospital equipment to provide a better treatment environment

We will subsidize hospitals in the installation of a negative pressure sputum collection room as well as protective and entertainment facilities to provide patients with high-quality treatment environment.
 - (3) Inspection of nosocomial infection control
 - i. Tuberculosis infection control has been included in the annual inspection of

nosocomial infection control. CDC will also continue to collaborate with relevant societies and associations in arranging training courses, and step up the infection control audit to make sure hospitals of all levels faithfully implement infection control measures.

- ii. CDC will also strengthen the functions of “Significant or Clustering Event Outbreak Investigation Reporting Platform” to allow Outbreak Investigation agency to enter the findings of each single incident, and under the pretext that the privacy of individual cases is not breached, analyze case information to examine the way an epidemic situation has been handled as reference in making improvement.
- iii. CDC will invite professional organizations to assist in evaluating whether the air conditioning system and other facilities of hospitals are up to standards.

3. Treatment of recalcitrant cases

- (1) We will continue to promote the “MDR-TB Medical Care System”, subsidizing designated hospitals that are responsible for providing medical care to MDR-TB patients. This is to address the problem where such patients are not adequately cared for because regular hospitals either lack the experience or are reluctant to treat this kind of patients due to low NHI payment.
- (2) We will import more medicines for treating MDR-TB, exchange experience with foreign experts, and stay in touch with new treatment regimens to give MDR-TB patients more hope of being cured.

(C) Implement case management

1. Improve the performance of case management

(1) Extend the implementation of DOTS

Treatment of tuberculosis takes a course of more than six months; it is a long fight. It requires patience and will-power on the part of the patient to face the discomfort brought about by medications and deal with all kinds of likely adverse reactions. For many reasons, TB patients often fail to take medicine regularly, which not only undermines their own treatment but also leads to the emergence of drug-resistant bacteria. Moreover, untreated patients will continue to transmit the disease to others, creating more serious problems. WHO strongly recommends DOTS for each and every TB case. Under DOTS, a trained and objective observer (not a family member) will “deliver medicine to the patient, see to it that the patient takes the medicine, and then leave until after the patient has taken the medicine.” The observer makes sure every patient takes every medicine as instructed to help patients regain their health in the long process of treatment, and at the same time, help eliminate one source of infection. Case management is very important in infection control, and more resources should be put in to effectively reduce the loss-to-follow-up rate, improve control effects, and reduce the number of drug-resistant patients.

In continuing the Phase 1 Plan that put sputum smear-positive cases under DOTS, all TB patients will be included in the DOTS program. On the one hand, it will benefit more patients and to ensure the success of TB infection control. On the other hand, the service of observers delivering medicine to patients can replace part of the work that used to be performed by public health nurse. Relieved of the work of calling patients everyday to urge them to take medicine on time, public health nurses can spend the time thus saved on managing tougher cases.

(2) Standardize the management process

To make sure each and every TB patient will receive comprehensive services, a “Tuberculosis Work Manual” is drawn up to detail each work process during case management so frontline personnel can have a reference at hand and work accordingly.

A “TB Handbook” booklet is available as a bridge of communication between clinical care and public health. Each confirmed TB patient is given a “TB Handbook” booklet by the public health nurse. The patients will bring the handbook with them when they visit their doctor and the doctor will enter relevant information on the patient in the handbook so infection control agency can readily grasp the status of each case in terms of treatment and recall visits. If the public health nurse finds that a patient experiences side effects in the case management process, they can also reflect this problem to the doctor through this handbook to help the patient complete the treatment without further complications.

(3) Strengthen the quality control of case management

i. Feedback through routine monitoring reports to city/county health bureaus

Various statistical tables on the quality of program activities and various real-time surveillance indexes will be produced based on the national tuberculosis database in the form of routine reports for the reference of city/county health bureaus in undertaking self-evaluation and drawing up improvement measures.

ii. Evaluation of annual performance of city/county health bureaus

For key infection control works, we set performance indicators for reviewing the work performance of cities and counties, and make public the review results for their reference. We also employ benchmarking to encourage positive competition and commend counties/cities doing outstanding work in infection control, and make them examples for other counties/cities to follow suit.

iii. We oversee city/county health bureaus and CDC branches to carry out spot check and visit of individual cases. CDC itself also conducts onsite inspection of local tuberculosis control work regularly to make sure all TB patients receive high-quality case management services.

(4) Observational learning

We will hold city/county open day from time to time for counties/cities to learn

from each other and improve their deficiencies.

(5) Automatic surveillance and feedback of case management data

The system will automatically generate surveillance reports for download by local health bureaus so they can learn any deficiency in case management and areas that can be improved within their jurisdiction.

2. Inadequate basic level public health personnel

Under the communicable disease prevention and control program, a collaboration with local health bureaus, observers and administrative observers are employed to assist in delivering medicine, checking on and managing individual cases so public health personnel can devote more of their time and energy on handling more difficult cases.

3. Special case management

(1) Integrate inter-agency resources for promoting TB infection control among indigenous people

- i. In coordination with the subsidy guidelines set out by the Council of Indigenous Peoples, we will provide relevant resources to encourage aborigine TB patients to receive treatment.
- ii. Through contests, local health bureaus (public health centers) are encouraged to develop localized tuberculosis control programs. Through integration of local resources and mobilization of local residents, it is hoped the local health bureaus (public health centers) can improve performance in active case-finding and case management, and ultimately reduce TB incidence in mountainous areas. °

(2) Implement accommodation management operation for chronic infectious TB patients

Chronic infectious TB patients will be encouraged to receive in-patient treatment at a designated hospital and receive a subsidy of NT\$600 a day for nutrition and living expenses. Government budget will be used to pay for the bed and examination costs as well as co-payment of the patient. It is hoped this way TB patients will receive regular care and stop transmitting the disease to others. For chronic patients who need to be isolated on a long-term basis, we will plan people-centered accommodation, taking into account both the human rights of patients and the needs of infection control.

(3) Subsidy of medical costs for TB patients without National Health Insurance

For TB patients who are not covered by National Health Insurance and not able to afford treatment, DOH will set aside government budget to pay for related medical expenses.

(4) Enforce isolated treatment for patients with notifiable communicable disease

For TB patients who are uncooperative and contagious, advised by a specialist to receive in-patient treatment but refuse to do so, the local health bureau may, in accordance with The Communicable Disease Control Act, issue an isolated

treatment notice to force the patient into receiving treatment in isolation. If the patient still refuses to be hospitalized after receiving the compulsory hospitalization notice, local health bureau may furthermore take compulsory measure or impose a fine in accordance with The Communicable Disease Control Act so protect communities from the continuing risk of disease transmission.

(5) Review and amend legal basis

- i. We will examine the administrative process for taking enforcement action under The Communicable Disease Control Act and coordinate the assistance of police so that the local health authority can seek the help of local police when enforcement action is taken against an extremely uncooperative patient. This is to enhance public authority while protecting the health of the general public.
- ii. For a few extremely uncooperative patients who might pose a risk to the health of the general public, if necessary, DOH would consider making public their names and information in accordance with the established administrative process.
- iii. For patients who are uncooperative and could infect others, we will take compulsory isolation action to protect the safety of the public.

(D) Air travel restriction measures

Taiwan became an observer of the International Health Regulations (IHR) and World Health Organization (WHO) in 2009. As a member of the Earth Village, we also impose air travel restriction on people with infectious tuberculosis to prevent the spread of germs. For TB patients who are not subject to the aforesaid restriction and foreign TB patients coming into Taiwan by plane, we will carry out referral and follow-up in accordance with IHR guidelines.

(E) Step up public health education and campaign to enhance the knowledge and awareness of the public to tuberculosis prevention and control

1. Through various media (TV, radio, newspapers, the Internet, outdoor TV walls), information on tuberculosis control will be disseminated. The Government Information Office will be asked to make available more communication channels for health campaign.
2. Innovative educational materials will be produced; more promotion channels will be developed to reach different target groups to advocate the concept of prevention and control, and remove the taboo associated with TB patients.
3. In coordination with the global theme of the World Health Organization, extensive activities will be organized before and after the World Tuberculosis Day to arouse the attention of the public.
4. Promotion activities with local features and active participation of communities, the indigenous peoples, medical care institutions, schools and support groups will be developed in collaboration with city/county governments taking into consideration the main issues, cultural cultures and festivity to promote community-based health

education programs.

(F) Cultivate personnel and strengthen research and international cooperation

1. Offer professional training and combine resources

In collaboration with local health agencies, associations and hospitals, we will arrange training activities to hone the professional skills of personnel involved in tuberculosis control, such as doctors, lab technicians, nurses, case managers and observers so that they have adequate knowledge and knowhow to solve patient's problems and provide better care to patients.

2. Strengthen experience-sharing on tuberculosis prevention and control with other countries and international professional organizations

(1) We will send outstanding professionals or sponsor non-government organizations to international conferences, study tours, and seminars to learn more about new knowledge and international experience so as to upgrade the quality of tuberculosis control in Taiwan.

(2) We will host international academic symposiums, inviting international scholars and experts to attend to promote academic exchanges and experience-sharing.

(3) We will participate in international research projects to provide and obtain the latest technology and information on tubercle bacilli repository / gene bank to boost our professional capability while gaining more international visibility.

(4) We will maintain professional exchanges and communication with international professional organizations such as the WHO and Global Fund to Fight AIDS, Tuberculosis and Malaria.

(5) We will recommend and send outstanding clinicians abroad to receive training, to study or to attend international conferences and draw on the experience of other countries.

(6) We will participate in international surveillance platform to download international TB typing information and provide Taiwan's typing information to promote comparison and sharing.

3. Encourage research

We will subsidize academic organizations in tuberculosis related research projects, in particular the development of new testing technology and new drugs to increase the treatment success rate.

(G) Provide BCG immunization service

We will provide BCG immunization service to infants that are at least 24 hours old and weight more than 2500 grams to protect them from tuberculosis meningitis. We will strengthen the training of immunization techniques and continue to conduct assessment of immunization techniques. We will also monitor the side effects of BCG immunization and review our vaccination policy whenever necessary.

(H) Strengthen the efficacy of prevention and control efforts of governments at all levels

1. Strengthen the tuberculosis control system

In accordance with the spirit of local autonomy, the central government is responsible for formulating policy and providing the local governments with necessary assistance. The city/county health bureaus should supervise various control works carried by its personnel in support of the central government policy in a manner of decentralization of responsibility.

2. Promote standard operating procedures and step up audits

Personnel at various levels should carry out control works according to the standard operating procedures established in line with the prevention and control plan. The superior agency is responsible for the audit work to ensure all operations are carried out according to the standard operating procedures, and for revising those procedures based on the actual needs. DOH on its part will add and/or revise various indicators for the control work and continue to conduct annual audit of city/county governments' efforts in tuberculosis control.

3. Strengthen the local "Halve TB in 10 Years Program" of city/county governments

For some counties/cities that have higher TB incidence, they were significant higher than the other counties/cities before the implementation of the Phase 1 Plan. After the launch of Phase 1, those counties/cities still have higher incidence, but their magnitude of decline is greater than the average, indicating that the prevention and control strategies are working. So in Phase 2, city/county governments will again be encouraged to combine the local resources and develop their own control programs around the prevention and control policy of the central government. City/county governments will also be encouraged to propose innovative programs and provided with extra subsidy. DOH will also launch pilot projects in some counties/cities to help address some particular local problems. In addition, DOH will develop automated total QC operation, periodically announce the attainment of various indicators, and urge counties/cities that did not meet the standards to take improvement actions.

4. Continue to strengthen the linkage between public health and medical care system

Tuberculosis prevention and control require the close collaboration between the public health workers and health care facilities. Only through continuous community-based management can we ensure that patient treatment will be successfully completed without interruption.

B. Phased implementation of Strategies and Steps

Item	Year	2011	2012	2013	2014	2015
1. Strengthen case-finding and reporting strategy						
Step up mobile X-ray screening of high-risk groups to discover cases early						
Administer treatment to children under 13 years of age with latent TB infection						
Promote treatment of HIV-positive individuals with latent TB infection						
Promote treatment of individuals in crowded facilities with latent TB infection						
Encourage medical care institutions to directly make online reporting of TB cases, increase the number of reporting spots to improve the timeliness of reporting; regularly announce the updated epidemiological information and provide real-time reports to make it convenient for health agencies and medical care institutions to grasp the conditions of individual cases and the epidemiological conditions in each region						
Continue to promote the “no reporting, no payment” policy, and in collaboration with the Bureau of National Health Insurance, link up medical claim cases with the national tuberculosis database for cross-checking.						
Step up contact investigation contact and include the work in the work performance audit of city/county health bureaus; allocate budget to make sure TB contacts will receive medical care and help ease their burden brought by examination costs						
Maintain the normal operation of national tuberculosis database and collect and instantly update complete information on TB cases, including diagnosis, reporting, registration, treatment, examination, management and state of contacts, and provide information needed for case management and situation analysis						
2. Improve the quality of laboratory testing and promote laboratory accreditation system						
Enhance the quality of specimen testing and step up education and training to improve the quality of TB specimen collection and delivery						
Expand the functions of communicable disease reporting system and the information system of tubercle bacilli testing network, provide accredited laboratories with the function of posting their testing results on the communicable disease reporting system						
Promote TAF accreditation of laboratories						
Provide reasonable tubercle bacilli testing cost data to BNHI						
Keep surveillance on MRT-TB situation in the country						
Monitor zoonotic tuberculosis and the side effects of BCG vaccination						
Build a system for collaborative diagnosis among laboratories and develop regional network						
3. Enhance the quality of diagnosis and treatment of tuberculosis in clinical settings						
Discuss with scholars and experts about the weight of tuberculosis course in the medical school curriculums to seek consensus						

Discuss with Taiwan Joint Commission on Hospital Accreditation to include course on TB prevention and control in PGY1					
Include course on TB prevention and control in PGY1 training					
Evaluate the feasibility of sending doctors to TB training hospitals to receive clinical training					
Carry out evaluation of software and hardware of hospitals to serve as a TB training center					
Draft the plan of increasing the weight of tuberculosis course in the medical school curriculums and reach consensus with relevant agencies					
Start to increase the weight of tuberculosis course in the medical school curriculums					
In collaboration with relevant medical societies, offer continuing education on the diagnosis and treatment of tuberculosis to maintain the quality of diagnosis and treatment					
Plan including periodic clinical continuing education on tuberculosis into the re-licensing requirements for physicians					
Invite TB experts to form a tuberculosis advisory committee that can give advice on suspected cases and other diagnosis/treatment questions, and assist in making confirmed diagnosis, while establishing a communication channel for dialogue between the public health community and the medical community.					
Periodically assess the review items and review results of the tuberculosis advisory committee as reference for evaluating the training curriculums					
Collaborate with the Bureau of National Health Insurance in conducting medical record audits to ensure high-quality medical care					
Promote the “MDR-TB Medical Care System”, subsidizing designated hospitals that are responsible for providing medical care to MDR-TB patients to address the problem where such patients are not adequately cared for because regular hospitals either lack the experience or are reluctant to treat this kind of patients due to low NHI payment.					
Include tuberculosis infection control in the annual inspection of nosocomial infection control, and continue to collaborate with relevant societies and associations in arranging training courses, and step up the infection control audit to make sure hospitals of all levels faithfully implement infection control measures					
Subsidize hospitals in the installation of a negative pressure sputum collection room to ensure workers and other patients are protected in the process of sputum collection					
Subsidize hospitals in the installation of protective and entertainment facilities in wards to provide patients with high-quality treatment environment					
4. Implement case management					
Step up the referral of disadvantaged patients to social welfare agencies for assistance					
Discuss foreign worker management policy with relevant agencies					
Produce automatic surveillance reports and various					

real-time surveillance indexes based on the national tuberculosis database for the reference of city/county health bureaus in undertaking self-evaluation					
Set performance indicators for reviewing the performance of cities and counties in key TB prevention and control works, and make public the review results for their reference, and commend counties/cities doing outstanding work in infection control, and make them examples for other counties/cities to follow suit					
Draw up and revise whenever necessary the “Tuberculosis Work Manual” to detail each work process during case management so frontline personnel can have a reference at hand and work accordingly					
Hire trained and objective observers to “deliver medicine to the patient, see to it that the patient takes the medicine, and then leave until after the patient has taken the medicine”, to make sure each and every patient will complete the full course of treatment					
Carry out DOTS implementation evaluation by continuing to conduct audits					
In coordination with the subsidy guidelines set out by the Council of Indigenous Peoples, provide relevant resources to encourage aborigine TB patients to receive treatment					
Encourage chronic infectious TB patients to receive in-patient treatment at a designated hospital and subsidize them nutrition and living expenses					
Use government budget to pay for the bed and examination costs as well as co-payment of the patient, hoping TB patients will receive regular care and stop transmitting the disease to others.					
Discuss with scholars and experts on the issue of accommodating patients with chronic infectious disease who require isolation on a long-term basis					
Seek proper site in conjunction with the long-term accommodation policy, which will take into consideration patient's rights					
Plan the long-term accommodation and placement program for chronic infectious patients					
For TB patients who are uncooperative and contagious, advised by a specialist to receive in-patient treatment but refuse to do so, the local health bureau may, in accordance with The Communicable Disease Control Act, issue an isolated treatment notice to force the patient into receiving treatment in isolation					
Urge local health bureaus to pay more attention to uncooperative cases and maintain good cooperative relationship with medical care institutions, and use the influence of doctors to make sure patients complete their treatment					
Conduct regular onsite audit of the local tuberculosis control work to make sure related work is faithfully carried out					
Push for the amendment of Communication Disease Control Act to include the management of uncooperative infectious cases into the Act					
5. Air travel restriction measures					
Urge city/county health bureaus to deliver a “Air Travel Restriction Notice to Infectious Pulmonary Tuberculosis					

Patients" to individuals and provide them with correct public health education					
Continue to monitor the "National Surveillance Network of Communicable Diseases" to ensure the accuracy of air travel restriction list					
Keep close contact with National Immigration Agency and relevant agencies to ensure the process of air travel restriction is carried out smoothly without affecting the rights of the public					
Evaluate the feasibility of prolonging the air travel restriction for highly infectious cases and revise the policy					
6. Step up public health education and campaign to enhance the knowledge and awareness of the public to tuberculosis prevention and control					
Disseminate information on tuberculosis control Through various media (TV, radio, newspapers, the Internet, outdoor TV walls), and ask Government Information Office to make available more communication channels for health campaign					
Produce innovative educational materials and develop more promotion channels to reach different target groups to advocate the concept of prevention and control, and remove the taboo associated with TB patients					
In coordination with the global theme of the World Health Organization, organize extensive activities before and after the World Tuberculosis Day to arouse the attention of the public					
7. Cultivate personnel and strengthen research and international cooperation					
Conduct survey of distribution of TB control personnel in cities/counties and medical care institutions so as to understand their needs and arrange proper training activities					
Continue to participate in international medical cooperation activities in support of government policy					
Commission academic association to provide hospital case manager training courses so as to improve hospital's case management efficiency, and bring together public health and medical care					
Collaborate with city/county health bureaus in arranging training courses for observers to familiarize them with patient interactions, and equip them with basic knowledge about tuberculosis					
Encourage relevant personnel to write their experience of caring for TB patients into a paper and submit the paper to prestigious international journals					
Continue to subsidize research projects to reward outstanding researchers and encourage them to apply to patents					
Participate in international research projects to boost our professional capability while gaining more international visibility					
Send outstanding professionals or sponsor non-government organizations to international conferences, study tours, and seminars to learn more about new knowledge and international experience so as to upgrade the quality of tuberculosis control in Taiwan					
Participate in international surveillance platform to facilitate comparison and sharing of TB typing information					

8. Provide immunization service					
Urge local health bureaus to follow up the BCG immunization coverage of children under one year using NIIS					
Conduct immunization census of school children upon their entering of primary school and track the sources of infection for those infected; calculate annual infection rate for the evaluation of infection control policy					
Carry out strain culture of those with abnormal reaction to BCG vaccination to clarify the vaccine issue					
Commission relevant academic associations to conduct assessment of BCG immunization techniques and cultivate seed instructors					
9. Strengthen the efficacy of governments at all levels					
Carry out epidemiological data analysis periodically to grasp the current status of tuberculosis in Taiwan					
If necessary, call communicable disease advisory committee meeting to review prevention and control policies					
Hold workshops at cities and counties to introduce to basic-level public health personnel new or revised policies, the origin of the policy and method of implementation					
Set annual performance indicators based on the focuses of prevention and control workers and continue to conduct annual audit of city/county governments' efforts in tuberculosis control					
Review the annual prevention and control programs of counties/cities, and carry out spot check to ensure the quality of implementation					

V. Timeline and Resource Needs

A. Plan Duration

January 1, 2011 ~ December 31, 2015

B. Resource Needs

- (A) Manpower needs: Short-term workers will be hired to meet the demands of additional work.
- (B) Funding needs: Total funds needed over the implementation period from 2011 to 2015 will be NT\$9,156,888,000 (excluding personnel expenses).

C. Source of Funding and Breakdown

- (A) Source of funding: To be budgeted annually in accordance with the government budget preparation process.
- (B) Breakdown:

(In 1,000 NTD)

Item	Year	2011	2012	2013	2014	2015	Total
1. Strengthen case-finding and reporting strategy							
Improve active case-finding		150,700	190,300	190,300	170,800	164,800	866,900
Strengthen the training of medical personnel		1,750	10,250	9,150	7,900	7,900	36,950
Case reporting and surveillance		5,540	5,540	5,540	5,540	5,540	27,700
Improve the quality of laboratory testing and promote laboratory accreditation system		45,500	66,500	56,000	56,000	56,000	280,000
2. Enhance the quality of diagnosis and treatment of tuberculosis in clinical settings							
Provide more incentives for hospital		95,170	702,758	632,242	613,000	581,000	2,624,170
Treatment of recalcitrant cases		360,242	406,958	340,000	316,000	280,000	1,703,200
3. Implement case management							
Improve the performance of case management		352,396	654,804	640,300	576,800	566,200	2,790,500
Special case management		13,042	87,362	77,322	77,760	69,678	325,164
4. Step up public health education and campaign		43,920	45,654	26,650	24,150	24,150	164,524
5. Cultivate personnel and strengthen research and international cooperation		22,530	79,560	72,880	67,530	67,530	310,030
6. Provide BCG immunization services		5,810	5,660	5,560	5,410	5,310	27,750
Total		1,096,600	2,255,346	2,055,944	1,920,890	1,828,108	9,156,888

D. Funding Needs

Total funds needed over the implementation period from 2011 to 2015 will be NT\$**9,156,888** (excluding personnel expenses). The allocation by year is: NT\$ **1,096,600,000** for 2011; NT\$**2,255,346,000** for 2012; NT\$ **2,055,944,000** for 2013; NT\$ **1,920,890,000** for 2014; and NT\$**1,828,108,000** for 2015.

A preliminary operational plan will be proposed each year and implemented following budget approval according to the government budget preparation process.

(In 1,000 NTD)

Year	2011	2012	2013	2014	2015	Total
Operating expenses	1,063,242	2,246,946	2,047,544	1,915,690	1,822,908	9,096,330
Capital expenditures	33,358	8,400	8,400	5,200	5,200	60,558
Total	1,096,600	2,255,346	2,055,944	1,920,890	1,828,108	9,156,888

VI. Expected Outcomes and Impact

Considerable amount of resources will be put in for the implementation of this Plan as we strive to keep the results of our tuberculosis control efforts abreast with other countries. The expected outcomes of the Plan and its impact are as follows:

- A. Reach the goal of reducing tuberculosis by half in response to the plan of World Health Organization.
- B. Enhance the quality of medical care through all kinds of education and training activities to acquaint clinicians with the diagnosis and treatment of tuberculosis so that they will provide patients with proper care.
- C. Increase the public knowledge and awareness of tuberculosis through various channels of propagation in the hope to achieve early detection and early detection, while removing the taboo associated with tuberculosis.
- D. Systemically sending people abroad to receive training can cultivate fresh blood in the fields of public health and medicine with expertise in tuberculosis control.
- E. Advance the level of tuberculosis testing in Taiwan to meet the international standards, and assist other countries in the region in TB testing to fulfill the responsibility of a world citizen.
- F. City/county health bureaus will become capable of planning and implementing localized TB prevention and control programs.
- G. The reduction in TB cases will help reduce the payouts of National Health Insurance on tuberculosis-related medical costs and the savings can be used to pay for other services.

VII. Supplemental Provisions

A. Analysis and Evaluation of Alternative Plan

When preliminary operational plan and budget are prepared each year for the Plan, budget review will be carried out as required to adjust the allocation of resources and adjust the planned budget in accordance with the approved budget, the annual operational plan and needs based on epidemiological analysis at that time.

B. Supports of Relevant Agencies

1. City/county governments: to propose community-based tuberculosis control plans, implement and evaluate the work of the community-based tuberculosis control plans while efficiently carrying out manpower management to obtain maximum results.
2. Ministry of Education: to actively supervise educational institutions at all levels in carrying out health education and campaign on tuberculosis control in schools, instilling students with the correct concepts and strengthening guidance for students to prevent the spread of infection on campus; to make plan for increasing class hours and internship curriculums on tuberculosis in medical schools.
3. Ministry of the Interior: to be responsible for tuberculosis control education and campaign targeting foreign spouses, and in nursing homes, foreigner detention centers, and for vagrants and substitute services draftees; to carry out data analysis of individual cases for the reference of health agencies in policy formulation.
4. Ministry of Justice: to carry out health education and campaign on tuberculosis control for inmates of correctional facilities; to collaborate in case screening and management, and carry out data analysis of individual cases for the reference of health agencies in policy formulation; to work with health agencies in planning and evaluating the management of uncooperative cases.
5. Ministry of National Defense: to be responsible for tuberculosis control education and campaign, screening, treatment and management of cases involving military personnel.
6. Ministry of Foreign Affairs: to plan on international cooperation matters, and understand the current situations and actual needs for tuberculosis control in different countries through embassies and medical missions as reference in formulating cooperation projects; to actively participate in regional or multi-lateral cooperation programs through channels of governmental and international non-governmental organizations.
7. Government Information Office: to take charge communication with the press and media, and assist health agencies in carrying out health education and campaign on tuberculosis control to provide the public with correct information.
8. Council of Labor Affairs: to plan matters regarding health examination for foreign workers, and when tuberculosis cases are found, rescind their work permit according to law, and inform the National Immigration Agency and its service station to urge

employer to arrange repatriation of the worker as soon as possible.

9. Council of Indigenous Peoples: to be responsible for health education and campaign on tuberculosis control for indigenous peoples and support the screening work; to encourage indigenous people with tuberculosis to accept treatment and change lifestyles, and thus to reduce the morbidity and mortality of tuberculosis among indigenous people.
10. Bureau of Medical Affairs, DOH: to be responsible for planning doctors' continuing education and internship programs on tuberculosis, to assist in controlling and enhancing the quality of hospital care, and to conduct hospital accreditation.
11. Bureau of National Health Insurance, DOH: to contract out works relating to paying TB-related medical costs with government budget, and to conduct review of reported TB cases.
12. Food and Drug Administration, DOH: to handle the review of anti-TB drugs imported under a special case status.
13. Bureau of Planning, DOH: to conduct research, evaluation and follow-up of the Plan.
14. Tuberculosis-related academic institutions and social organizations: to work with health agencies on health education and campaign on tuberculosis control, academic research, and international exchange activities.
15. Medical care institutions: to be responsible for the diagnosis, outpatient care and inpatient care of tuberculosis cases, and follow-up; to collaborate with the competent authorities to improve the quality of medical care, laboratory testing, and follow-up management, and to carry out relevant teaching and research.