Kingdom of Cambodia

National Tuberculosis Control Project Phase 2

External Evaluator: Machi KANEKO, Earth and Human Corporation

0. Summary

This Project was implemented for the purpose of reducing deaths from tuberculosis (TB) and a reduction in the number of TB patients in Cambodia, one of the specified "22 high TB-burden countries". The Project has undertaken qualitative improvement of DOTS (Directly Observed Treatment with Short-course chemotherapy) that is expanding across the country, strengthened diagnosis capabilities for TB control beyond that of DOTS, strengthened administrative capacities and worked to develop human resources. This effort has been carried out in an approach consistent with the policies of Cambodia and therefore its relevance is very high.

Upon completion of the Project, it has been confirmed that the foundation for disseminating and expanding the DOTS that involves citizens, Public-Private Mix (PPM) DOTS and community DOTS, has been built and the results are being continued by other donors at the time of this ex-post evaluation. In addition, as a result of efforts to focus on strengthening the diagnosis capacities of labs, it contributed domestic tuberculosis culture labs that meet the criteria of the WHO in three locations. Furthermore, from the fact that the prevalence of all types of TB and the TB mortality rate, which were the indicators for assessing the overall goal, have been achieved four years earlier than the target year, 2015, effectiveness and impact of the Project is high. Although the project period was within the plan, the project cost was significantly exceeded, therefore efficiency of the Project is fair.

In regards to sustainability, while TB with slight symptoms, smear negative (-) TB, TB in aged patients etc. and other new challenges are becoming apparent, there are slight problems in regards to the technology and a systems that can respond to them. In addition, while there is an apparent trend of decreases in external funds from donors pertaining to TB control, Cambodia continues to be specified as one of the "22 high TB-burden countries," and as there are problems in terms of long-term financial sustainability, sustainability is considered fair.

In light of the above, this Project is evaluated to be satisfactory.

1. Project Description

Project Location
(Target Area: all regions of Cambodia)

A pilot activity example:
Right: Culture laboratory of Battambang Referral Hospital (supported the diagnosis capacity building)
Left: Monument commemorating the introduction of DOTS to Cambodia
(The built in 1999 in the same hospital, a nurse hands water and TB drugs to a TB patient and watches as he takes it)

1.1 Background

In the Kingdom of Cambodia (hereafter referred to as "Cambodia"), access to health care and sanitary conditions deteriorated due to the effects of the civil war which raged for 30 years and from a global perspective tuberculosis infection has increased to an alarming level with the yearly occurrence of new sputum smear positive (+) patients reaching 130 per 100,000 people. For this reason, the Cambodian government has been working to strengthen TB control measures and, under the guidance of WHO, has been introducing DOTS (Directly Observed Treatment with Short-course chemotherapy) into hospitals from 1994. However the need for the quality of TB control to be maintained and further expanded is high and therefore a request for assistance was sent to the Japanese government.

In response to this, JICA, as a counterpart of the National Tuberculosis Control Program (NTP), initiated the "Tuberculosis Control Project" from 1999 with a goal of providing DOTS to 900 health centers across the country. After conducting this cooperation, it completed the goal of a nationwide spread of DOTS by 2004, earlier than the original target year (2005). On the other hand, due to the fact that new problems such as maintaining DOTS quality, increases in the rate HIV infection, and the need for TB control in urban areas, cooperation for Phase 2 had been requested and the cooperation of this Project was initiated from 2004 to extend for the next five years.

Based on strengthening the fundamental capabilities of national TB control and expanding the DOTS services achieved in Phase 1, this Project will enable the improvement and quality assurance of national TB control.

Aimed to strengthen management capacity building, introduce "Beyond DOTS" (tuberculosis services beyond the existing DOTS), strengthen the sustainability of the NTP service delivery system as a whole (National Center for Tuberculosis and Leprosy Control (CENAT), provincial health departments, operational districts, health centers, etc.).

1.2 Project Outline

Overall Goal		TB morbidity and mortality are reduced
Project Objective		Sustainable quality TB Programme is implemented nationwide.
Outputs	Output 1	Management capacity of the NTP is improved.
	Output 2	Sustainable quality DOTS is expanded nationwide.
	Output 3	Suitable services and guidelines beyond routine DOTS are developed.
	Output 4	Quality of laboratory services to support DOTS, TB/HIV activities and surveys is improved.
	Output 5	Effective IEC/advocacy activities to support TB control program are implemented.
Inputs		Japan side: 1. Dispatch of Experts: 30 3 for long-term, 27 for short-term 2. Trainees Received 20 3. Total Trainees for Third Country training programs: 50 4. Provision of Equipment: 65 million yen 5. General operational expenses: 182 million yen Cambodia side: 1. Counterpart position 2. Establishment of a Joint Coordinating Committee: CENAT project Director, CENAT staff, provincial health departments, operational districts, health centers tuberculosis staff 3. Land and Facilities: Project Office, training facilities 4. Local Costs: CENAT staff, local NTP staff activity costs, administrative expenses
Total Cost		786 million yen
Period of Cooperation		August 2004 - July 2009
Implementing Agencies		Cambodia Ministry of Health (MoH), National Center for Tuberculosis and Leprosy Control (CENAT)
Cooperation Agency in Japan		The Japan Association of Charitable Organizations, Japan Anti-Tuberculosis Association
Related Projects		[Short-term dispatch of experts] dispatch of TB control experts (1995-2000) [Technical Cooperation Project] Tuberculosis Control Project (1999.8-2004.7) The Project for Improving the Capacity of the National TB Control Program through Implementation of the 2nd National Prevalence Survey (2009.11 – 2012.11) [Grant aid] National Tuberculosis Center Improvement Plan (2000) [Other aid agencies] ✧ World Health Organization (WHO)

	✧ World bank (WB) (about 10 years support up until 2008) ✧ Canadian International Development Agency (until 2005) ✧ The Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) ✧ United States Agency for International Development (USAID) (TBCTA (2000-2005), TBCAP (2005-2010), TB CARE I & II (2011-2015) ✧ US Centers for Disease Control (USCDC) ✧ Médecins Sans Frontières (MSF), Various other NGOs

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement of Overall Goal

The WHO Global target[1] is to achieve a 70% detection rate of new smear (+) TB patients, maintain an 85% cure rate, and in so doing work toward a reduction in the prevalence of smear (+) tuberculosis and the number of TB patients. This Project aims to achieve an overall goal based on this global target and therefore set project objective indicators of achieving a 70% detection rate of new smear (+) tuberculosis patients, maintaining an 85% cure rate that if maintained will achieve the overall goal of a reduction in the prevalence of smear (+) tuberculosis and the number of TB patients.

At the time of terminal evaluation, it has been confirmed that the project objectives have been achieved or improved, and the foundation for the achievement of the overall goal has been determined to be in order. As for new projects related to TB control introduced through the cooperation of organizations related to this Project, in order for the National Center for Tuberculosis and Leprosy Control (CENAT) and the National TB Control Program (NTP) to achieve nationwide coverage, efforts are in full swing towards achievement of the overall goal and the expectation that it will be realized is high.

1.3.2 Achievement of Project Objective

For the project goals, four indicators have been set. The discovery rate of indicator 1 of 70% of new smear (+) TB patients was achieved in 2005. In addition, the cure rate of new smear (+) TB patients of indicator 2 remained at a high level of around 90% or so throughout the project period, maintaining the goal of 85%. In regards to indicator 3, in 2009 there were 8,378 reports of smear (+) pulmonary tuberculosis which approximates to about twice that of 2003, and in 2007 1,422 people reported tuberculosis in children, which achieved the indicator 4 target of 1,268.

[1] WHO global target: Goals and plans published by the WHO in 2006, in the "Stop TB strategy". Associated Millennium Development Goals (MDGs) set numerical targets such as to "detect at least 70% of new sputum smear (+) TB cases and cure at least 85% of these cases" and “by 2015: reduce prevalence of and death due to TB by 50% relative to 1990”

1.3.3 Recommendations

The followings are proposed in terminal evaluation.

- ✓ In order to take advantage of the talent that has been cultivated by the Project, the development of human resource development systems that can support new technology introduction is necessary. It is also necessary to strive for improved program monitoring and evaluation capacities at each level from, central to district, and improve the capabilities of surveys, research designs, and data analysis carried out by CENAT itself.
- ✓ In regards to community DOTS[2], it is necessary for CENAT, while promoting the activity management of related organizations, to aim for quality improvement. As for childhood TB control, it is necessary to take the two provinces that have been supported in this Project as a model, and raise the quality to a level that can be expanded nationwide.
- ✓ X-ray diagnosis was intended, through the support of relevant organizations and this Project, to strengthening the diagnostic capacity of sputum-negative cases, however the need to enhance diagnostic capabilities further has been pointed out by experts. The EQA (external quality assessment) of sputum smear diagnosis is expanding nationwide through the system developed in this project, however it is necessary to establish a system that practically promotes capacity building.
- ✓ As for culture tests, while implementation has been made possible for laboratories in three locations nationwide, implementation support for culture testing is limited, improvement is required for the diagnosis of drug-resistant tuberculosis and sputum-negative cases to function effectively. In addition, it is necessary to promote ongoing capacity building of culture test laboratories which meet the biosafety standards of the WHO.

[2] The method of DOTS implementation, there is "hospital DOTS" where health workers directly monitor the drug intake of patients admitted to the hospital as well as "health center DOTS " where the patient visits a health center every morning and their drug intake is carried out under direct monitoring by a health worker, etc. In "community DOTS" monitoring people is not done by a health worker, but by responsible members of the community who received a certain level of guidance. Within the flow of DOTS diffusion, there are residents who do not have access to enough DOTS services through public medical institutions, and therefore community DOTS which involves the community through a kind of “DOTS at home”, where community members act as “DOTS Watchers” to directly monitor the drug intake of patients, has begun to be actively introduced. Village health support groups (VHSG) play this role in Cambodia.

2. Outline of the Evaluation Study

2.1 External Evaluator

Machi KANEKO, Earth and Human Corporation

2.2 Duration of Evaluation Study

The External Evaluator performed an evaluation study as follows in the course of this ex-post evaluation:

Duration of the Study: September 2012 - October 2013

Duration of the Field Study: November 30 - December 23, 2012 and May 7 - 25, 2013

3. Results of the Evaluation (Overall Rating: B[3])

3.1 Relevance (Rating: ③[4])

3.1.1 Relevance with the Development Plan of Cambodia

In 2004, corresponding to the start of this Project, the Cambodian government announced its "Rectangular Strategy" as a comprehensive framework of national development. In this strategy, positioning health and medical care, education, gender, population as the main pillars for "capacity building and human resource development" placing particular focus on the health and medical fields, effective use of the private sector, facility expansion of health centers and referral hospitals, disease prevention, infectious disease control, and maternal and child health as important issues. In addition, the first sector strategy policy of the "Health Strategic Plan (HSP 2003-2007)", created jointly by the Ministry of Health and aid agencies, raised the reduction of infectious diseases such as tuberculosis, malaria, dengue fever, etc. as first priorities. Furthermore, the Cambodia Millennium Development Goals (CMDG 2005 Update,) indicated the long-term development goals of Cambodia, raised the important issue of infectious disease control for tuberculosis, AIDS, and malaria, and on the basis of the global targets of the WHO, numerical targets have been set respectively for the prevalence of smear tuberculosis, mortality from tuberculosis, case detection rate and the cure rate.

The National Strategic Development Plan (NSDP 2006 - 2010), which is the national development policy related to this Project from its implementation to its completion, regarded the health sector as an important area of nation-building. In addition, the "Health Strategic Plan (HSP 2008-2015)", set addressing perinatal medicine, infectious diseases and non-infectious diseases as three overall goals (HSP Goals). With tuberculosis included in infectious diseases, target values in line with those of the CMDG were set. In addition, the health strategy, particularly the "National Health Strategic Plan for Tuberculosis Control in

[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[4] 3: High, 2: Fair, 1: Low

the Kingdom of Cambodia (2006-2010)" which indicates TB control, set numerical targets in line with the CMDG and HSP Goals and, as an approach to achieve these target values, called for nationwide dispersal of "Directly Observed Treatment with Short-course chemotherapy (DOTS)", a strengthening of laboratories and TB control that goes beyond the basic premise of DOTS (such as C-DOTS, TB / HIV, PPM-DOTS), an improvement in the quality of services, human resource development and a strengthening of administrative capacities. Each of these measures is consistent with the approach outlined for this Project.

In light of the above, both at the point of ex-ante evaluation and at the time of project completion, it can be said that the purpose of this Project was consistent with the goals listed in the various policies above and that its relevance to the health and national policies of Cambodia is high.

3.1.2 Relevance with the Development Needs of Cambodia

In Cambodia tuberculosis infection has expanded due to the collapse of the medical system and the deterioration in the nutritional status of its people brought about by the civil war which lasted until the 1980s. The WHO has specified it as one of the "22 high TB-burden countries[5]" that urgently requires TB control measures. In order to cope with this TB epidemic, the WHO introduced its DOTS strategy into Cambodia in 1994 and the TB cure rate improved significantly. However, along with the impasse that has occurred in capacity building and the shortage of health care workers, many patients fall within the twenty to fifty working age range and therefore the spread of tuberculosis infection is a problem that directly affects the economy. Further, as the status of the tuberculosis epidemic in the whole country is not accurately understood, the fact that it is difficult to attain a long-term perspective in relation to TB control has also been a problem. For this reason, the Cambodia government requested the implementation of a project centered on the requests of health care workers and focused on strengthening the operational functions of the national TB program (NTP). Accordingly JICA began this Project in 1999 as a technical cooperation project that falls on Phase 1 of the "National Tuberculosis Control Project" (hereinafter referred to as “phase 1”).

In phase 1, with CENAT / NTP as a counterpart, and taking into account the flow of general health sector reform being carried out by the WHO in the same period, this Project aimed to spread diagnosis by sputum smear examination and TB treatment with DOTS to health centers throughout the country. As a result, upon project completion in 2004, DOTS coverage to health centers had expanded to 79% (over 750 locations) from the 0% recorded at the start of the Project. Also, although the tuberculosis detection rate stood at 64% (2004), lower than the project goal of 70%, the tuberculosis cure rate continued to be maintained at more than 85%.

[5] 22 high TB-burden countries: Shows the 22 countries specified by the WHO as having particularly large numbers of estimated outbreaks of patients with tuberculosis. It is said that these 22 countries account for 80% of the new occurrences of tuberculosis.

On the other hand, in addition to the fact that there remains challenges in terms of ensuring the quality of DOTS which has expanded rapidly nationwide, new challenges such as the increased TB/HIV co-infection in urban areas (about 30% of TB cases in the capital), the importance of public and private mix (PPM) cooperation, the need to respond to pediatric tuberculosis etc. are becoming clear and the Cambodian government has requested this Project, the "National Tuberculosis Control Project Phase 2" in order to deal with these problems. For these reasons it can be said that the sequence of this Project from Phase 1 through to Phase 2 has been clear and relevant with the development needs at the time. In addition it has been determined that the approach of this Project has been consistent with the global strategy of the WHO to lead world TB control as part of the "Stop TB Strategy".

In addition, after completion of this Project, with the aim of comparing the changes in the prevalence of current results compared to those of the 1st National Tuberculosis Prevalence Survey conducted in 2002 (before the full-scale nationwide expansion of DOTS), and in cooperation with international organizations such as the WHO, "The Project for Improving the Capacity of the National TB Control Program through Implementation of the 2nd National Prevalence Survey (2009.11-2013.01) (hereinafter referred to as the 2nd prevalence survey)" technical cooperation project was implemented. From this, an approximately 38% reduction in the number of sputum smear (+) patients (from 437 down to 272 per 100,000 people over the age of 15) was observed in the first survey results. However, Cambodia continues to be designated as one of the "22 high TB-burden countries" even today, despite 20 years having passed since DOTS implementation, and the continued need for TB control in the future has been recognized.

This Project has been working on addressing the new challenges of quality improvement following the expansion of DOTS implemented in phase 1, and TB/HIV co-infection, etc. The development needs can be considered high both at the start and completion of the Project.

3.1.3 Relevance with Japan’s ODA Policy

The Japanese "Country Assistance Policy for Cambodia" is actively involved in cooperation for infectious disease control measures, in particular those for HIV/AIDS and TB, as well as the complications that go with them, and malaria and parasites. In addition, in JICA’s Country Assistance Policy for Cambodia, an important area of the health sector, TB control is a priority problem to be addressed in the same way as family planning and AIDS prevention.

In addition, Japan has a track record with respect to TB control because it has been promoting TB control in Asia in cooperation with international organizations such as the WHO. For this reason it can be said, from the perspective of cross-sectional operation, that it

was appropriate to make use of the advantages of Japanese aid through the means of this Project.

In light of the above, this Project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness and Impact[6] (Rating: ③)

3.2.1 Effectiveness

3.2.1.1 Project Output

For TB control in Cambodia, the WHO, MSF and Japan initiated support at the beginning of the early 1990s, after the turmoil following the civil war, after which the World Bank, USAID, USCDC, GFATM and a number of other donors and NGOs began full-fledged support. Therefore, while bearing in mind the difficulties incurred in extracting and evaluating only the contributions of this Project in the achievement of each outcome, we have focused on the results of which this Project has played a particularly important role.

1) Output 1

Management capacity of the NTP is improved.

Indicators for Output 1:

Program management

1-1: By the end of the Project, all the NTP staff at central and provincial levels has ability to formulate plans based on objective assessment.

Information management, monitoring and evaluation

1-2: By 2007 "Annual Statistics of Tuberculosis in Cambodia" is published without delay.

1-3: Throughout the Project, the database is updated timely and appropriately.

1-4: By the end of the Project, NTP activities are analyzed and evaluated using computers in selected areas.

Logistic management

1-5: By the end of 2005, the CENAT staff correctly qualify the yearly TB drug needs and request them to the MOH(Cambodia Ministry of Health) with the specification for the products.

1-6: By the end of 2007, all the TB drugs procured through the national supply system are of high quality, preferably of GDF standard

1-7: By the end of 2006, the quantity of TB drugs requested quarterly from all the operational districts (OD) is consistent with actual TB incidence and existing stocks.

Research

1-8: By the end of the Project, NTP has technical capacity to conduct and analyze survey/research with less assistance of experts.

Coordination

1-9: Achievements of the Project or Survey results are presented at international conferences every year.

[6] Sub-rating for Effectiveness is to be put with consideration of Impact

Output 1 was intended to improve the operational and management abilities of the NTP by improving the abilities of TB control related planning, information management, monitoring and evaluation, drug management, survey research and aid coordination, etc. It was intended that this Project would effectuate capacity building of mainly CENAT, Provincial Health Department (PHD) and operational district (OD) staff and it has been confirmed that the 9 indicators, above, were mainly achieved by the time of project completion.

In particular, central level and provincial level CENAT staff have become capable of formulating annual activity plans, and their planning ability has been greatly improved compared to before the start of the Project. In addition, capacity training for staff was also conducted regarding tuberculosis annual statistics, which were being issued annually by the middle stage of the Project, and a database of statistical data was also developed. As a result, it has become possible to reflect statistical data, analysis and evaluation and analysis results in planning and supervision. In addition, with respect to indicator 1-7, in 2009 it became possible for 65% of all ODs to make requests based on the actual amount of stock and number of TB patients. Also cyclic guidance for the drug management of TB treatment facilities in health centers, etc. was conducted at about 400 locations and this information was shared through central level workshop and feedback on the plan was promoted.

As for the output 1, with regards to medical and lab staff training, information management, drug management, etc., a portion was implemented through cooperation with the WHO but the majority of activities were funded by JICA.

At the time of this ex-post evaluation, the "National Health Strategic Plan for Tuberculosis Control in the Kingdom of Cambodia (TB-NSP 2014-2021)" is in the development stage, and central level CENAT / NTP staff have taken the lead. On the basis of survey results conducted so far, they have set targets, considered implementation policies, etc., and after confirmation by CENAT, continued to regularly issue tuberculosis annual statistics, and utilize a tuberculosis patient information management system. While ODs are making requests based on drug inventory levels and tuberculosis patient numbers, etc., not only are the OD personnel conducting supervision of health centers, but health centers are making requests to ODs and efforts are being undertaken for continually improve the system. In addition, the implementation of the 2nd prevalence survey contributed to these improvements, with the addition of improvements in the surveys and research capacity of the NTP, as well as improvements in site monitoring management, analysis/evaluation, report generation capacities etc. being particularly recognized on the CENAT side. Furthermore, the 2nd prevalence survey has been published in international conferences by the director of the CENAT.

In addition, including the implementation of the 2nd prevalence survey, the Cambodian

side has been working as the main protagonist for research operations, particularly at the field level, which has provided a chance to show relevant organizations tangible proof of the enhanced capacities of central and local level NTP staff made through Phase 1 and Phase 2 of the Project.

Based on the above, Output 1 had largely been attained at the end of the Project. Further, it has been confirmed that the capacities of CENAT and NTP will be enhanced continuously after completion of the Project.

2) Output 2

Sustainable quality DOTS is expanded nationwide.

Indicators for Output 2:

Quality Improvement of routine DOTS

2-1: By the end of 2005, number of HCs providing DOTS services is increased from 706 in 2003 to all the MPA (Minimum Package Activity) Health Centers.
2-2: By the end of the Project, at least 95% of TB patients receive correct TB drugs in the correct dosage in all the selected target areas (currently 90%)
2-3: By the end of the Project, 90% of TB patients in the continuation phase are observed by someone while swallowing TB drugs in all the selected target areas (currently 40%).
2-4: By the end of the Project, stock records for TB drugs correspond exactly with physical counts in 50% of the government drug stores in all the selected target areas (currently 10%).

6 Months Short Course regimen(6MSCC)

2-5: By mid 2007, guidelines for 6MSCC are developed.
2-6: By the end of 2005, 6MSCC is implemented in all existing referral hospitals and health centers.

Public-private mix (PPM) DOTS

2-7: By the end of 2007, guideline for PPM-DOTS is formulated.
2-8: By the end of the Project, PPM services are implemented in selected areas.

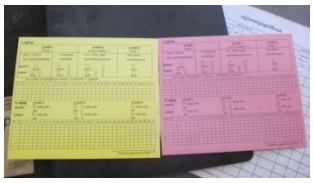
Community DOTS

2-9: By the end of the Project, community DOTS is implemented in more than 665 HCs among 950 HCs

Output 2 sought to spread a nationwide service for more efficiently delivering that DOTS that was introduced into health centers across the country through Phase 1, especially to remote areas with difficulty in accessing health care facilities, TB patients that cannot come to medical facilities and their families, and other rural residents. Along with this, by switching to the more efficient 6MSCC, it sought to achieve improvement and normalization of service quality. At the time of completion of this Project, along with the qualitative improvement of DOTS, a method of community DOTS and PPM-DOTS was implemented in a pilot region with the aim of providing wide-spread DOTS services to people that until now had found it difficult to receive DOTS. Therefore, by project completion it has been confirmed that the above indicator has been mostly achieved.

Specifically, indicator 2-3, the "percentage of TB patients receiving drug administration through DOTS in the continuation period" which is related to the qualitative improvement of DOTS, was 40% before the start of the Project, but improved to 95% following project completion. For 6MSCC it has been determined that changes to drug procurement by the GFATM from 2008 presented a chance to introduce 4FDC (four-drug fixed dose combination). Therefore, in addition to the development of guidelines towards this, monitoring/patrol guidance of 6MSCC was conducted with C/P, provincial/OD/hospital tuberculosis staff in need of re-training were identified, a retraining plan developed and support was given for staff re-training across the country. As a result, staff training and the switching of drugs is carried out smoothly with the support of the WHO and GFATM.

Health Center DOTS: Tuberculosis patient medical records that health centers manage



Community DOTS: Card to record daily dose of TB drugs
(Yellow: village health support groups (VHSG) keep tuberculosis medication and monitor and record daily dosage for TB patients)
(Pink: for TB patients record)
About once a week, health centers confirm both records.

In addition, PPM-DOTS was implemented with the aim of introducing public institutions to tuberculosis suspected patients who visit urban pharmacies and private clinics with a lot of resident access. In Phnom Penh City, where PPM-DOTS introduction was attempted, ODs positively confirmed increases in the number of patients with suspected tuberculosis who received DOTS services. Also, community DOTS, in cooperation with USAID, GFATM, and MSF, was introduced to 502 health centers by the time of project completion, after which, through continued support from donors, the number of locations has increased further to 799 by the end of 2012. In this survey interviews were carried out with medical personnel at central, state and district levels. In these interviews the many people said, “during the civil war there was no medicine and medical equipment and the only support from abroad came from the Red Cross, so there wasn’t anything we could do for patients. For this reason, when DOTS was introduced, medical personnel and resident volunteers, who had been waiting on-site for diagnostic technology and tuberculosis drugs, were actively involved in DOTS expansion”.

It should also be noted that to spread health center DOTS, cooperation was carried out with local NGOs (URC), and, to expand the activities of six month therapy, the WHO, GFATM and Public-Private Mix (PPM) DOTS cooperated with USAID.

In addition, the guidelines for Public-Private Mix (PPM) DOTS were formulated in this Project, then revisions were made with support from USAID and so on, and a site inspection confirmed that PPM-DOTS were functioning in the field while making use of the equipment that has been provided through USAID/TB-CARE1. In addition, in 2008, 919 people total were referred from small scale general practitioners and pharmacies due to suspicions of

tuberculosis, 424 people (46%) were examined in health centers, and 57 people were diagnosed with tuberculosis. As can be seen in Table 1 there has been a significant increase of 1908 referrals in 2012 and the examination rate has also improved to 63%. Also, revisions have been made in the guidelines for 6MSCC based on the latest guidance of the WHO.

Table 1: Activities as Public-Private Mix of (PPM) DOTS, referred from small scale general practitioners and pharmacies due to suspicion of tuberculosis, the number that are examined in public medical institutions (2012)

Phnom Penh OD	No. of referrals	Number examined	Number of patients with tuberculosis
North	544	249	33
South	598	375	111
Central	296	319	43
West	470	260	26
Total	1908	1203 (63%)	213

Source: Material from CENAT

Based on the above, Output 2 had largely been attained at the end of the Project. In addition, since the support from donors including USAID, GFATM and NGOs is continuing after project completion, the number of referrals from small scale general practitioners and pharmacies for suspicion of tuberculosis as well as the rate of examination will also increase following the end of the Project, and it is determined that the outcome are subsequently continuing to expand.

3) Output 3

Suitable services and guidelines beyond routine DOTS are developed.

Indicators for Output 3:

TB/HIV

3-1: By mid of 2005, a guideline for TB/HIV services is formulated.

3-2: By the end of the Project TB/HIV services are available at selected ODs.

Pediatric TB control

3-3: By the end of 2007, a guideline (national TB manual in 2003) for pediatric TB is revised

3-4: By the end of the Project, pediatric TB services are available at all Provincial Referral Hospitals (RHs).

Smear(-)

3-5: Guideline (draft) for smear (-) is developed.

Output 3 was to develop guidelines for dealing with the new challenges of TB control identified at the end of phase 1 such as TB/HIV co-infection, childhood TB control, and services for dealing with sputum smear (-) cases. The activities carried out through this Project have been recognized as fundamental tuberculosis services, so at the time of terminal evaluation it was confirmed the output has largely been achieved.

Specifically, indicator 3-2, services related to TB/HIV are provided in 67 out of the total 77

ODs, and an increase in the number of TB/HIV co-infection diagnoses have been confirmed. Also indicator 3-4, upon completion of the January 2008 pediatric tuberculosis guidelines, CENAT selected three pilot states (Battambang, Kampong Cham, Prey Veng) based on the advice of the Project and, under the leadership of project experts, carried out training in areas such as tuberculin sensitivity testing and patrol guidance. Further, while treatment for pediatric TB has been carried out in hospitals, since reporting had not been implemented properly, guidance was performed on periodic reports and information exchange and, as a result, in 2007 reports of pediatric TB cases exceeded the project target of 1,268, reaching 1,422.

For indicator 3-5, a smear(-) tuberculosis diagnosis measures proposal of the national TB control guidelines was created jointly by CENAT, USAID (TBCAP), and the project in July 2009.

At the time of this ex-post evaluation, these activities are continuing and the number of TB patients receiving HIV testing in Phnom Penh operational districts has increased as shown in Table 2 below. In addition, the referral system for TB/HIV co-infected patients has expanded to other operational districts even after the completion of this Project and having been introduced into 74 ODs in 2009 was finally introduced into all 77 OD locations by 2010.

In addition, these services are working to expand tuberculosis support from donors such as USAID and GFATM who plays a central role, but the budgets of these donors have seen yearly reductions and it can be said that these reductions will likely impact on monitoring frequency and activities on site.

In addition, with regard tuberculosis in children, the number of reported patients rose to 5,706 people in 2011, and therefore it has been determined that activities have been ongoing (see Table 8).

Table 2: Numbers of diagnoses of TB / HIV co-infected, number/rates of TB patients receiving testing for HIV in 4 Operational Districts of Phnom Penh City

Item	2009	2010	2011
Number TB receiving patients HIV testing	25,045	30,431	31,176
Diagnoses of TB / HIV co-infected	396	307	282

Source: Material from CENAT

Based on the above, Output 3 had largely been attained at the end of the Project. Further, it has been confirmed that some achievements have continued subsequently even after completion of the Project.

4) Output 4

Quality of laboratory services to support DOTS, TB/HIV activities and surveys is improved.

Indicators for Output 4:

Develop Guidelines

4-1: By the end of 2007, a guideline for total quality management (TQM) of bacteriological examination for TB is formulated.

CD4[7]

4-2: By the end of 2005, CD4 testing service is available in CENAT.

Stock Management

4-3: Throughout the project, it does not face shortage of reagents and materials at all TB laboratories.

Improvement in the quality of inspection

4-4: Training for smear examination are conducted strategically based on Quality Assessment results.

4-5: QC circle activities are sit up at selected province.

4-6: Throughout the project, evaluation indicators (ex. Agreement rates >95%, etc.) for bacteriological examination are maintained the expected ranges.

4-7: By the end of the Project, smear (+) rate among suspects is decreased to expected rate(10%-15%)

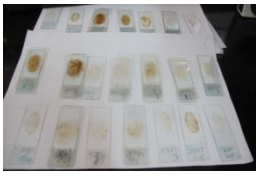
4-8: Trainings for assessors and cross-checkers are conducted once a year.

4-9: By the end of the Project, External Quality Assessment (EQA) system for Drug Susceptibility Test (DST) between supranational reference laboratory and CENAT laboratory is developed.

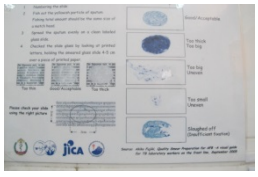
Output 4 sought to improve the quality of DOTS, TB/HIV measures, research activities, required inspections etc., through training and practice on TQM, CD4, sputum examination, bacteriological work, EQA for DST and so on. At the time of terminal evaluation the 9 indicators are confirmed to have been largely achieved.

More specifically, the English and Khmer versions of the TQM guidelines for the 2 pilot ODs related to indicator 4-1 (Battambang province, Mung Russey OD and Kandal province, S'ang OD) were created by the end of 2007 and published in May 2008 and July 2009 respectively. Also, in relation to indicator 4-7, the smear (+) rate of tuberculosis suspected cases was 13.0% in 2008, and remained within the Project's desirable range. The smear (+) rate has seen an improving trend since Phase I and, having achieved the numerical targets of 2006, has maintained the target number thereafter. The reason for this is that it has been determined that EQA (external quality assessment) expansion and regular support activities for the laboratories has been continuing.

Sputum smear slides of suspected tuberculosis patients are delivered to a district hospital lab from a health center



Sputum smear slides under examination in the lab



Inspection guide that was created in Phase 2 (introduced to lab facilities nationwide)

[7] CD4 testing is one indicator used to measure the progress of AIDS infection by measuring T lymphocytes which promote the production of immunoglobulins in plasma cells.

On the other hand, at ex-post evaluation it was confirmed that TQM activity has stagnated. The reason for this given by a representative from Battambang province is that the TQM method is difficult and to continuing it without the guidance of Japanese experts has proved difficult. In addition, development of a TQM system was aimed for at the planning stage of Phase 2, but problems in end lab inspection capabilities became apparent during project implementation and therefore, in order to shift from EQA every 3 months to every 6 months, activities focused on organizational building, training, and equipment provision were carried out in the Project. Quarterly EQA funded by GFATM came to be carried out in all 24 states in 2009 and, as shown in Table 3 on the right, with the support of the GFATM, Quarterly EQA is also being carried out after completion of the Project and the proportion of poor quality laboratories in decreasing.

Table 3: Quarterly ongoing EQA status following completion of the Project

Quarter	Percentage of poor quality laboratories for each EQA quarter
2010-I	21%
2010-II	22%
2010-III	21%
2010-IV	17%
2011-I	12%
2011-II	8%
2011-III	11%
2011-IV	14%
2012-I	17%
2012-II	13%

Source: Material from CENAT

In addition, during the project period, a culture test SOP (standard operating procedures) is in place, strengthening of the inspection capacity of culture labs at three locations, including the CENAT lab, has been performed, and this effort has contributed to the installation of tuberculosis (TB) culture labs that meet the criteria of the WHO, receiving high praise from the Cambodian side at the time of this ex-post evaluation.

Further, human resource development and the provision of equipment for lab testing in Kampong Cham and Battambang supported in this Project has been carried out with the support of USAID and MSF.

In addition, in regards to indicator 4-7, the smear (+) rate of patients with suspected tuberculosis, was decreased to 13.0% in 2008 from 28.6% in 2001, and was reduced further after 2009, after the end of the Project has remained in the range of 10.1% to 11.7% as shown in Table 4.

Table 4: Smear (+) rate in patients with suspected tuberculosis

Year	Number of samples	Number suspected of tuberculosis	Smear (+) rate
2005	463,246	138,144	15.3 %
2006	458,646	138,516	14.5 %
2007	487,987	147,929	13.3 %
2008	486,568	147,594	13.0 %
2009	506,636	154,465	11.7%
2010	521,353	161,541	11.0%
2011	539,825	165,554	10.1%

Source: Material from CENAT

Based on the above, Output 4 had largely been attained at the end of the Project. Further, it has been confirmed that some outputs are still continuing and numerical indicators are improving even after Project finished.

5) Output 5

Effective IEC/Advocacy (Information, Education Communication/Advocacy: IEC activities (e.g., production of teaching materials for awareness activities and educational activities)/advocacy) activities to support the TB control program are implemented. Indicators for Output 5: 5-1: By 2007, NTP has an IEC/advocacy strategy to support TB control program. 5-2: By the end of the Project, NTP implements the IEC/advocacy strategy with partner organizations 5-3: By the end of the Project, 70% of DOTS Health Centers is supported by Village Health Support Groups (VHSGs) through IEC/advocacy activities.

Output 5 was to formulate and implement the strategies concerning IEC/Advocacy to support the TB control program, and the nearly complete attainment of the three indicators was confirmed at the time of terminal evaluation. Note that there was a shift form IEC/Advocacy to ACSM (Advocacy, Communication and Social Mobilization) at the midpoint of the Project. ACSM is a concept adopted by the WHO's Stop TB Partnership, which has become the international main stream replacing IEC/Advocacy. Reflecting this change, the formulation of IEC/Advocacy strategies in Indicator 5-1 was redefined as the formulation of ACSM strategies, and the draft of these strategies has been completed. CENAT/NTP has conducted training concerning ACSM strategies for the OD-level staff at all 77 locations, and initiated the implementation of ACSM activities according to the guidelines. With respect to Indicator 5-3, C-DOTS has been introduced at 61 out of the 77 ODs in the country (about 80%), and activities are performed by VHSGs (village health support groups) who have received TB educational training through this Project.

At the time of ex-post evaluation, the importance of ACSM has increased further. It is positioned as a horizontal concept that must not only be discussed as a separate element but be considered in all aspects of TB control. ACSM activities are continued at all 77 ODs. C-DOTS has also been introduced at all 77 ODs (100%).

Based on the above, Output 5 had largely been attained at the end of the Project. It was also confirmed that the activities by CENAT have been continued after the end of the Project.

3.2.1.2 Achievement of Project Objectives

Project objective

Sustainable quality TB Programme is implemented nationwide.

Indictors of project objective:

Indicator 1: Throughout the Project, cure rate among newly registered smear (+) TB patients is maintained at least 85%.

Indicator 2: By the end of the Project, smear (+) detection rate is increased and maintained at least 70%.

Indicator 3: By the end of the Project, number of smear (-) registered cases is increased twice as many from the level in 2003.

Indicator 4: By the end of the Project, number of registered TB cases in children is increased twice as many from the level in 2003.

1) Indicator 1

Throughout the Project period, the cure rate among new smear (+) TB cases remained at high levels of about 90%. The target value for the cure rate of 85% was maintained.

Table 5 to the right shows the cure rate among new smear (+) TB cases as confirmed during this ex-post evaluation. It is considered that the rate is still maintained at the level at the end of the Project.

Table 5: Cure Rate among New Smear (+) TB Cases

Year	Cure rate
2004	89.7 %
2005	88.9 %
2006	90.4 %
2007	91.1 %
2008	92%
2009	92%
2010	92%
2011	91%

Source: Material from CENAT

2) Indicator 2

As shown in Table 6, Indicator 2 concerning the detection rate of new smear (+) TB cases achieved the target value in 2005 and then achieved 69% shortly before the end of the Project. Although the detection rate tended to decrease thereafter, such decrease was considered normal, as confirmed by the "Joint Study on NTP" conducted by the WHO in 2012 in collaboration with other organizations supporting TB control, and the rate is expected to decrease gradually in the future. Specifically speaking, the recent decrease in detection rate was not the reflection of general aggravation of situations, but of the actual decrease in the prevalence of smear (+) TB resulting from the efforts toward detection of smear (+) TB cases that have been continued for more than 10 years. We were told that the case detection rate (CDR) would cease to be an indicator and be replaced by the case notification rate (CNR[8]) of new smear (+) patients.

Table 6: Detection Rate of New Smear (+) TB cases (CDR)

Year	Detection Rate
2004	64 %
2005	70 %
2006	66 %
2007	65 %
2008	69 %
2009	63%
2010	63%
2011	60%

Source: Material from CENAT

[8] The smear (+) case notification rate (CNR) tended to decrease from 131 in 2009 to 109 in 2010 (vs. target 125) and 101 in 2011 (vs. target 122).

3) Indicator 3

The number of registered smear (-) TB cases in 2008 was 7,847. Although the number of registered cases increased satisfactorily during the Project period, it did not reach the target value of 8,314 (twice the number in 2003). However, because the number of reported cases of smear (-) pulmonary TB increased satisfactorily during phases 1 and 2, it was considered that the situations stabilized in 2005 and the stable state was maintained thereafter.

Table 7: Number of Registered Smear (-) TB Cases

Year	Registered Cases
2001	1658
2002	2668
2003	4307
2004	5800
2005	7057
2006	6875
2007	7120
2008	7847
2009	8378
2010	8301
2011	7686

Source: Material from CENAT

Therefore, although the target number was not attained at the time of terminal evaluation, the documented improvement in the detection of smear (-) cases supports the expectation that the number of reported cases of sputum negative pulmonary TB would increase further as a result of possible future improvement in the quality of chest X-ray equipment and that in the access to X-ray diagnosis. On the other hand, no concrete support programs for such quality improvement and access improvement have been identified at the present.

4) Indicator 4

NTP, in response to the recommendations in the Project, started registration of the total number of childhood TB cases in 2005, in addition to the number of smear (+) childhood TB cases. As shown in Table 8 to the right, the number of reported cases of childhood TB reached 1,422 in 2007, achieving the target number of 1,268. This number increased further to 2,540 in 2008. As a result, NTP became capable of grasping a more accurate picture of the entirety of TB patients in Cambodia, and hence became able to formulate more appropriate measures against TB for children.

Table 8: Number of Reported Cases of Childhood TB

Year	Registered Smear (+) TB Cases	Total number of Childhood TB Cases
2003	83	634
2004	64	NA
2005	94	696
2006	96	1081
2007	111	1422
2008	120	2540
2009	82	3853
2010	92	4613
2011	67	5706

Source: Material from CENAT

The number of childhood TB cases increased further in and after 2009. This is considered to demonstrate the enduring functioning of the system for the reporting of NTP data from hospitals.

As reviewed above, the indicators concerning the project objective of this Project are considered to have been achieved in general. And this project has largely achieved its objectives, therefore its effectiveness is high.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

The mortality rate and morbidity of TB decrease.

Indicators of overall goal at the time of terminal evaluation:

Indicator 1: By 2012 incidence of smear (+) TB is reduced from 241/100,000 in 1997 to 120/100,000 nationwide.

Indicator 2: By 2012 prevalence of smear (+) TB is reduced from 540/100,000 in 1997 to 270/100,000 nationwide.

Indicator 3: By 2012, mortality rate of TB is reduced from 90/100,000 in 1997 to 45/100,000 nationwide.

The WHO's global target concerning TB predicts that achieving a 70% detection rate of new smear (+) TB patients and maintaining a 85% cure rate would result in decreases in the incidence rate and prevalence of smear (+) TB and in the mortality rate of TB patients. The overall goal and the project objective of this Project were defined based on this global target. On the other hand, we confirmed the most up-to-date numerical targets at CENAT, and found that the current CMDG adopts numerical targets relative to the baseline levels set in 1990, and that the current National Health Strategic Plan (TB-NSP 2011-2015) for TB control also adopts the same baseline year and numerical targets as CMDG. In addition, the new numerical targets use the prevalence rate of all TB (including smear (-) TB) rather than the prevalence rate of smear (+) TB.

For this reason, we evaluate the achievement of the overall goal of this Project based on the attainment of the following two numerical targets, while also considering the indicators in the initial plan.

Indicators and achievement of overall goal at the time of ex-post evaluation:

Indicator 1: The prevalence rate of all forms of TB decreases by half from that in 1990 by 2015.

(Achievement)

About 60% decrease was achieved 4 years earlier than the target year.

1990: 1,670 / 100,000

2011: 817 / 100,000 (51% decrease)

Indicator 2: TB mortality rate decreases by half from that in 1990 by 2015.

(Achievement)

1990: 155/100,000

2011: 63 / 100,000 (60% decrease)

Source: WHO, "Global Tuberculosis Report 2012"

As shown above, the prevalence of all forms of TB decreased by half from 1670 per 100,000 in 1990 to 817 per 100,000. The TB mortality rate also decreased by half from 155 per 100,000 in 1990 to 63 per 100,000. The figures for the prevalence of all forms of TB were brought to light through the 1st prevalence survey conducted in phase 1 and the 2nd

prevalence survey conducted upon project completion. This result was featured prominently in the WHO "Global Tuberculosis Report 2012," which highly commended the fact that the approach to this problem, which requires long-term measures, achieved a substantial reduction in a period as short as 9 years and the outcome was clarified based on direct epidemiological information.

The overall goal target indicators were largely achieved and therefore its impact is high.

3.2.2.2 Other Impacts

No negative impacts, including those on natural environment, were identified during the implementation of this Project and at the time of ex-post evaluation. No relocation of inhabitants or acquisition of land is planned.

The implementation of this Project achieved the project objective of the 70% detection rate of new smear (+) TB cases in 2005. The cure rate of new smear (+) TB cases also hovered at high levels of about 90% throughout the Project period, consistently exceeding the 85% target. As for the overall goal, the prevalence rate of TB in all forms achieved a decrease of about 60% four years earlier than the target year. This project has largely achieved its objectives, therefore its effectiveness is high.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

The input plan and actual performance of this Project are as follows.

Inputs	**Plan**	**Actual Performance** (as of the end)
(1) Experts	3 for Long-Term Chief advisor, task coordination, laboratory management Short-Term: As needed	F.Y. 2004 Long-term: 3 persons Short-term: 15 F.Y. 2005 Short-term: 16 F.Y. 2006 Short-term: 21 F.Y. 2007 Short-term: 17 F.Y. 2008 Short-term: 13
(2) Trainees received	Main training areas: TB control, testing techniques	Main training areas: TB control, testing techniques F.Y. 2004 C/P training: 5 F.Y. 2005 Country focus training: 3 F.Y. 2006 Country focus training: 2
(3) Third-Country Training Programs	Main training areas: TB control, testing techniques	Main training areas: X-ray diagnosis/examination techniques Number of trainees: 50 (Thailand, Philippines)
(4) Equipment	Main input equipment:	Main input equipment:

Inputs	Plan	Actual Performance (as of the end)
	Microscope, motorbike, X-ray equipment, OA equipment, smear test kit, etc.	Microscope, X-ray equipment, OA equipment, smear test kit, etc. Total 65 million yen
Total project cost	Total 510 million yen	Total 786 million yen
Local cost	Because CENAT conducts the activities in this Project and NTP activities as a whole and it is difficult to single out the budget for this Project, the budget amount has not been specified.	Because of the reason given in the left column, the input amount on the Cambodian side has not been estimated.

3.3.1.1 Elements of Inputs

The input from the Japanese side was executed largely as planned, including the dispatch of experts, acceptance of trainees, third-country training, and provision of equipment. The timing of dispatch, specialty, and teaching ability of Japanese experts, as well as the training in Japan and third-country training, were evaluated highly by the Cambodian side. The equipment provided is still in use at health centers and laboratories.

While the Cambodian side assigned counterpart personnel to facilitate Project activities, there were very few occasions in which they were unavailable because of long-term training or personnel transfer, and there were no problems in Project activities.

3.3.1.2 Project Cost

The amount of assistance significantly exceeded the planned amount (154% of the planned amount). This excess occurred because a scheme for technical cooperation project using outsourced operations was established and accordingly the configuration of the Project was changed from the dispatch of experts, assumed in the initial evaluation, to the commissioning of services.

3.3.1.3 Period of Cooperation

The period of cooperation was as planned (100% of planned period).

Although the period of cooperation was within the plan, elements of inputs were partially inappropriate and project cost exceeded the plan, therefore efficiency of the project is fair.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy towards the Project

All government initiatives from the National Strategic Development Plan (NSDP

2006-2010) to the Health Strategic Plan (HSP 2008-2015) clearly set forth consistently coherent TB policies, and the commitment of the Cambodian Government to TB control is solid. In addition, the Cambodian Government has formulated the "National Health Strategic Plan for TB Control," addressing the improvement of the quality of healthcare services, the involvement of communities and TB patients, TB/HIV control measures, PPM-DOTS , multiple drug resistant TB, information and research, human resource development, partnership with related organizations, etc. The current strategic plan is the National Health Strategic Plan (TB-NSP 2011-2015) with the target year of 2015. Although this target year has not arrived, the government is in the process of formulating a new National Health Strategic Plan for TB control (TB-NSP 2014-2021). According to CENAT, this new strategic plan is going to launch the 5.5 Strategy for TB Control in Cambodia, which promotes TB control aiming to reduce germ-positive prevalence rate and mortality rate by 5% every year for 5 years based on 5 principles. From this we can assume the Cambodian Government still gives a high priority to TB control, and that this direction is expected to be upheld in the future, therefore sustainability in political and organizational aspects is considered high.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

CENAT is the central organization driving the national TB program and has the comprehensive responsibility to promote the program on the national level. It is expected to stay in the position as the central organization. CENAT is striving to strengthen human resources and organizations under the support of Japan and other donors and is considered capable of driving the program into the future as a comprehensive and responsible organization for the national-level promotion of NTP. In addition, the strong leadership of the current director of CENAT is considered a factor ensuring the promotion of NTP.

Reinforcement of supervision from the central government to provinces, from provinces to OD/referral hospitals (RH), from OD/RH to health centers, and from health centers to VHSG is also planned through the expansion of DOTS. However, now that the expansion of DOTS has been achieved, it has become more important to further improve the quality of individual organizations in addition to the reinforcing supervision. For example, the prevalence survey in this study identified three problems; (1) TB with slight symptoms (cases lacking a cough persisting for over two weeks or bloody sputum), (2) smear (-) TB, and (3) TB in aged patients. Responses to these problems need decisions on whether to perform procedures such as chest X-rays even in slight or sputum negative cases. Although the field visits in this study confirmed the satisfactory functioning of supervision from OD to health centers and from health centers to VHSG, disparities were noted in frequency and capability, dependent on the status of donor and NGO assistance. It is necessary to improve the DOTS monitoring system, to increase the capabilities of localities showing weakened functions and to build a system to

support field-level problem solving.

As seen above, while the organizational sustainability of CENAT as the executing body of this Project is evaluated as high, problems have been noted because some initiatives, including the system for maintaining qualitative improvement of DOTS expansion, as well as human resource development and organizational reinforcement to respond to new issues are lagging. Therefore, sustainability in the systematic aspect is considered partially insufficient.

3.4.3 Technical Aspects of the Implementing Agency

Efforts were made in this Project to improve the technical abilities of individual workers engaged in TB control, such as the CENAT staff, provincial health department (PHD) staff and operational district (OD) staff. As a result, a basis for nation-wide deployment of C-DOTS, 6MSCC, PPM-DOTS, etc. was constructed, leading to the continuation of activities after the end of the Project. Guidelines for TB/HIV and childhood TB were also developed with the technical support from Japanese experts. In this sense, the Project helped the development of infrastructure for not only DOTS but also a wide range of activities necessary for TB control in Cambodia.

Furthermore, the prevalence survey in this study provided an opportunity for technology transfer in relation to survey design, data analysis, chest X-ray diagnosis, EQA, culture testing, etc., which were pointed out as problems during the terminal evaluation.

While TB control measures in Cambodia have been achieving success through steady efforts to develop infrastructure for a nation-wide spread of DOTS, our study identified the same three problems as those in the institutional aspect: (1) TB with slight symptoms (cases lacking a cough persisting for over two weeks or bloody sputum), (2) smear (-) TB (cases that are negative on sputum smear testing but are diagnosed as TB on chest X-ray and other examination), and (3) TB in aged patients (cases that are difficult to diagnose because of the vagueness of symptoms in aged patients). Measures to address these problems, including reinforcement of outpatient diagnostic functions, reinforcement of health center functions, and community-based health screening, are needed. During an interview, the director of CENAT pointed out that the decrease in prevalence rate has not been large enough to remove Cambodia from the list of the “22 TB high-burden countries,” although the prevalence survey in this study demonstrated the effectiveness of the TB control measures in the past, and strongly acknowledged the importance of further improvement of the operation management capabilities and technological strength of CENAT/NTP so that serious problems will not occur in the quality of TB control in the future.

Based on the above, while sustainability in the technical aspect is improving, the situation is considered partially unsatisfactory in terms of the further reduction of TB prevalence rate and the response to new issues.

3.4.4 Financial Aspects of the Implementing Agency

The TB control budget of NTP has depended chiefly on the WHO, GFATM, USAID, and Japan and it is expected to diminish in the future as financial assistance from multiple donors, including the 10-year financial assistance from the World Bank, is being discontinued. On the other hand, we appreciate the fact that the 2013 government budget for TB control had been increased by about 170% over 2009 when this Project ended. However, the government budget represents only 12% of the total budget (according to the WHO) and the situation in which the Government is dependent on external funds, such as from donors, for most of this budget is expected to continue for a long time. In the face of the need to address new TB control measures, CENAT/NTP plans to submit re-application to a new GFATM round for the purpose of securing funds for the years after the termination of Round 7 in 2014. However, as GFATM is revising its schemes for financial assistance, it is uncertain whether or not a sufficient budget can be secured.

Table 9: Government TB Control Budget of MOH (US$)

Annual	2009	2010	2011	2012	2013
Actual	650,000	653,000	868,000	998,000	1,115,000

Source: Material from CENAT

For these reasons, while there are no problems in the short term financial situation, there may be difficulties in long-term financial sustainability.

Some problems have been observed in the structural, technical and financial aspects of the executing agency, therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This Project was implemented for the purpose of reducing deaths from tuberculosis (TB) and a reduction in the number of TB patients in Cambodia, one of the specified "22 high TB-burden countries". The Project has undertaken qualitative improvement of DOTS (Directly Observed Treatment with Short-course chemotherapy) that is expanding across the country, strengthened diagnosis capabilities for TB control beyond that of DOTS, strengthened administrative capacities and worked to develop human resources. This effort has been carried out in an approach consistent with the policies of Cambodia and therefore its relevance is very high.

Upon completion of the Project, it has been confirmed that the foundation for

disseminating and expanding the DOTS that involves citizens, Public-Private Mix (PPM) DOTS and community DOTS, has been built and the results are being continued by other donors at the time of this ex-post evaluation. In addition, as a result of efforts to focus on strengthening the diagnosis capacities of labs, it contributed domestic tuberculosis culture labs that meet the criteria of the WHO in three locations. Furthermore, from the fact that the prevalence of all types of TB and the TB mortality rate, which were the indicators for assessing the overall goal, have been achieved four years earlier than the target year, 2015, effectiveness and impact of the Project is high. Although the project period was as the plan, the project cost was significantly exceeded, therefore efficiency of the Project is fair.

In regards to sustainability, while TB with slight symptoms, smear (-) TB, TB in aged patients etc. and other new challenges are becoming apparent, there are slight problems in regards to the technology of a system that can respond to them. In addition, while there is an apparent trend of decreases in external funds from donors pertaining to TB control, Cambodia continues to be specified as one of the "22 high TB-burden countries," and as there are problems in terms of long-term financial sustainability, sustainability is considered fair.

In light of the above, this Project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Financial Aspects of the Implementing Agency

The TB control budget of the Cambodian Government has been increasing year by year, and this point is highly appreciated. However, as the government budget represents only 12% of the total budget and there is uncertainty about the continuation of support from various international donors in TB control, it is important that the project implementing organization, in cooperation with the Ministry of Health, tries to increase the percentage of domestic funds and press the Government and private sector to make efforts towards this purpose.

4.2.2 Recommendations to JICA

Infrastructure for the nation-wide expansion of various activities needed for TB control in Cambodia has been developed through this Project, and the role of Japan in TB control in this country has been significant. On the other hand, new issues have been identified through the second national TB prevalence survey. In order for Cambodia to cease to be a TB high-burden country, it needs technical assistance in addressing these issues (support to the improvement of chest X-ray diagnosis, laboratory testing capabilities, etc.) and the training of young workers to support long-term TB control. Sufficient discussion must be held with CENAT in regards to the desirable forms of future assistance in TB control.

4.3 Lessons Learned

The TB prevalence in Cambodia is ranked high in the world, and the measures to control TB in this country are still in the process of development. However, the trajectory of the nation-wide expansion of DOTS from hospitals to health centers, from health centers to communities, and to Public-Private Mix has proved the effectiveness of DOTS-based TB control in reducing TB prevalence rate. In the background of this success were factors such as the persistent strong commitment of the Cambodian Government to TB control, as well as the positive participation of healthcare workers, eagerly looking forward to obtaining TB medicines and diagnostic technologies in the field, and inhabitant volunteers in the efforts to spread DOTS. Another important factor that led to the substantial reduction in the prevalence rate was the fact that international donors and NGOs strongly supported the TB control measures of the Cambodian Government and ceaselessly helped organizational improvement, human resources development, technical assistance, provision of medicines and equipment, etc.

On the other hand, while donors such as GFATM and USAID are still continuing assistance in TB control, the assistance from some other donors is shifting from the control of specific diseases such as TB to the reinforcement of healthcare systems. In this situation, difficulty is expected in securing financial resources for long-term TB control activities. The time has come to consider how to address the issues of new TB control measures that must be taken after the expansion of DOTS.

In similar projects in the future, it is considered important to begin discussion with the recipient government at early stages concerning the long-term vision of TB control, focusing not only on the success after the introduction of DOTS in Cambodia but also foreseeing measures for addressing the new problems ((1) TB with slight symptoms, (2) smear (-) TB, (3) TB in aged patients) confronting Cambodia at the present.