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Nation Religion King

Ministry of Health

TUBERCULOSIS REPORT 2016



អត្ថបទជាភាសាអង់គ្លេស
ENGLISH VERSION

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Leprosy Control



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1. Introduction

The Ministry of Health of Cambodia has given high priority to TB Control. With the support and encouragement from the Royal Government of Kingdom of Cambodia led by the Prime Minister, Samdech Akka Moha Sena Padei Techo Hun Sen, as the Honorable Chairman of the National Anti-Tuberculosis Committee, as well as the involvement from all partners, TB control in Cambodia has achieved the remarkable results in the last recent years. This achievement has been recognized by the World Health Organization (WHO) and other key partners.

In 2015, WHO reclassified the countries with high burden of tuberculosis in which there are 30 countries with high burden of TB in the new list compared to 22 high burden countries in the old one. By the end of 2015, Cambodia was one of the 9 countries among 22 TB high burden countries that have successfully achieved Millennium Development Goal (MDG). Despite this great achievement, based on the new classification, Cambodia is still one of the 30 countries with high burden of TB in the world. However, Cambodia is no longer country with high burden of TB/HIV.

According to the 2016 WHO Global TB Report, Cambodia had TB incidence of 380 per 100,000 population, while the mortality rates of 55 per 100,000 population in 2015. The TB prevalence rate was estimated to be around 630 per 100,000 population,

The followings are the main achievements on TB control in 2016 and direction/targets for 2017 and the years beyond.

2. Tuberculosis Situation in the World

Worldwide, 10.4 million people are estimated to have fallen ill with TB in 2015; of which only 6.1 million new cases of TB were detected and reported to WHO. In the same year, TB killed 1.4 million people including 400,000 HIV-positive. TB now ranks alongside HIV as a leading cause of death among infectious diseases.

There are three main Millennium Development Goals related to TB for the period between 1990 and 2015:

- 1-Reduction of TB prevalence by 50%;
- 2-Reduction of TB mortality by 50% and
- 3-Reverse TB incidence

Worldwide, by the end of 2015, TB mortality has fallen 47% (between 1990 and 2015) compared to MDG target of 50%; while prevalence of TB has declined since 2000. In particular, only three out of the six WHO regions achieved all three MDG targets: the America, South-east Asia, and Asia Pacific regions. The other three regions that did not achieve the MDG targets include the Eastern Mediterranean, European, and African.

3. Main Achievements

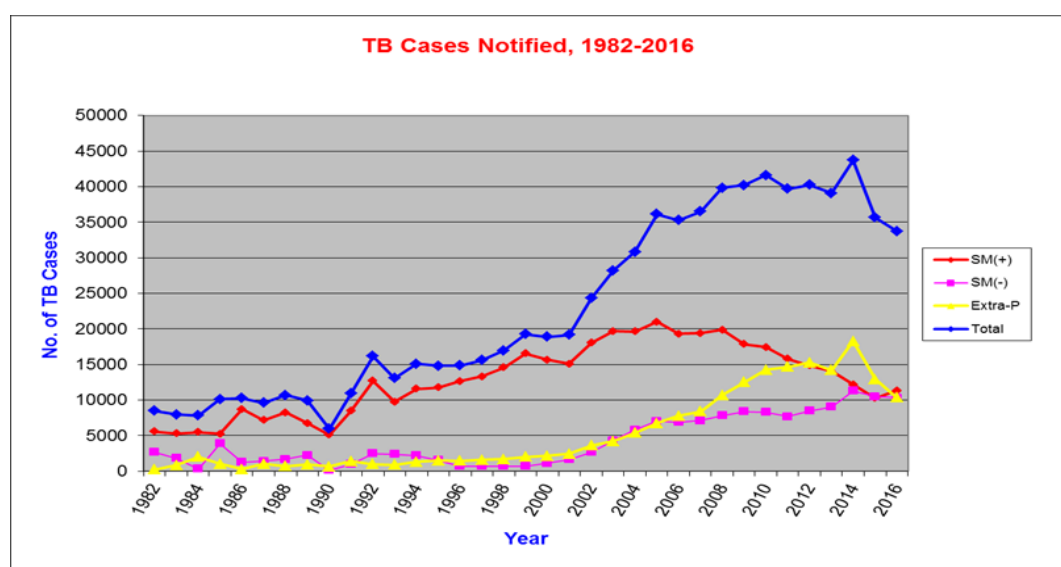
National TB Control Program has achieved the main results as below:

3.1. Service Coverage

The coverage of Directly Observed Treatment, Short Course (DOTS) Strategy has been maintaining at 100% in all health centers nationwide. Community DOTS (C-DOTS) has been expanded from 506 health centers in 2008 to 870 health centers in 2016. Public-Private Mix DOTS (PPM-DOTS) has been implemented in 27 ODs (operational districts) of 8 provinces in 2014 but this activity has been discontinued in 2015 and 2016 due to lack of fund. TB/HIV collaborative activity has been implementing in all ODs in 2016 (compared to only 57 ODs in 2008) while TB in children activity was implemented in 25 ODs. In addition, the implementation of DOTS strategy has been implementing in 13 factories and 17 prisons in 2015. MDR-TB treatment sites have increased from 9 in 2010 to 11 in 2016. In total, there are 1,387 health facilities with DOTS services across the country.

3.2. Case Detection

In 2016, NTP has detected a total of 33,736 TB cases, of which 11,323 was bacteriologically confirmed New TB cases.



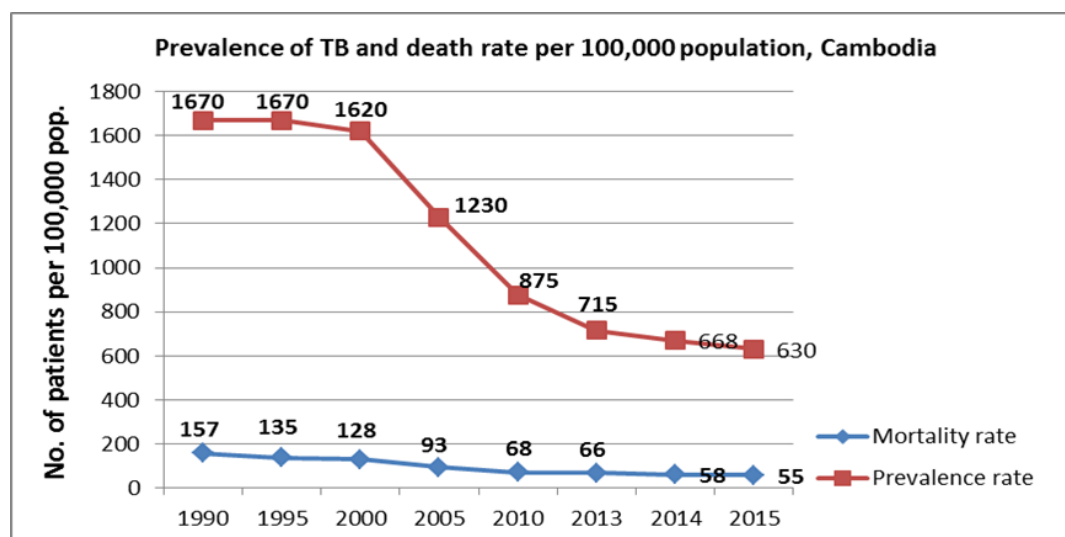
3.3. Treatment

The Treatment Success Rate of TB has been maintained over 85% during the last 19 years. For instance, NTP has achieved 93% of the treatment success rate in 2015 which surpassed the target of 90%.

3.4. Mortality, Incidence, and Prevalence

In the recent years, Cambodia has achieved remarkable results in TB control. The 2016 WHO Global TB Report has shown that TB mortality rate dropped from 157 per 100,000 population (pop) in 1990 to 55 per 100,000 pop in 2015, which equal to 65% reduction against MDG target of 50% reduction by 2015. The prevalence of TB dropped from 1,670 per 100,000 pop in 1990 to around 630 per 100,000 pop which equal to 62% reduction against MDG target of 50% reduction by 2015 compared with 1990 figures. While the incidence has also fallen from 580 per 100,000 pop in 1990 to 380 per 100,000 pop in 2015, which equal to 34% reduction.

Ministry of Health's NTP has already achieved MDG targets in reversing incidence, reduction of prevalence and death rate due to TB by 50% since 2011, that's four years earlier than scheduled. By the end of 2015, Cambodia was one of the nine countries among 22 high burden countries that have successfully achieved tuberculosis MDG targets.



Moreover, the report of second national TB prevalence survey conducted in 2011 has shown that the prevalence of bacteriologically confirmed pulmonary TB cases has fallen by 38% between 2002 and 2011, which equal to 4.2% each year. This level of reduction is more than estimated by TB experts. The 2012 WHO Global TB Report has mentioned that Cambodia was a model example that remarkably reduced TB prevalence by 4.2% every year, which is a rare case that low-income country like Cambodia could achieve such tremendous result. These are great achievements of NTP.

4. Main Interventions

In addition to the main achievements mentioned above, the National TB Control Program has remarkably achieved the results, which related to the main interventions as following:

4.1. Drug Resistance Tuberculosis

The Cambodia NTP started implementing programmatic management for drug resistant TB (PMDT) since 2006 in collaboration with partners, especially World Health Organization (WHO), Cambodian Health Committee Organization (CHC), Médecins Sans Frontières (MSF-F), and Médecins Sans Frontières-Belgium (MSF-B), US-CDC, and USAID. The second National Drug Resistant Survey (NDRS), conducted in 2006-2007, showed that the proportion of Multi-Drug Resistant TB (MDR-TB) were 1.4% and 10.5% among new and previously treated TB cases.

4.1.1. MDR-TB Suspect Screening

One thousand five hundred and forty two MDR-TB suspect patients were tested by Xpert MT/RIF in 2016. Of those, one thousand one hundred and ninety nine patients were previously treated pulmonary TB. This figure reflects that the program tested for Rifampicin resistant among pulmonary TB previously treated was only 81% (1199/1,484) of previously treated pulmonary TB registered for treatment.

Number of MDR-TB suspects tested for drug sensitivity testing in 2016 decreased up to 14% compared to 2015 (Figure 1). The decline might be due to some reasons such as the delay of budget approval of partners, limited budget for supervision of all levels, staff handover, MDR-TB suspect referral mechanism is not well functioning, and limited knowledge of health care workers working for TB at referral hospital and health centers.

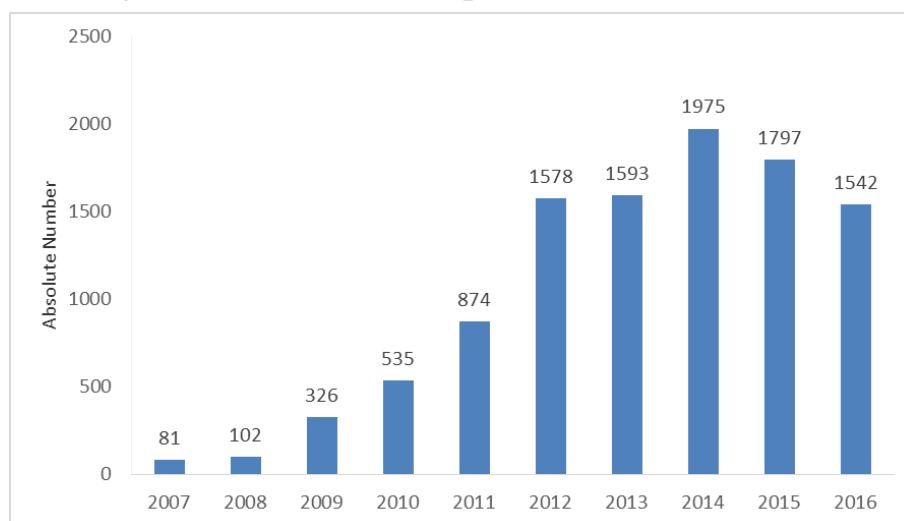


Figure 1: Number of MDR-TB suspects tested for drug sensitivity testing

Moreover, only 25% (2943/11827) of bacteriological positive TB patients tested by Xpert MTB/RIF and the rest of the cases were diagnosed based on smear microscope.

4.1.2. MDR-TB Diagnosis and Treatment

Cambodia has 11 MDR-TB treatment sites with 57 isolation rooms by the end of 2016. Patients enrolled for MDR-TB treatment had remarkably decreased in 2015 and increased in 2016 (Figure 2). RR/MDR-TB patients initiated on MDR-TB treatment regimen was higher 101 cases in 2016 comparing to 75 cases in 2015. Three Mono/PDR-TB patients were enrolled for their appropriate treatment. The highest number of MDR-TB cases enrolled for treatment was 55 cases at CENAT MDR-TB treatment site followed by Siem Reap and Banteay Meanchey MDR-TB treatment sites. Since MDR-TB project started up to the end of 2016, NTP has diagnosed and enrolled 711 MDR-TB cases for the appropriate treatment with second line anti-TB drugs.

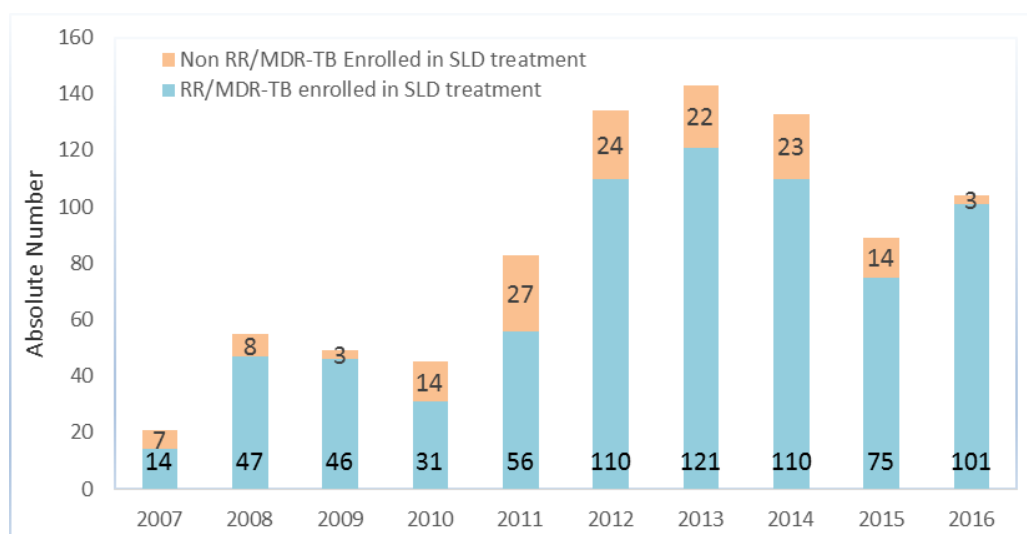


Figure 2: Patients enrolled on second line drugs

4.1.3. MDR-TB Treatment Outcome

The following table shows the number of RR/MDR-TB patients converted culture by month 6 of treatment and the proportion of culture conversion among RR/MDR-TB patients enrolled on second line drug treatment during 2011-2015. The proportion of culture conversion has declined from 90% in 2011 to 77% in 2015 due to the increase of death rate.

Table: Culture conversion at month 6 of RR/MDR-TB patients enrolled on treatment

Year	Enrolled RR/MDR-TB patients	Culture negative	Culture positive	Died	Lost to follow-up	Culture conversion rate*	Culture not done or not MDR-TB
2011	56	45	5	0	0	90%	6
2012	110	78	5	10	7	78%	9
2013	121	83	1	12	4	83%	17
2014	110	80	6	12	3**	80%	9
2015	75	57	2	9	6	77%	1

* Denominator includes patients tested, died, and lost to follow up

RR/MDR-TB treatment success rate among RR/MDR-TB patients initiated on MDR-TB regimen had increased from 64% in 2007 to 86% in 2011 cohort (Figure 3). This treatment success rate has declined from 86% in 2011 to 76% in 2014 cohort (compared to the target of 75%) while the death rate increased from 7% to 17% in the same period.

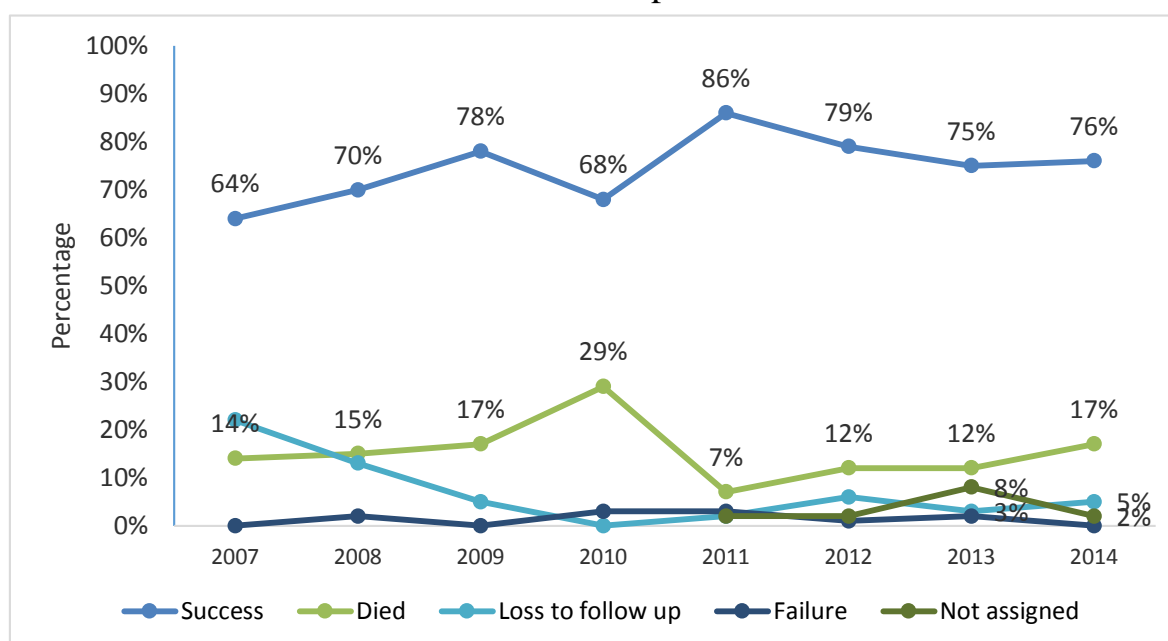


Figure 3: RR/MDR-TB treatment outcome cohort: 2007-2014

4.2. Collaborative TB/HIV activities

4.2.1. Meeting

In collaboration with National Center for HIV/AIDS, Dermatology and STD (NCHADS), National Center for TB and Leprosy Control (CENAT) jointly conducted Three I's cluster meeting workshop in US-CDC focused provinces at the beginning of the US-CDC project.

The main objectives of the meeting were to monitor and evaluate the progress being made toward Three's Is Strategy and share experiences and good practices among OI/ART sites through the presentation from different sites of OI/ART services.

From April 2016 onward, 4 times of 3Is cluster meeting were conducted in 4 cluster sites where Battambang cluster site consists of Battambang, Pursat, Pailin, Banteay Meanchey and Siem Reap provinces; Sihanouk cluster site consists of Sihanouk, Kampot, Kampong Speu and Koh Kong provinces; Kampong Cham cluster site consists of Kampong Cham, Tbong Khmom, Kampong Thom, Prey Veng and Svay Rieng provinces and Phnom Penh cluster site consists of Phnom Penh, Takeo, Kandal, Kampong Chhnang and OI/ART sites in Phnom Penh.

4.2.2. Training

With the financial support from GFATM, National Center for TB and Leprosy (CENAT) in collaboration with National Center for HIV/AIDS, Dermatology and STD (NCHADS) has an opportunity to conduct trainings on TB diagnostic workup for PLHIV to OI/ART sites. There are around 37 participants per training course and the trained participants are PHD TB supervisor, OD TB supervisor and physician and staff of OI/ART team (including TB physicians). 9 training courses are conducted in the sites of OI/ART as bellow:

- 1- From 28th to 29th March 2016, at Takeo PHD, there is 5 OI/ART sites from Takeo (Daunkeo PH, Kirivong RH, Angroka RH and Prey Kabas RH) and Kampot (Kampong Trach RH).
- 2- From 31st March to 1st April 2016, at Prey Veng PHD, there is 5 OI/ART sites from Prey Veng (Neak Loeung RH, Prey Veng PH and Pearing RH) and Svay Rieng (Svay Rieng PH and Romeas Hek RH)
- 3- From 20th to 21st June 2016, at Preah Sihanouk PHD, there is 4 OI/ART sites from Sihanouk province (Preah Sihanouk PH), Kampot (Kampot PH), Koh Kong (Smach Meanchey PH and Sre Ambil RH)
- 4- From 23th to 24th June 2016, at Siem Reap PHD, there is 4 OI/ART sites from Siem Reap (Siem Reap PH, Sotnikum RH and Kralanh RH) and Odar Meanchey (Samrong RH)
- 5- From 28th to 29th July 2016, at Kg Speu PHD, there is 5 OI/ART sites from Kg Speu (Kg Speu PH, Kang Pisey RH and Outdong RH) and Kg Chhnang (Kg Chhnang PH), and Kep (Kep PH)
- 6- From 25th to 26th August 2016, at Kg Thom PHD, there is 5 OI/ART sites from Kg Thom (Kg Thom PH and Baray Santok RH) and Preah Vihear (Preah Vihear PH) Kg Cham (Chheung Prey RH), and Odar Meanchey (Anlong Veng RH)
- 7- From 22th to 23th September 2016, at Kg Cham PHD, there is 5 OI/ART sites from Kg Cham (Kg Cham PH, Chamkaleu RH and Srey Santhor

- RH) and Tbong Khmom (Tbong Khmom PH and Memot RH),
- 8- From 30th November to 1st December 2016, at Banteay Meanchey PHD, there is 5 OI/ART sites from Banteay Meanchey (Monkul Borey PH, Serey Sophorn RH, O Chrov RH and Thmor Pourk RH) and Pursat (Sampov Meas PH)
- 9- From 19th to 20th December 2016, at Battambang PHD, there is 5 OI/ART sites from Battambang (Battambang PH, Maung Russey RH, Thmorkol RH, and Sampov Loun RH) and Pailin (Pailin PH)

4.2.3. Supervision

A main objective of supervision is to monitor and follow up the performance of collaborative TB/HIV activities and provide job coaching at sites visited if there is mistake or misunderstanding during the implementation. The activities were jointly conducted by both national programmes in collaboration with US-CDC to provinces where 3Is strategy is being implemented.

The challenges found to be addressed in the field are: 1/difficult to collect sputum from PLHIV who have symptom screening positive with dry cough; 2/OI/ART site without Xpert machine and no budget of transportation of specimen of PLHIV to Xpert sites; 3/workload for the staff at the field; and 4/shortage in number and knowledge of staff or physicians who are working at OI/ART and TB as well.

4.2.4. TB/HIV Data :

HIV / AIDS Among TB Patients 2016									
Quarter	Number of TB cases registered for treatment (including HIV+)	Number of TB Cases Registered for treatment (excluding HIV+)	Number of Known HIV+ before TB treatment	Number of TB Cases Referred to VCT for HIV testing	Number of TB Cases tested for HIV at VCT	HIV+	HIV -	CPT	ARV
1	8,347	8,192	155	7,180	7,052	46	7,006	207	207
2	8,101	7,973	128	6,804	6,698	35	6,663	161	161
3	9,136	8,992	144	7,258	7,426	36	7,390	177	177
4	8,152	8,002	150	7,096	7,022	27	6,995	163	163
Total	33,736	33,159	577	28,356	28,198	144	28,054	708	708

Percentage of registered unknown HIV status TB patients referred and tested for HIV (tested on sites mostly at health centers where the activity has been implemented in the middle of 2014) was increased gradually from 54%

in 2008 to 70.59% in 2009, to 79.28% in 2010, to 81% in 2014, to 82.77% in 2015 and to 85% in 2016. HIV positive TB patients who received Cotrimoxazole Preventive Therapy (CPT) increase from 65% in 2010 to 92% in 2015 and to 98.2% in 2016. Anti-Retroviral Treatment (ART) among TB/HIV patients also increase from 45% in 2010 to 92% in 2015 and to 98.2% in 2016.

Proportion of registered TB patients who were tested and recorded the result of HIV in the TB register is 85.30% (28,775/33,736).

INH Preventive Therapy for people living with HIV/AIDS who are not likely having TB disease is increasing from 172 in 2010 to 1,043 in 2011. Since the mid of 2014 we start introduce IPT for all PLHIV (new and ART clients) the number of PLHIV who are unlikely to have TB disease is increasing from 767 in 2014 to 954 in 2015 and to 2,379 in 2016.

TB Among PLHIV 2016									
Quarter	Number of HIV + clients registered at VCCT	Number of HIV+ clients at VCCT referred to OI/ART service for TB screening	Number of HIV+ clients screened TB at OI/ART	PTB		EPTB		Total	Number of HIV+ received IPT
				BK+	BK-	BK+	BK-		
1	883	639	829	42	57	10	27	136	1,013
2	834	548	996	53	62	3	51	169	661
3	1,006	659	1,050	61	73	15	34	181	332
4	866	558	680	35	57	0	32	124	373
Total	3,589	2,404	3,555	191	249	28	144	610	2,379

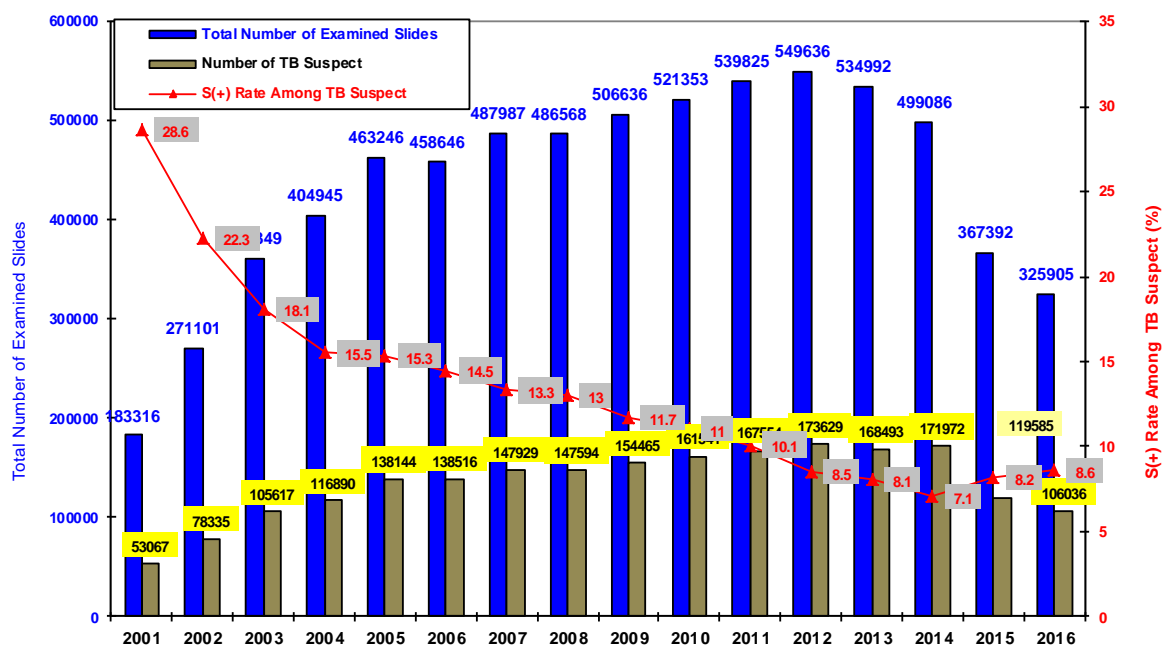
4.3. Diagnosis by Bacteriological Examination

4.3.1. Diagnosis by Smear Microscopy

The total number of slides that National Tuberculosis Program used for TB smear examination in 2016 was 325,905 (detection and follow up), of which 305,127 slides were for detection. The positivity rate among smear examination for case detection was 8.6%.

To strengthen the quality of sputum examination, NTP has conducted the crosschecking by re-examining the read slides. This is one of the laboratory quality assurance activities. Results showed that agreement rate was 98.6% with false positive and false negative rates of 1.6% and 1.4% respectively for year 2016.

Below chart is yearly smear microscopy report from 2001 to 2016

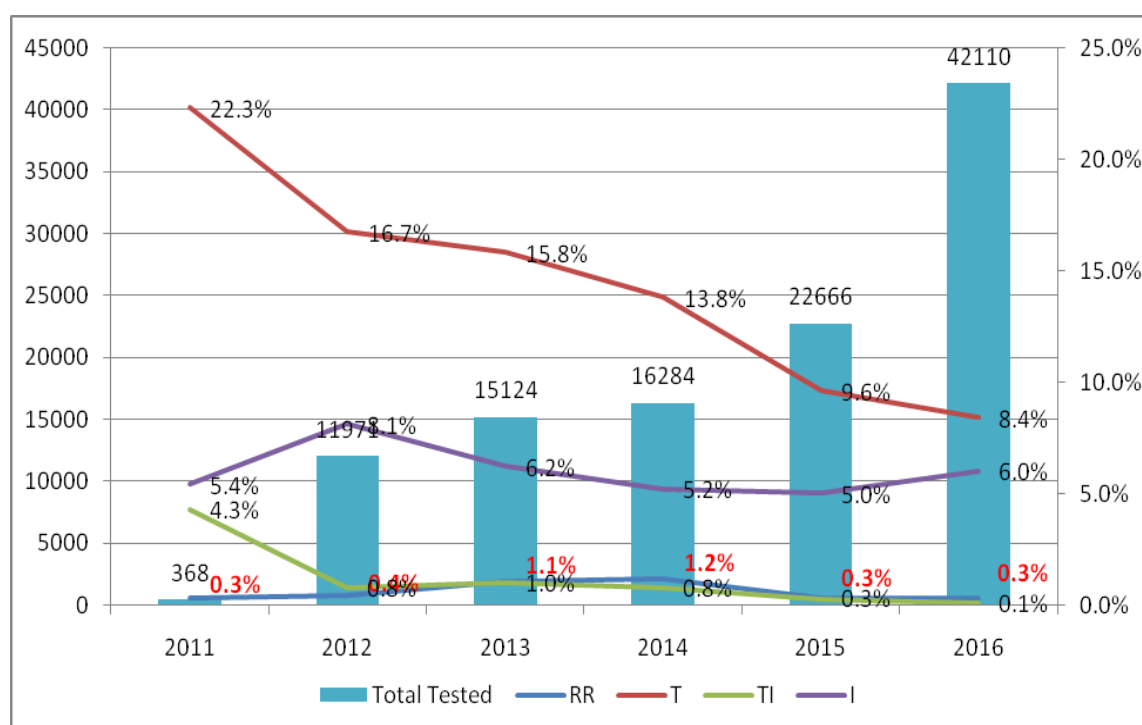


4.3.2. Diagnosis by GeneXpert, Xpert MTB/RIF

New diagnostic tool is GeneXpert machine, which had the tests called Xpert® MTB/RIF has put into operation in the country in 2011 after an official authorization from the World Health Organization in late 2010 and currently the 75 sets have been using. Among these 75 sets, 69 sets (at 64 sites) are used for routine activities.

This test is simple, highly effective and gets results faster for less than two hours. This new tests is not only detected susceptible TB but it also can detect Rifampicin resistant. Based on their specific characteristic, NTP decided to roll out these machines to use for case detection among the group of presumptive MDR-TB, the group of PLHA, the group of high risk population (elderly over 55 years old, close contact with smear positive PTB, Diabetic, and PLHA) and for Active Case Finding activities. The utilization of tests increases year by year, i.e. in 2016, national program used 42,110 tests with the results as following: Rate of MTB detected and Rifampicin resistant detected (RR) 0.3%, MTB detected and Rifampicin not detected (T) 8.4%, MTB detected and Rifampicin resistant indeterminate (TI) 0.1% and test Error (I) 6%.

Below chart is yearly Xpert MTB/Rif report from 2011 to 2016



4.3.3. TB Culture and Drug Susceptibility Testing

In late 1999, NTP under the technical assistance from JICA introduced TB culture with solid medium. Step by step and in recently, the capacity to culture on liquid medium (MGIT) and rapid method to make identification for MTB started up in 2011 at the National Center for TB and Leprosy Control, Battambang TB Laboratory and 2014 at Kampong Cham TB Laboratory.

The first line Drug Susceptibility Testing by using liquid medium (MGIT) was evaluated and introduced at National Center (CENAT) and later at Kampong Cham TB Laboratory (2014). The second line Drug Susceptibility Testing by using liquid medium (MGIT) was evaluated by the supranational TB reference laboratory from Research Institute of Tuberculosis of Japan (RIT) and was put into service since 2014.

In 2016, three culture center laboratories (CENAT, Battambang and Kampong Cham) received 5,281 specimens to do culture for TB with positive rate of 11.6%.

4.3.4. Training

In 2016, National TB Laboratory conducted several training courses as following:

1- We conducted training course on utilization of GeneXpert machine to laboratory staff from 39 sites newly equipped with GeneXpert machine

and 2 to 3 participants from each site were invited to attend the course. This course was supported by Global Fund.

2- We conducted 3 refresher training courses on smear microscopy by using fluorescent microscopy to 39 participants. These training courses were supported by CoAg. CENAT/USCDC.

3- We conducted 2 refresher training courses on utilization of GeneXpert machine to 40 participants. These courses were supported by CoAg. CENAT/USCDC.

4.4. Childhood TB

Childhood TB is one of the priority of NTP. There were 5,186 childhood TB cases nationwide notified and treated in 2016.

After JATA has ended by 2014 its TB CARE I project funded by USAID and implemented in 27 ODs, NTP has maintained and strengthened childhood TB activities in 25 ODs supported by USAID, most of them are former ODs implementing childhood TB under TB CARE I project.

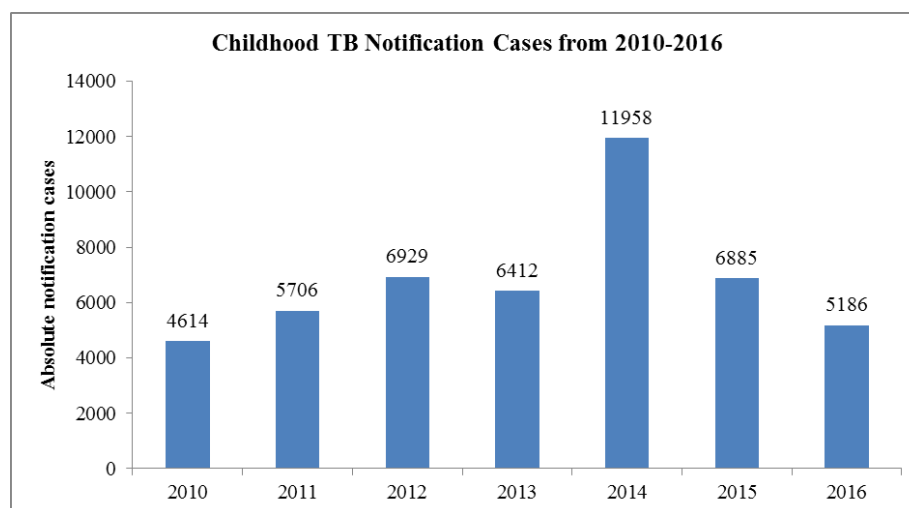


Figure 1: Childhood TB Notification cases in 2010-2016

Currently, childhood TB activities supported by USAID has been implementing by FHI-360 under Challenge TB project collaborated with ECH project. This project has been implementing childhood TB activities in 25 ODs of the 10 provinces namely Battambang, Pursat, Kampong Chhnang, Kampong Thom, Kampong Speu, Prey Veng, Svay Rieng, Kampot, Kampong Cham, and Tbong Khmum. Challenge TB project collaborated with ECH project supported contact investigation activity to identify TB suspected children and refer them to referral hospital for TB diagnosis. Childhood TB is becoming a routine activity in community and health center/referral hospital. As a result, through contact investigation, the project has notified 2,299 childhood TB cases, which equal to 44 % of the country's total 5,186 childhood TB cases in 2016. The number of children under five years old received IPT increases compared to 2015 (see figure below).

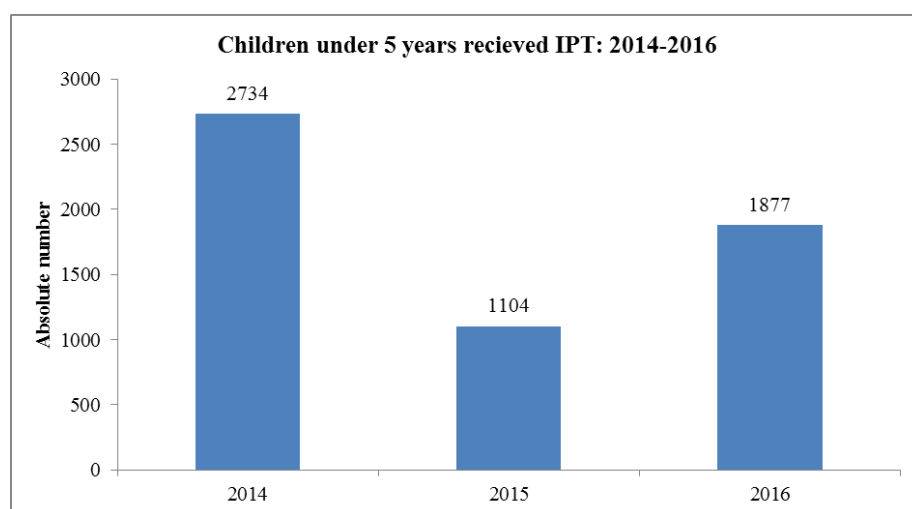


Figure 2: Children under 5 years old received IPT in 2014-2016

Challenge:

Challenge TB and ECH prefects that collaborate with NTP will end by the end of 2017. Meanwhile, grants for supporting TB program from 2018 onward remains uncertain and is not yet committed by other partners.

4.5. Financing

The National Tuberculosis Program has clearly identified a 7-year National Strategy Plan (2014-2020) by thoroughly consultation with all concern partners and financial gap was also clearly shown. In average, the need of NTP is about US\$35 million per year. Based on this National Strategy Plan, budget plan for 2016 was developed. NTP is trying to negotiate with all potential partners for program financing.

From April 2009 to the end of 2014, National Center for Tuberculosis Control has become a Principal Recipient (PR) for the Global Fund to Fight with AIDS, Tuberculosis and Malaria (GFATM) for TB grant round 7 and managed the financing of 11 Sub-Recipients (11SRs). From 2015 to 2017, CENAT still continue as a PR for The Global Fund under New Funding Model (NFM) with the total funding amount about US\$15.6 million and managed the financing of 5 Sub-Recipients (5SRs). In late 2016, CENAT has been informed by the Global Fund that, the Global Fund will allocate fund to TB program in Cambodia about US\$13.8 million for the next three years funding cycle 2018-2020. CENAT is currently developing this funding application to submit to the Global Fund by 23rd May 2017.

USAID is supporting NTP under the two projects, namely “Challenge TB” implemented by FHI-360 and “Empowering Community for Health (ECH)” implemented by RACHA. US-CDC is also continuing its funding support to NTP.

In addition to these grants from development partners, Royal Government of Cambodia is increasing fund allocation from National Budget to TB program. In 2016, NTP received funding support from four main sources, namely National Budget, The Global Fund, USAID/US-CDC, and TB Drugs and equipment from GDF/Stop TB Partnership.

However, the funding that NTP can mobilize may not be sufficient for more aggressive TB control to meet the new direction since some projects will end by 2017.

4.6. TB Drugs, Reagents, and Consumables

Anti-TB drugs, reagents, and consumables are key elements of the National TB Program. An uninterrupted supply of anti-TB drugs, reagents, and consumables is necessary for the sustained provision of quality TB diagnostic and treatment services through DOTS in all service delivery facilities nationwide. It promotes better patient care, improves the public health services' credibility, and increases the patients' trust and more participation in the program. Ensuring uninterrupted of TB drugs, reagents, and consumables leads to better treatment success and reduces TB deaths.

NTP closely collaborates with Ministry of Health (MoH)'s Department of Drug and Food (DDF) and Central Medical Store (CMS); and TB partners to thoroughly monitor stock situation, distribution and utilization of anti-TB drugs through quarterly report of NTP, monthly report of CMS and system management of drugs of DDF in order to ensure the uninterrupted supply and proper management of good quality of anti-TB drugs, reagents and consumables to TB networks.

In 2016, NTP received First Line Drugs (FLD) for treating adult TB patients from Global Drug Facility (GDF) which is the last grant. In 2017, NTP will also receive FLD for adult from United States Agency for International Development (USAID) under Bridge Financing Project through Stop TB Partnership/GDF for the first tranche with the quantity of 11 months of the annual need, and National Budget will also contribute 30% of the annual need.

Meanwhile, under the Global Fund New Funding Model (GF-NFM) grant, NTP received childhood anti-TB drugs 5 shipments, Second Line Drug (SLD) 1 shipment for drug resistance TB treatment, diagnostic tool such as Xpert machines, and chest X-ray films.

In addition, NTP received some SLDs for drug resistance TB treatment and childhood anti-TB drugs from national budget in 2016.

NTP always sends its officers to attend regular drug management meetings organized by relevant departments of Ministry of Health to report TB drug management activities of the national program and obtain information on the current national drug management update.

4.7. TB Infection Control

In Collaboration with US-CDC, the NTP successfully performed the following activities related to strengthening TB infection control (TBIC).

Since 2014, the NTP implemented TB IC in 17 hospitals, including 7 hospitals in 2016. Under this project, the NTP conducted a baseline assessment, conducted trainings, developed supervisory checklists, quarterly supervisory visits combined with progress review workshops, supplied personal protection equipment, displayed appropriate posters, and created general awareness at these hospitals. In addition, the NTP updated the chapter on infection control in the MDRTB guidelines and assessed the physical infrastructure and supplies for infection control at almost all of the 11MDR TB hospitals in Cambodia.

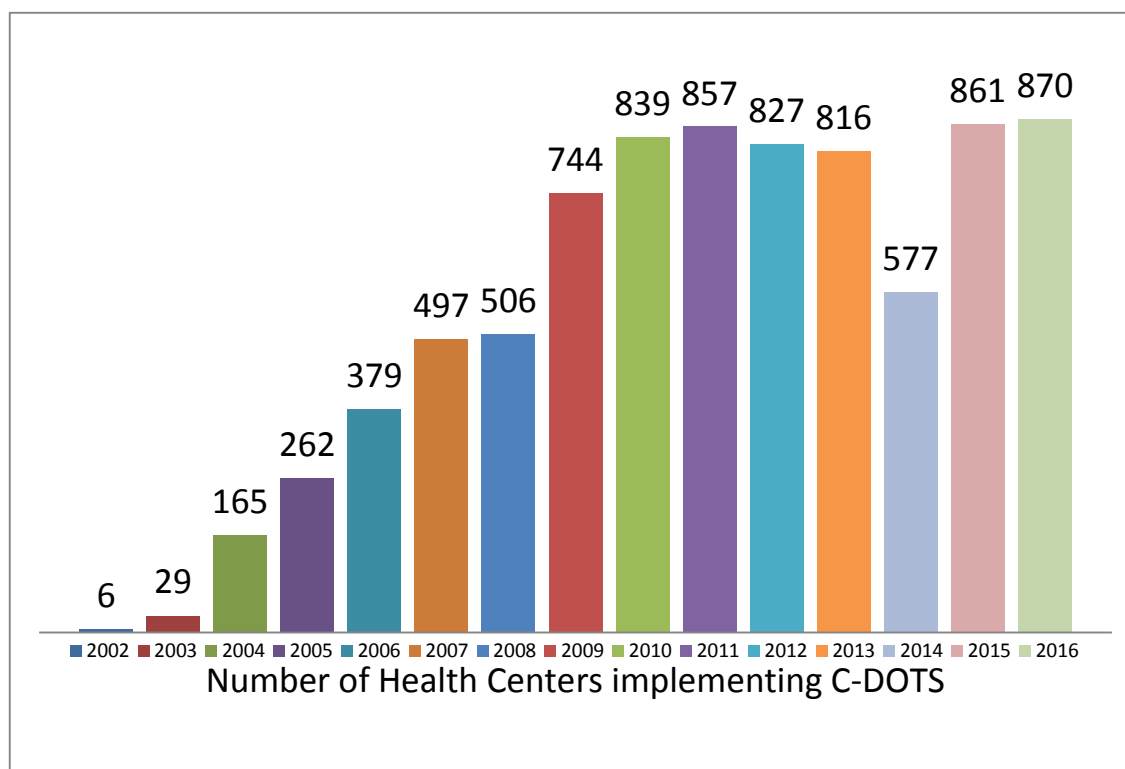
After implementation, NTP reassessed the status of infection control in 2016. Areas assessed were in-patient wards and outpatient departments, X-ray units, intensive care units and TB laboratories. Compared with the results from the baseline assessment, the implementing hospitals showed many positive changes. Each hospital had established or reactivated dormant infection control committees. The hospitals were screening TB suspects and patients and separating them systematically at the inpatient wards and outpatient departments (OPDs), most of the TB care areas had doors and windows opened for natural ventilation. The hospitals were maintaining UVGI fixtures and lamps appropriately. Access, donning and storage of N95 masks were adequate. Waiting areas and in-patient and outpatient departments had well-displayed posters on infection control.

4.8. Community DOTS

Strengthening and scaling up the Community DOTS is one of the NTP priorities in order to bring DOTS service closer to the community to achieve case detection and treatment outcome. The purpose of the Community DOTS implementation is to improve case finding through referral of TB suspects to Health Center or Referral Hospital by community volunteers and to provide anti-TB drugs to patients who are unable to take anti-TB drugs every day at public health facilities.

As shown in the table below, the number of health facilities implementing Community DOTS varied from year to year according to the support from NGO TB partners and donors.

In 2016 there are 870 HCs implementing Community DOTS in 62 Operational Districts under financial support from Global Fund (5 SRs namely CHC, CRS, HPA, Op-ASHA, and RHAC) and USAID (FHI-360's Challenge TB and RACHA's ECH).



There are some constraints and challenges in the implementation of Community DOTS. Insufficient funding limits the implementation of community DOTS at all levels. There is limited motivation for VHSGs/DOT Watchers as well as for TB supervisors and HC staff. The insufficient resources cause limited capacity of frontline TB health workers. This challenge will need us to do more efforts. The different strategies in community DOTS implementation of partners is another challenge. Moreover, there are other challenges such as turn-over of trained TB staff at health center, limited capacity of TB health workers, and seasonal migration of VHSG/DOT Watchers for employment. These challenges need to be solved on time in order to make community DOTS sustainable.

4.9. Public-Private Mix DOTS

Public-Private Mix DOTS (PPM-DOTS) is collaboration between NTP and public and private healthcare providers to promote DOTS service. This approach aims to strengthen the referral of TB suspects from the private sector (including pharmacy, consultation room, private clinics etc.) to public health facilities for appropriate TB diagnosis and treatment. In collaboration with many NGOs and International partners, NTP has intensified the implementation of PPM-DOTS since its start in 2005 up to 2014. TB CARE I project that supported this activity has ended at the end of 2014 and this activity had not been continued in 2015 and 2016 due to lack of funding support from donor.

Table: Summary Table of PPM-DOTS: 2005-2016

Year	Number of province	Number of OD	PPM-DOT implementer	TB Suspects referred from private	TB Suspects received by public	TB patients diagnosed among suspects referred from private	Referral success rate	Yield per referral (all forms)
				(a)	(b)	(c)	(b)/(a)	(c)/(a)
2005	2	3	287	314	242	46	77%	15%
2006	8	15	755	1989	1154	244	58%	12%
2007	11	38	980	5562	2763	533	50%	10%
2008	11	38	1690	4212	1882	301	45%	7%
2009	10	38	1735	9781	5540	769	57%	8%
2010	10	37	1735	7612	4280	851	56%	11%
2011	10	37	1547	5024	2920	691	58%	14%
2012	10	35	1919	4589	3130	763	68%	17%
2013	10	35	1696	6392	3919	660	61%	10%
2014	8	30	1187	3049	2148	465	70%	15%
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0

In response, NTP is making an effort to mobilize resources in order to resume PPM-DOTS activity.

4.10. TB in Congregational Settings

In recent years, the NTP has focused on case finding in congregational settings such as prisons and factories where TB transmission is high.

4.10.1. Prisons

With strong support from the MoH and the Ministry of the Interior, and in close collaboration with the Prison Department and other partners, great progress has been made in prison TB control. The activities include TB health education for prisoners and referral of TB suspects to public health facilities for diagnosis and for subsequent treatment at prison health post with DOTS approach. Table 16 depicts the increasing TB control activities in prison in recent years. The number of prisons implementing TB control activities increased from 8 in 2009 to 26 in 2015 and remains 17 in 2016. In 2016, we have 2 partners were doing TB in prison one is Challenge-TB supported 10 prisons and CARITAS supported 7 prisons. Through passive and Active case finding, 139 TB cases detected including 2 TB/HIV cases.

Table: TB Control Activities in Prisons: 2009-2016

Year of Implementation	Number of Prisons	TB Cases Detected	TB/HIV Cases Detected
2009	8	203	26
2010	11	315	26
2011	19	342	19
2012	19	368	8
2013	22	299	7
2014	26	229	12
2015	26	191	4
2016	17	139	2

4.10.2. Factories and Enterprises

Factory and enterprises are ideal for TB transmission as employees work together in close area and have high interaction with others. NTP in collaboration with Occupational Health Department of Ministry of Labor and Vocational Training, and with the support from partners especially from CATA, has been implementing DOTS pilot project in 6 factories and enterprises in 2007.

The main activities are to strengthen capacity of health staff who are working at infirmary of factories and enterprises that refer TB suspects to health centers for diagnosis, to conduct supportive supervision, and quarterly meeting that aims to motivate staff and to prepare plan for the coming quarters. Currently, 13 factories and enterprises have been providing TB-DOTS services at their workplaces. This activity reduced one factory compared to 2015, due to one factory was closed and the external support from ARC ended.

A summary of TB control activities in factories and enterprises (2007-2015) are shown in table below. The table shows that the number of workers covered by the activities has some fluctuations by from year to year. In recent years, the number of TB suspects referred was in the range of 70-150 cases and TB cases detected was around 10-24 cases.

Table: TB Control Activities in Factories and Enterprises: 2007-2016

Year of implementation	Number of workers	TB suspects referred	TB cases detected	Yield per population (per 100 000)	Yield per referral (%)
	(a)	(b)	(c)	(c)/(a)	(c)/(b)
2007	10900	44	6	55	14%
2008	22701	149	22	97	15%
2009	15740	102	10	64	10%
2010	21077	99	24	114	24%
2011	25171	107	15	60	14%
2012	25881	127	16	62	13%
2013	22575	145	17	75	12%
2014	19402	139	11	57	8%
2015	20402	144	14	69	10 %
2016	18443	68	10	54	15%

4.11. Hospital Linkages

National Center for Tuberculosis and Leprosy Control, with support from Challenge TB (CTB) project, has supported five hospitals to implement the hospital linkage approach, namely Battambang, Maung Russey, Sampov Meas, Kampong Speu, and Korng Pisey. TB symptom screening was introduced in all departments within the hospitals including out-patient (OPD) and in-patients departments (IPD), pediatric and diabetes (DM) clinics. Cough triage has been deployed in all out-patient departments of the five referral hospitals. Cough triage and FAST (Find Actively, Separate Safely and Treat) strategy have been implemented in those five referral hospitals. Patients who are coughing are separated and provided with masks. All presumptive TB patients are referred to TB ward for further investigation. Under CENAT leadership, Challenge TB collaborates with partners to include four main TB symptoms in the IPD and OPD medical forms and cough in the triage form and now these documents are being used in the implementing hospitals.

From January to December 2016, 151,452 clients presented at an OPD and IPD. Of those who have TB sign and/or symptom were then referred for TB diagnosis at TB units within the hospitals. Among the screened patients, 2,899 were diagnosed as TB and put on treatment.

TB case detection in five hospitals:

Name Hospital	OPD and IPD	TB all forms	Bacteriologically Confirmed TB	Clinically Diagnosed Pulmonary TB	Extra Pulmonary TB
Battambang	44,581	657	228	180	249
Maung Russey	20,021	599	41	463	95
Sampov Meas	28,562	161	42	59	60
Kampong Speu	40,279	553	172	266	115
Korng Pisey	18,009	923	74	554	295
Total	151,452	2,893	557	1,522	814

Coverage areas: Battambang, Maung Russey, Sampov Meas, Korng Pisey and Kampong Speu. National program is evaluating the pilot project. The findings will be used to improve the strategies and approaches as well as to apply this model at other hospitals from 2017 onwards.

4.12. Summary of Active Case Finding Project

CATA had implemented Active Case Finding from 03 March 2016 to 01 November 2016, under the grant funded by USAID/FHI360. This project was implemented among Elderly aged 55 and over and high-risk population in community. This ACF intervention was implemented in 10 districts (of 5 provinces): OD Bakan, OD Sampovemeas (included new OD Kravanh and OD Krakor), OD Kampong Speu, OD Prey Chhor, OD Chamkarleu, OD Srey Santhor, OD Preahnet Preah and OD Kralanh. The project's target population was elderly aged from 55 years old and other vulnerable population. The CATA's mobile team equipped with semi-digital X-ray machine and X-pert MTB/RIF assay visited each health center (HC) in the target areas as planned schedule.

The trained Village Health Support Groups (VHSG) visited door-to-door the population in their villages and listed up those with TB symptoms. Not all the symptomatic people were listed but it was limited depending on the corresponding number of the population in each village. A few days before the event, the VHSGs have to report the number of TB suspects in their village to HC staff so that they know in advance and could arrange it to not exceed 200 cases per day. On the appointed date, the TB suspects were referred to the HC where the CATA's team was ready for screening. They were re-interviewed before Chest X-ray screening and those with Chest X-ray positive (active or suspect) have had their sputum collected to test by X-pert MTB/RIF assay.

A total of 29,972 people referred, which resulted in the symptomatic screening of 18,658 (62.5%) symptoms positive. 11,704 (62.7%) elderly aged 55 and over have been screened by CXR which resulting 6.7% active for TB, 3.0% suspect for TB, and 19.7% heal from TB. Only 1.8% were other lung diseases and 0.7% heart diseases.

A total of 2,622 people provided sputum specimens for testing, which resulted in the detection of 460 (32.5%) Xpert tested positive. Only 4 of the Bac+ results (0.9%) were resistant to rifampicin. More than 74% of the people tested with the Xpert MTB/RIF assay were aged 55 or over and most of the people tested. The total of TB case all forms was 1,414 included 460 Xpert positives (4 Rifampicin resistant) and 91 EP TB patients starting treatment for TB and being report to NTP.

4.13. Collaborative DM-TB Services

Introduction:

In collaboration with Health and Social Development (HSD), National Center for TB Control (CENAT) has been implemented collaborative TB/DM services in Prey Veng province (Pearaing OD) and Siem Reap province (Siem Reap and Sotnikum ODs).

Diabetes mellitus is a known risk factor for tuberculosis (TB), but no studies have been reported from South-East Asia, which has a high burden of TB and a rapidly growing prevalence of diabetes. In 2013, CENAT, NCD and URC in Cambodia conducted a rapid assessment on burden of DM and TB comorbidity in Siem Reap and Prey Veng provinces. The Result showed that the prevalence of DM among TB patients in Siem Reap and Prey Veng was 7% & 5% respectively. This prevalence is higher than the prevalence of DM among general population (9.2%)¹. The prevalence of TB among DM was also high, about 6 folds higher than TB prevalence in general population.

Since 2014, under the support from WDF, HSD has implemented a project to improve DM-TB bi-directional screening, diagnosis and treatment of people with DM-TB comorbidity in three ODs: Pearaing, Siem Reap, and Sotnikum.

Project goal and objectives:

Goal: reduce mortality and morbidity for patients with co-morbidity of DM and TB through prevention, early detection and improving quality of care

Specific objectives:

- Strengthen public health system capacity in diabetes diagnosis and case management
- Integrate diabetes screening with TB services and TB screening in diabetes service delivery provided by public health facilities
- Increase patients' awareness about diabetes/TB co-morbidity

Project Key Partners:

HSD works closely with both National NTP and NCD programs particularly with provincial and district team to implement the project activities.

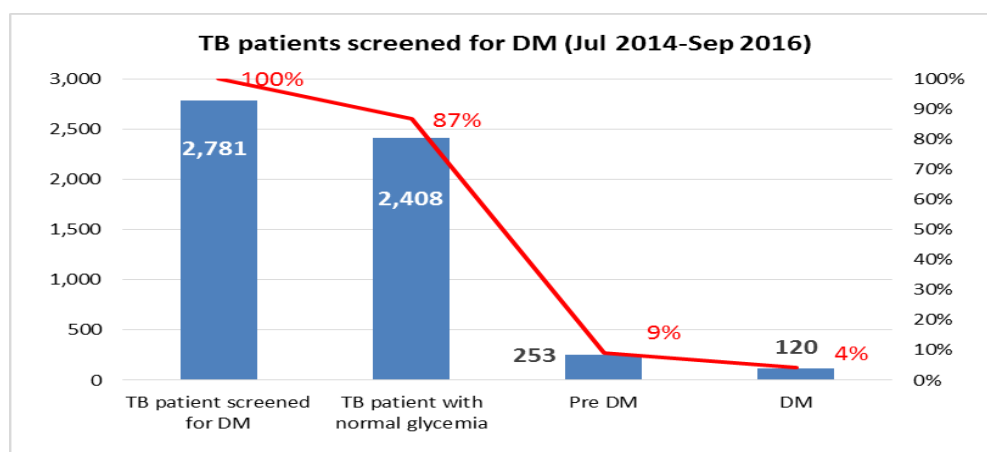
¹ Prevalence of non-communicable disease risk factors in Cambodia (STEPS Survey, Country Report, September 2010)

Key results: (From July 2014 to September 2016)

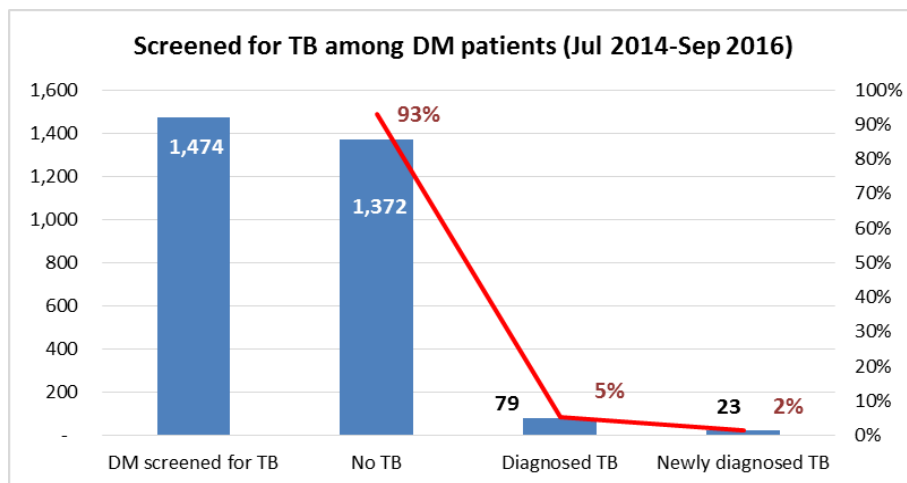


Honourable guests attending annual-project dissemination workshop in September 2016 (Photo by HSD)

- Annual Dissemination Workshop:** the dissemination workshop was conducted 2 times and the participants to attend the workshop are from provinces where the project is implemented. The main objective of the meeting is to share experience among implemented sites and discuss to address challenges during the operation and also to raise the way forward for future plan of activities.
- Capacity building:** DM-TB technical working group has been established and meet on a regular basis. HSD supports capacity building on DM-TB comorbidity case management to counterpart staff. In addition, the project strengthens capacity of DM data collection and data entry to the existing OD data system.
- TB patient screened for DM:** Registered TB patients are screened for DM by glycemia test at health facilities. All 2,781 TB patients (100%) are tested and 2,408 patients (87%) found not to be DM (normal glycemia) and 253 patients (9%) are found to be pre-DM and 120 TB patients found to be DM.



- **DM patient screened for TB:** at diabetes clinic, DM patients are screened for TB. 1,474 DM patients are screened and we found that 1,372 patients (93%) have no TB and 79 patients (5%) found to be TB (known TB before DM) and 23 patients (2%) are newly diagnosed TB. All co-morbidity TB/DM are referred for appropriate care and treatment.



- **Increase patients' awareness about diabetes/TB co-morbidity:**
TB education for diabetes patients, world diabetes day,
Community awareness and project dissemination workshop

Challenges:

- No clear responsibility at district level
- Limited decentralization of DM care to health facility
- Equipment and materials for DM diabetic diagnosis among TB patients at health facility level is limited
- Limited human resource for TB/DM clinic is limited
- Network for TB/DM comorbidity is still limited
- Financial barrier to DM care

Way forward:

- Continue and expand current DM-TB bi-directional screening activities. Four more ODs will be added in this second phase (Cheung Prey, Memut, Daunkeo, and Kirivong)
- Add diabetes foot and wound screening and care to the current activities

4.14. Advocacy, Communication and Social Mobilization

Advocacy, Communication and Social Mobilization (ACSM) is an integral part of the TB control program. The NTP always ensures that various ACSM approaches are included in the contents of refresher trainings and workshops.

Due to financial resource constraints, a very limited number of IEC materials were produced in 2016. However a notable success was that the NTP, in collaboration with partners including USAID, FHI360, JICA, HSD, US-CDC and Op-ASHA produced IEC materials such as poster, educational leaflet on general TB adult and children awareness, MDR-TB, Prevention Infection Control, TB-Diabetic. To overcome the limitations in the available funds and to further strengthen the ACSM activities in the country, the NTP will intensify its plans for future resource mobilization.

4.15. Research

Research activity is one of the national TB control program's priorities. We have started to develop a protocol and plan for conducting third national drug resistance survey which will be implemented in the middle of 2017. This survey has been supported by Global Fund, Challenge TB, and US-CDC.

Also in 2016, NTP has developed an operational research on Childhood TB, which is supported by the Global Fund. This study is also cooperated with National University of Singapore, and will conduct field operation in 3rd quarter 2017.

The National TB Control Programme (NTP) is discussing with National University of Singapore to explore/select the study topics for the period 2017-2018.

5. Targets for 2017-2020

- Maintain the treatment cure rate of over 85%
- Detect all forms of TB: 40,400 cases (255 per 100,000 population)
- Detect bacteriologically confirmed TB: 13,077 cases (83 per 100,000 population)
- Detect Childhood TB: 7,456 cases
- Detect MDR-TB cases: 155 cases
- Conduct the third round of national drug-resistant survey
- Promote intensified case detection through active and semi-active case findings

Main Indicators and Targets for 2017-2020

Indicators	Target			
	2017	2018	2019	2020
Number of all TB cases notified to NTP	40,400	40,500	40,600	40,700
Number of bacteriologically confirmed patients detected each year	13,077	12,750	12,432	12,121
Number of childhood TB cases notified by NTP	7,456	7,638	7,820	8,000
Number of RR-TB /MDR-TB cases notified by NTP	155	160	165	170

6. Acknowledgement

With the support from the Royal Government of Cambodia and Ministry of Health, NTP has achieved tremendous results. The Royal Government of Cambodia and Ministry of Health of Cambodia has given high priority to TB Control. The above achievements are also contributed by active participation from all healthcare workers across the country with the supports and collaboration from various partners. These partners include local authority, community, volunteer, technical and financial supports from non-governmental and international organizations.

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- NGO/IO partners especially WHO, Global Fund (GFATM), USAID, UD-CDC, Stop TB Partnership/GDF, TB-REACH, JICA, OIs and NGOs for their both technical and financial supports to NTP.
- Local authority, community, and volunteer as well as other partners for their supports and collaboration.

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